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December 19, 2011

Dr. Kenneth Hill
Chairman
Tennessee Regulatory Authority
460 James Robertson Pkwy.
Nashville, TN 37243-0505

Re: ***Petition of Piedmont Natural Gas Company, Inc, For Adjustment to its Rates***
Docket No. 11-00144

Dear Chairman:

Please accept for filing the attached pre-filed Direct Testimony of the Consumer Advocate in the above-referenced docket. This information was previously filed under seal out of an abundance of caution due to the large volume of financial information Piedmont Natural Gas Company, Inc. ("Piedmont", "Company") deemed "confidential" under the protective order entered in this docket.

The Consumer Advocate and the Company have worked together to ensure that this information be made public, with the exception of one footnote (no. 5) in the Direct Testimony of William H. Novak and all workpapers related to Dave Peters' Direct Testimony, which will remain under seal.

Sincerely,

Ryan McGehee
Assistant Attorney General
(615) 532-5512

cc: all parties of record in Docket 11-00144

BEFORE THE TENNESSEE REGULATORY AUTHORITY
NASHVILLE, TENNESSEE

Petition of Piedmont Natural Gas	)	
Company, Inc. for an Adjustment to Its	)	
Rates, Approval of Changes to Its Rate	)	DOCKET NO. 11-00144
Design, Amortization of Certain Deferred	)	
Assets, Approval of New Depreciation	)	
Rates, Approval of Revised Tariffs and	)	
Service Regulations, and Approval of a	)	
New Energy Efficiency Program and GTI	)	
Funding.	)	

PRE-FILED DIRECT TESTIMONY OF

CHRISTOPHER C. KLEIN, PH.D.

ON BEHALF OF THE TENNESSEE ATTORNEY GENERAL
CONSUMER ADVOCATE AND PROTECTION DIVISION

DECEMBER 6, 2011

Before the

TENNESSEE REGULATORY AUTHORITY

IN RE:	)	
PETITION OF PIEDMONT NATURAL GAS COMPANY, INC., for an Adjustment to Its Rates, Approval of Changes to Its Rate Design, Amortization of Certain Deferred Assets, Approval of New Depreciation Rates, Approval of Revised Tariffs and Service Regulations, and Approval of a New Energy Efficiency Program and GTI Funding	)	**DOCKET NO. 11-00144**

AFFIDAVIT

I, Dr. Christopher C. Klein, Regulatory Economist, on behalf of the Consumer Advocate Division of the Attorney General's Office, hereby certify that the attached Direct Testimony represents my opinion in the above-referenced case and the opinion of the Consumer Advocate Division.

Christopher C. Klein

CHRISTOPHER C. KLEIN

Sworn to and subscribed before me
this 1st day of Dec, ~~2009~~ 11

Angela A. Ray
NOTARY PUBLIC

My commission expires: 2-22-15

ANGELA A. RAY
STATE OF TENNESSEE NOTARY PUBLIC
RUTHERFORD COUNTY
MY COMMISSION EXPIRES:
February 22, 2015

BEFORE THE TENNESSEE REGULATORY AUTHORITY
NASHVILLE, TENNESSEE

December 6, 2011

DOCKET NO. 11-00144

PRE-FILED DIRECT TESTIMONY AND EXHIBITS OF
DR. CHRISTOPHER C. KLEIN

Q. Please state your name and your current position.

A. My name is Christopher C. Klein and I am an Associate Professor in the Economics and Finance Department at Middle Tennessee State University (MTSU) in Murfreesboro, Tennessee.

Q. What is your educational background?

A. I received a B. A. in Economics from the University of Alabama in 1976 and I received a Ph. D. in Economics from the University of North Carolina at Chapel Hill in 1980.

Q. What is your professional experience involving regulated industries?

A. I was employed as an Economist in the Antitrust Division of the Bureau of Economics at the Federal Trade Commission (FTC) in Washington, D.C., for six years starting in 1980. In 1986, I was hired as the first Economist for the Tennessee Public Service Commission (TPSC). Although my title changed over the years, I functioned as the Chief Economist for the TPSC and, after 1996, the Tennessee Regulatory Authority (TRA), until August of 2002, when I assumed my current position with MTSU.

Q. What were your duties at the FTC?

A. I performed the economic analysis in antitrust investigations involving more than 20 industries and contributed to staff reports on mergers in the petroleum industry, competition in grocery retailing, and the economics of predatory or sham litigation.

Q. What was your primary responsibility at the TPSC?

A. I was an expert witness for the staff of the TPSC in rate cases and other similar proceedings involving telecommunications, natural gas, electric and water utilities, as well as motor carriers. I testified in 36 dockets before the TPSC on the issues of cost of capital, rate design, and competitive effects. I also filed testimony before the Federal Communications Commission (FCC).

Q. How did your responsibilities change when the TRA supplanted the TPSC?

A. I oversaw the Utility Rate Division and then the Economic Analysis Division. The TRA staff no longer testified in proceedings before the agency, but provided analysis and advice to the TRA Directors. I was responsible for all such advice and analysis provided to the Directors by these Divisions, either individually or in concert with other TRA staff, in all proceedings that came before the agency for resolution. These proceedings included rate cases and tariff filings by public utilities, as well as those associated with the implementation of the federal Telecommunications Act of 1996.

Q. Were you a member of any regulatory committees or boards while you worked for the TPSC and the TRA?

A. Yes. I was a member of the National Association of Regulatory Utility Commissioners (NARUC) Staff Subcommittee on Gas. I was a member of, and Chaired, the Research Advisory Committee to the Board of Directors of the National Regulatory Research Institute (NRRI). I also served on the State Staff of the FCC's Federal-State Joint Board in CC Docket No.80-286 (the "Separations" Joint Board) and as a Group Leader on the NARUC Staff Subcommittee on Accounts Multi-state Audit Team that produced the 1988 Report on Bell Communications Research.

Q. **What is your primary responsibility at MTSU?**

A. I teach classes in the general area of applied microeconomics, including Principles of Microeconomics, Intermediate Microeconomic Theory, Managerial Economics, Economics of Antitrust and Regulation, and Econometrics, as well as undertaking scholarly research, participating in various university committees, and serving on dissertation committees.

Q. **Have you taught at any other universities?**

A. I taught classes in the Economics of Regulation and in Antitrust Economics in the Economics Department at Vanderbilt University for several years while I was employed at the TRA.

Q. **Are you a member of any professional organizations?**

A. I am a member of the American Economic Association, the Southern Economic Association, the Western Economic Association, the Industrial Organization Society, and Alpha Pi Mu: the National Industrial Engineering Honor Society, as well as Beta Gamma Sigma: the International Honor Society for Collegiate Schools of Business.

Q. **Have you published articles in professional or academic journals and presented papers at professional meetings?**

A. More than 30 of my articles have appeared in professional or academic journals such as *Energy Economics*, *Utilities Policy*, *The Electricity Journal*, *The Journal of Applied Regulation* and many others. I have made more than 50 presentations at professional meetings.

Q. **Have you testified before any other governmental bodies in Tennessee?**

A. Yes. I have testified before various committees of the Tennessee General Assembly on regulatory issues, especially telecommunications issues and competition in the telecommunications industry, as well as before the Tennessee Advisory Commission on Intergovernmental Relations and the Tennessee Regulatory Authority. A complete list is provided in my Vita, attached as my Exhibit 7.

PURPOSE OF TESTIMONY

Q. **What is the purpose of your testimony?**

A. I will address the Cost of Capital for Piedmont Natural Gas Company (Piedmont) and recommend an allowed rate of return to be adopted for ratemaking purposes. This includes issues regarding capital structure, cost of debt and cost of equity.

Q. Can you summarize your testimony pertaining to capital structure and cost of debt?

A. Yes. I concur with Piedmont's recommended capital structure and cost of long term and short term debt as presented by Mr. Dzuricky. This capital structure is an average of the company's structure on June 30, 2009, 2010, and 2011. It is very similar to Piedmont's five-year average capital structure shown on my Exhibit 2.

Q. Can you summarize your testimony on cost of equity?

A. I recommend a cost of equity of 9.5% based on the Discounted Cash Flow (DCF) and Capital Asset Pricing Model (CAPM) methods summarized in my Exhibits 3 through 6. I recommend no additional adjustments.

Q. What overall cost of capital do you recommend for use as the allowed rate of return for Piedmont?

A. I recommend an overall weighted cost of capital of 7.61% for Piedmont as shown on my Exhibit 1.

Q. How is your testimony organized?

A. I will address the concept of cost of capital first, then capital structure and cost of debt. This is followed by cost of equity.

COST OF CAPITAL

Q. What do you mean by cost of capital?

A. I mean the rate of return necessary to induce investors to hold the debt and stock of a company. This rate of return should be equal to that available to investors on alternative investments of similar risk.

Q. How is the cost of capital related to the legal principles of determining the allowed rate of return for regulated utilities?

A. The cost of capital concept embodies the economic principles for determining the allowed rate of return set out by the U.S. Supreme Court in *Bluefield Water Works v. P.S.C.* (262 U.S. 679, 1923) and *F. P. C. v. Hope Natural Gas Co.* (320 U. S. 591, 1944). For instance, the Court stated in Hope that, "…the return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital." (320 U.S. 603) In my opinion, the allowed rate of return on the capital employed by Piedmont should be set equal to its cost of capital.

Q. What are the consequences of not setting the allowed rate of return equal to the cost of capital?

A. If the allowed rate of return is set below the cost of capital, then the company's credit rating will fall and its cost of debt will rise. The price of its stock will decline to reflect the lower expected return. Eventually, the company may face difficulties in financing investments in new plant and equipment, causing the quality of its products and services to decline.

If the allowed rate of return is set above the cost of capital, then the firm's stockholders realize a capital gain as the price of the firm's stock rises to reflect the higher return. Moreover, the capital gain is paid for by the firm's customers in the form of excessively high prices.

Clearly, failure to set the allowed rate of return equal to the firm's cost of capital is detrimental to the firm's customers as well as its stockholders.

CAPITAL STRUCTURE AND COST OF DEBT

Q. What was your first step in estimating the cost of capital for Piedmont?

A. My first step was to determine the appropriate capital structure and cost of debt for Piedmont. I started with the capital structure proposed by Piedmont's witness Mr. Dzuricky and compared it to the historical capital structures of Piedmont as shown on my Exhibit 2. The structure proposed by Mr. Dzuricky is the average structure for 2009-2011. This differs only slightly from the five-year historical average structure of Piedmont and the proportions of each component lie within their historical ranges. In this context, Mr. Dzuricky's capital structure likely represents the longer term average capital structure of Piedmont. For this reason, I concur with Mr. Dzuricky's proposed capital structure of 5.87% short term debt, 41.42% long term debt and 52.71% common equity as shown on my Exhibit 1.

Q. Did you apply double leverage to arrive at your recommended capital structure?

A. No. Piedmont is not organized as a parent company with subsidiaries, but as a single corporation with various divisions. Double-leverage is only applied to parent-subsidiary organizations. It is not applicable to Piedmont's corporate organizational structure.

Q. How did you arrive at the cost of debt shown on your Exhibit 2?

A. Again, I started with the cost of long term and short term debt proposed by Mr. Dzuricky. He proposes the weighted average costs as of June 30, 2011. I found these to be reasonable and have adopted them in my recommended capital structure.

COST OF EQUITY

Q. How do you estimate Piedmont's cost of equity?

A. I use the Discounted Cash Flow (DCF) and Capital Asset Pricing Model (CAPM) methods.

Q. Can you explain the Discounted Cash Flow (DCF) method?

A. Yes. The DCF method views investors as valuing a company's stock based on the present value of the cash flows a stockholder expects to receive from owning the stock over an infinite time horizon. These cash flows from stock ownership are just the dividends paid by the company. Consequently, some simple mathematics show that the rate of return an investor expects on stock ownership in a company is the dividend yield for the current period plus the expected growth rate in that dividend. The dividend yield is just the expected dividend divided by the current price of the stock.

Q. Have you computed a DCF cost of equity for Piedmont?

A. Yes. My Exhibit 3 shows this calculation for Piedmont and six similar natural gas distribution utilities selected from Value Line. I start with dividend yields reported by Value Line, as well as more recent yields reported by the *Wall Street Journal*. I use both expected growth in earnings per share and in dividends for the growth rate in the DCF formula. Earnings are the source of dividend payments to stockholders, so earnings growth is often an indicator of dividend growth. For Piedmont, Value Line reports a full complement of growth rates in dividends and earnings that range from 3 percent to 5 percent. Piedmont’s recent dividend yield has ranged from 3.63% to 3.74%. Consequently, the calculated DCF values for Piedmont range from 6.63% to 8.74%. The midpoints of the average DCF ranges for the six natural gas companies are higher at 9.1% and 9.72% respectively.

Q. How did you select the six natural gas utilities for your DCF analysis?

A. I looked for natural gas utilities covered by Value Line’s “Ratings and Reports” that were comparable in size and riskiness to Piedmont. I sought to limit the companies to those with total capital of over $1.0 billion and to eliminate any companies involved in mergers or acquisitions. This procedure led to the same six companies selected by Piedmont’s witness Dr. Murry as comparable to Piedmont. The market capitalization and beta, a measure of riskiness, for Piedmont and the six natural gas utilities are shown on my Exhibit 5.

Q. How does your DCF analysis compare to that of Piedmont's witness Dr. Murry?

A. My DCF analysis for Piedmont yields an overall range of 6.63-8.84%, compared to Dr. Murry's overall DCF range for Piedmont of 6.59-9.15% (Schedules DAM-17 through 20). The slightly higher upper end of Dr. Murry's range is caused entirely by his use of the 52-week low share price for Piedmont which inflates Piedmont's dividend yield over that using current share prices. All of the rest of his DCF calculations for Piedmont fall roughly within the range that I calculate. My average DCF ranges for the six natural gas utilities fall within 7.57-10.95% while Dr. Murry's average DCF values for the six natural gas companies cover a lower range (6.84-9.78%, Schedules DAM-17 through 20).

Q. What do you conclude from the DCF analysis?

A. The midpoints of my average DCF ranges for the six natural gas companies are 9.1% and 9.72%. These are higher than the DCF range for Piedmont, but reflect investor expectations for similar firms as suggested by the Supreme Court in *Hope* (320 U. S. 591, 1944). For that reason, I conclude that the DCF analysis defines a reasonable range of the cost of equity for Piedmont of 9.1% to 9.72%.

Q. Can you explain the CAPM?

A. Yes. In the CAPM, an investor's required return on an investment is based on the relative riskiness of the investment. That is, an investor must be compensated with a higher expected return for investing in a riskier investment. The CAPM begins by estimating the risk premium required on a broad portfolio of common stocks relative to a risk-free asset. This risk premium is then adjusted for a particular stock's riskiness relative to the market – that is, a broad portfolio of stocks. This is done by using the stock's beta, which measures the riskiness of an individual stock relative to the market.

The resulting CAPM cost of equity consists of the risk-free return plus beta times the market risk premium.

Q. How do you estimate the risk premium?

A. I calculate risk premia from *2011 Ibbotson® SBBI®, Stocks, Bonds, Bills and Inflation® Valuation Yearbook,* submitted in response to CAPD discovery request number 1, question 46. I calculate these risk premia by subtracting the income portion of the return on intermediate government bonds and short term bills from the total return on large company stocks. U. S. government bills and bonds are widely considered to have the lowest risk of default of all available debt instruments.

Q. How do you choose the risk-free instrument and the appropriate risk premium?

A. Technically, the lowest risk is associated with very short term Treasury bills, because the short time frame provides the least opportunity for default and little chance that the expected inflation rate will not be realized over the life of the investment. Nevertheless, these short term bills also embody short term returns that may not reflect all factors affecting the expected return on a stock for a multi-year period. If one chooses longer term bonds as the "risk-free" instrument, however, then expected returns over multiple years may be better captured, but more risk is also introduced. This is the risk that the actual inflation rate over the life of the bond may differ from expectations. If this occurs then the real, inflation adjusted, return on the bond also differs from expectations. This inflation risk in a longer term bond raises the necessary return above the risk-free rate. The analyst must then trade-off any bias introduced by higher risk in longer term instruments against capturing the factors affecting the risk-free return over a longer period.

Q. How do you make this trade-off?

A. Since current interest rates on Treasury bills (T-bills) are at historically very low levels, some consideration for longer term bonds is appropriate. The risk premium of stocks over T-bills from Ibbotson is 8.2%, while the risk premium of stocks over the income component of Intermediate term bonds (5-year) is 7.2%. The most recent yield for five-year T-notes is less than 2%, but I also recognize the year-to-date high of 2.041% in order to mitigate the unusually low current returns. Using these figures, the CAPM cost of equity for an "average" stock – a stock whose beta is 1.0 - is 9.2%.

Q. How do you adjust these estimates for specific companies such as Piedmont?

A. The risk premium is adjusted using a stock's beta. I use betas for Piedmont and the six gas utilities as reported by Value Line. These companies are less risky than the average stock, so their betas range from 0.6 to 0.75. An average stock, or a broad portfolio of stocks representing the market return, has a beta of 1.0. My Exhibit 6 shows the resulting range of CAPM cost of equity estimates. For Piedmont, the CAPM cost of equity is 6.721%. Since the CAPM for each company is determined by each company's beta, the comparable water and natural gas utilities all have very similar CAPM cost of equity estimates between 6.36% and 7.44%.

Q. Are there other factors that can affect these CAPM cost of equity estimates?

A. Yes. The pertinent factor at this time is the tendency for the risk premium to expand when interest rates, and bond returns, are low and shrink when interest rates are high. Consequently, because short term interest rates are near zero, the CAPM cost of equity estimates likely underestimate the current cost of equity. There is some evidence that the CAPM underestimates the cost of equity for firms with betas less than one. Nevertheless, it is reasonable to expect that the cost of equity of relatively low-risk utilities is less than the cost of equity of the market portfolio – that is, the CAPM estimate for a beta of one.

Q. What cost of equity do you recommend for Piedmont?

A. I recommend a cost of equity of 9.5%.

Q. How did you come to this conclusion?

A. Although my CAPM estimate of Piedmont's cost of equity of 6.72% is within the range of my DCF cost of equity estimates for Piedmont of 6.63% to 7.24%, these are both below the DCF range for the six similar gas utilities of 9.1% to 9.72%. The range of CAPM cost of equity estimates for the six similar gas utilities is also less than this DCF range. The CAPM estimates may be relatively accurate for the immediate present, but likely underestimate the cost of equity in the event that interest rates increase. Given the historically low level of current interest rates, it seems likely that they could rise significantly over the next few years. For this reason, I base my recommendation on the DCF analysis for the six gas utilities.

Q. How does your cost of equity of 9.5% compare to that recommended by Piedmont's witness Dr. Murry?

A. Dr. Murry recommends a cost of equity for Piedmont of 11.25%, but his recommendation appears to rely almost entirely on inappropriate projected returns on the book value of common equity for Piedmont and the six gas utilities. For example, Schedule DAM-24 shows that these projected returns on equity range from 12% to 12.5% for Piedmont and 9% to 17.5% for the six gas utilities, while the highest of Dr. Murry's DCF and CAPM estimates is only 10.33%. In fact, his DCF cost of equity estimates cover a range nearly identical to mine.

Q. Why are returns on common equity inappropriate for estimating the cost of equity?

A. A regulated firm's return on its book value of common equity is the same as its cost of equity, *only* if the firm's allowed return is set exactly equal to its cost of capital and the firm never deviates from this allowed return in any period. In this case the firm's stock price and book value per share are equal, because its earned return on equity exactly equals its cost of equity and investors' expectations are fulfilled. If the regulated firm's allowed return is not set equal to its cost of capital, or its actual return deviates from its cost of capital, or the firm has unregulated operations, then its return on its book value of common equity will not equal its cost of equity *and* its stock price will not equal its book value per share. In practice, regulated firms' returns on common equity rarely coincide exactly with their cost of equity. This can be tested by comparing a firm's book value per share to its stock price. As reported by *Value Line*, Piedmont's book value per share is approximately $14.00, while its current stock price is over $30.00. Therefore, its return on common equity does not equal its cost of capital.

Q. Does Piedmont's projected return on common equity have any implications for its cost of equity?

A. Yes. Since Piedmont's projected return on common equity (12-12.5%) exceeds the estimates of its cost of equity presented here, this suggests that no rate increase is necessary for Piedmont at this time.

Q. Why does Piedmont's projected return on common equity imply that Piedmont does not require any increase in its rates?

A. *Value Line*'s projected returns on common equity reported by Dr. Murry by necessity pre-date the filing of Piedmont's request in this docket and cannot include the outcome of this proceeding. Consequently, Value Line projects Piedmont to earn in excess of its cost of equity on the book value of its common equity *without any rate increase in Tennessee*. If these projected returns on common equity are considered as Dr. Murry apparently suggests, then the implication is that no rate change is necessary for Piedmont at this time.

Q. Do you recommend the use of projected returns on common equity in this way?

A. No. The DCF and CAPM methods for estimating the cost of equity are widely accepted by analysts and regulators, even though the application of them may vary among analysts. The Authority should base its decision on these methods.

Q. Do you apply the DCF and CAPM cost of equity methods differently from Dr. Murry?

A. There are slight differences in the ways that Dr. Murry and I apply the DCF method, but these do not result in any significant differences in the range of cost of equity estimates that we calculate. There are material differences in our applications of the CAPM, however.

Q. How does your application of the CAPM differ from Dr. Murry's?

A. I calculate my risk premium using U. S. Treasury Bills and Intermediate Term (5-year) Notes, whereas Dr. Murry uses Long Term (20-year) U. S. Treasury Bonds. Dr. Murry also makes an adjustment for the size of Piedmont and the six gas utilities.

Q. What are the effects of these differences on Piedmont's CAPM cost of equity estimates?

A. Both of Dr. Murry's variations increase the CAPM cost of equity estimates over those that I calculate. Since 20-year Treasury Bonds have higher yields than shorter term bills and bonds, the resulting risk premium is smaller using 20-year bonds than it is with shorter term instruments. This risk premium is adjusted by beta to arrive at an adjusted risk premium for each firm. Since the betas of Piedmont and the six gas utilities are all less than one, the resulting reduction in the risk premium is smaller in Dr. Murry's method and the resulting cost of equity estimate is higher by 200-300 basis points. The size adjustment involves adding 120 basis points to the CAPM estimates for Piedmont and the six gas utilities. Dr. Murry claims that this is necessary to account for a higher cost of equity for these "mid-cap" firms. In total, the effect is to increase Dr. Murry's CAPM cost of equity estimates by 350-400 basis points over those I calculate.

Q. Do you agree with Dr. Murry's approach?

A. No. The appropriate debt instrument for the CAPM should approximate a risk-free rate of return. Short term U. S. Treasury instruments are preferable to long term instruments for this purpose, because they contain nearly zero inflation risk. Further, if investors demand compensation for risk, then higher risk debt instruments must carry higher interest rates. Current short term Treasury instruments clearly involve lower risk as they pay interest rates near zero, while current long term instruments pay rates of over 4%. I am less skeptical of Dr. Murry's mid-cap size adjustment, although application of it to my CAPM produces cost of equity estimates between 6.29% and 8.64% that are still less than my recommended cost of equity of 9.5%.

Q. Dr. Murry examines the after-tax interest coverage produced by his cost of equity recommendation. Have you done this for your recommended cost of equity?

A. Yes and the resulting difference in interest coverage is relatively small. I should point out that the capital structure and cost rates on debt that Dr. Murry and I recommend are the same, such that any difference in after-tax interest coverage is due solely to the difference in our cost of equity recommendations. Dr. Murry calculates Piedmont's after-tax interest coverage as 3.28 for his cost of equity of 11.25%, while Piedmont's after-tax interest coverage is 2.93 for my recommended 9.5% cost of equity. Both of these fall within the range for the six gas utilities reported by Dr. Murry (Schedule DAM-26), although this range is so wide (2.44-9.75) that it provides little guidance.

Q. Does this conclude your testimony at this time?

A. Yes.

Piedmont Natural Gas Company
Recommended Capital Structure and Cost of Capital

Component	%	Cost Rate	Weighted Cost
Short Term Debt	5.87	1.59%	0.093%
Long Term Debt	41.42	6.05%	2.506%
Common Equity	52.71	9.5%	5.008%
Total	100		7.61%

Piedmont Natural Gas Company
Consolidated Capital Structures
June 30, 2007-2011[1]

Component	2011	2010	2009	2008	2007	Average	Dzuricky
Short Term Debt	6.98%	2.40	8.07	5.82	7.92	6.24%	5.87%
Long Term Debt	38.65%	43.14	42.45	44.11	43.73	43.42%	41.42%
Common Equity	54.37%	54.46	49.48	50.07	48.35	50.34%	52.71%
Total	100%	100	100	100	100	100%	100%

[1] Exhibit DJD-1 and Response to CAPD Discovery Request 48.

Klein Direct
Exhibit 3
09-00183

Summary of
Discounted Cash Flow
Cost of Equity Estimates

Company	Div. Yield %	Hist. Div. Growth	Proj. Div. Growth	Hist. Earnings Growth	Proj. Earnings Growth	DCF Ranges Historical	DCF Ranges Projected
Piedmont N. Gas	3.63-3.74	4.5%	3.5%	5.0%	3.0%	8.13-8.74	6.63-7.24
Atmos Energy	3.89-4.06	2.0%	2.0%	5.0%	5.0%	5.89-9.06	5.89-9.06
New Jersey Res.	3.0-3.1	7.5	4.5	8.5	4.0	10.5-11.6	7.0-7.6
Northwest N. Gas	3.79-3.91	3.5	2.5	9.5	4.5	7.29-13.41	6.29-8.41
South Jersey Ind.	2.57-2.69	8.5	8.5	10.5	9.0	11.07-13.19	11.07-11.69
Southwest Gas	2.63-2.73	2.0	4.5	6.0	9.0	4.63-8.73	7.13-11.73
WGL Holdings	3.55-3.76	2.5	2.5	4.0	1.5	6.05-7.76	5.05-6.26
Average Ranges for 6 Comparable Companies (%)						7.57-10.63	8.49-10.95
Midpoints of Average Ranges						9.10%	9.72%

Sources:

Dividend Yield: Klein Direct, Exhibit 4

Historical Growth Rates: Highest of 5 or 10 year average, Value Line Investment Survey, *Ratings and Reports*, 9/9/11.

Projected Growth Rates: Value Line Investment Survey, *Ratings and Reports*, 9/9/11.

Stock Prices and Dividend Yields
Piedmont and Six Natural Gas Utilities
www.WSJ.com, 11/14/11

	November Price	Current Dividend	Current Div. Yield	Div. Yield Range
Piedmont	$31.00-32.00	$0.29	3.66%	3.63-3.74%
Atmos Energy	$34.00-35.50	$0.345	3.94%	3.89-4.06%
New Jersey Res.	46.50-48.00	0.36	3.02	3.00-3.10
Northwest N. G.	45.50-47.00	0.445	3.82	3.79-3.91
South Jersey Ind.	54.30-56.70	0.365	2.64	2.57-2.69
Southwest Gas	38.78-40.30	0.265	2.70	2.63-2.73
WGL Holdings	41.18-43.62	0.3875	3.61	3.55-3.76

Sources:

November Price, Current Dividend, and Current Dividend Yield from WSJ.com, 11/14/11.
Dividend Yield Range = [Current Dividend x 4]/[November Price]

Market Capitalization and Beta
Piedmont and Six Natural Gas Utilities

Company	Beta	Capitalization
Piedmont N. Gas	0.65	$2.2 billion
Atmos Energy	0.70	$3.0 billion
New Jersey Res.	0.65	$2.0 billion
Northwest N. Gas	0.60	$1.2 billion
South Jersey Ind.	0.65	$1.5 billion
Southwest Gas	0.75	$1.7 billion
WGL Holdings	0.65	$2.1 billion

Source: Value Line Investment Survey, *Ratings and Reports*, 9/9/11.

Klein Direct
Exhibit 6
09-00104

Summary of
Capital Asset Pricing Model (CAPM)
Cost of Equity Analysis

Company	Beta	Short-Term Adj. Risk Premium[2]	T-bill Yield	Intermediate Adj.Risk Premium[3]	5-year T-note Yield	CAPM Range
Piedmont	0.65	5.33%	0.17%	4.68%	2.041%	5.50-6.721%
Atmos Energy	0.70	5.74%	0.17%	5.04%	2.041%	5.91-7.081%
New Jersey Res.	0.65	5.33%	0.17%	4.68%	2.041%	5.50-6.721%
Northwest N. Gas	0.60	4.92%	0.17%	4.32%	2.041%	5.09-6.361%
South Jersey Ind.	0.65	5.33%	0.17%	4.68%	2.041%	5.50-6.721%
Southwest Gas	0.75	6.15%	0.17%	5.40%	2.041%	6.32-7.441%
WGL Holdings	0.65	5.33%	0.17%	4.68%	2.041%	5.50-6.721%

Sources:
1) Beta: Value Line Investment Survey, *Ratings and Reports*, 9/9/2011.
2) T-bill and T-bond highest yields for year-to-date from The Wall Street Journal, http://online.wsj.com, 11/14/11.

[2] Short Term Risk Premium = Beta x 8.2%. Risk Premium for stock returns over short-term T-bills (8.2%) from Response to CAPD Discovery Request #46.
[3] Intermediate Term Risk Premium = Beta x 7.2%. Risk Premium for stock returns over intermediate-term T-bonds (7.2%) from Response to CAPD Discovery Request #46.

VITA

CHRISTOPHER C. KLEIN

EDUCATION:

Ph. D. (Economics), University of North Carolina - Chapel Hill (1980)
B. A. (Economics), University of Alabama - Tuscaloosa (1976)

EXPERIENCE:

2002-Present	**Middle Tennessee State University** Associate Professor of Economics
2002-Present	**Consultant** Clients included: AGL Resources, Inc.; Reseller Coalition; Tennessee Advisory Commission on Intergovernmental Relations; Tennessee American Water Company, Inc.; Tennessee Department of Environment and Conservation; US LEC of Tennessee, Inc.; Verizon Wireless; West Virginia American Water Company, Inc.; Z-Tel Communications, Inc.
1996-2002	**Tennessee Regulatory Authority** Chief, Economic Analysis Division, 1997-2002 Chief, Utility Rate Division, 1996-97
1998-2001	**Vanderbilt University** Adjunct Associate Professor of Economics
1986-1996	**Tennessee Public Service Commission** Director, Utility Rate Division, 1994-96 Economist & Research Director, 1993-94 Commission Economist, 1986-1993
1990-1994	**Middle Tennessee State University** Adjunct Faculty, Department of Economics and Finance
1980-1986	**Federal Trade Commission** Economist, Bureau of Economics - Antitrust Division

PROFESSIONAL ACTIVITIES:

Editor, *Journal for Economic Educators*, 2007 to present.

Member 1994-96, State Staff, Federal-State Joint Board, Federal Communications Commission CC Docket No.80-286 (“Separations” Joint Board).

Chair 1993-95, member 1990-95, Research Advisory Committee to the Board of Directors of the National Regulatory Research Institute at Ohio State University.

Member 1990-95, Staff Subcommittee on Gas, National Association of Regulatory Utility Commissioners.

Group Leader: Economics, Contracts, and Non-affiliate Revenue; NARUC* Staff Subcommittee on Accounts Multi-state Audit Team, 1988 Report on Bell Communications Research.
Referee: *Contemporary Economic Policy*, *Eastern Economic Journal, Land Economics, Management and Decision Economics*, *Review of Industrial Organization, Social Science Quarterly, Southern Economic Journal*.
Memberships: American Economic Association (AEA, since 1981), Southern Economic Association (1982), Industrial Organization Society (1986), Western Economic Association (2003).

HONORS:

Beta Gamma Sigma, International Honor Society for Collegiate Schools of Business, 2008
Top 30 Score, 2003-2004 Student Evaluation of Faculty Performance, Jones College of Business, Middle Tennessee State University.
Resolution of Recognition, National Regulatory Research Institute, 1995
Listed in various Who's Who publications, 1990-
Certificate of Commendation, Federal Trade Commission,1985
First in my class to complete the Ph. D., 1980
Alpha Pi Mu, National Industrial Engineering Honorary, 1973

GRANTS RECEIVED:

MTSU Jones College Summer Research Grant: 2004, 2005, 2007.
MTSU Faculty Research and Creative Activity Academic Year Grant: 2004-2005 (with Reuben Kyle)
MTSU Faculty Research and Creative Projects Committee Summer Salary Grant: 2006, 2009.

TEACHING

At MTSU

ECON 2420, Principles of Economics – Microeconomics
ECON 3520, Intermediate Microeconomic Theory
ECON 4400, Economics of Antitrust and Regulation
ECON 4570, Managerial Economics
ECON 4620, Econometrics and Forecasting
ECON 7121, Seminar in Applied Microeconomic Theory (Ph.D. Program)
ECON 7250, Methods of Outcome Assessment (Ph.D. Program)
Student Internships (ECON/FIN 4890, ECON/FIN 5890, ECON/FIN 6440)

At Vanderbilt University

ECON 252, Antitrust Economics
ECON 283, Economics of Regulation

MTSU Dissertation Committees

Shea W. Slonaker, Chair, *Three Essays on the Recorded Music Industry*, Ph. D. 2009.
Hua Liu, *U.S. Trade Deficit, Productivity Growth and Offshore Outsourcing*, Ph. D.

2006.

Jennifer Wilgus, *A Life-Cycle Approach to Human Capital Investment and Skill-Biased Technological Change*, Ph. D. 2005.

Anealia Sasser, *A Theoretical Examination of Title IV Financial Aid for Higher Education*, D.A. 2004.

Vanderbilt University Dissertation Committees:

Aster Adams, *The Impact of Deregulation and Competition on Efficiency, Financial Performance, and Shareholder Wealth of Electric Utilities in the United States*, Ph. D. 2009.

David B. Sapper, *Trial Selection and the Effects of Sentencing Reform in Criminal Antitrust Cases: A Theoretical and Empirical Analysis*, Ph. D. 2006.

T. Randolph Beard, *Bankruptcy, Safety Expenditure, and Safety Regulation in the Motor Carrier Industry*, Ph. D. 1988

PUBLICATIONS AND WORKING PAPERS

"The Price of Quality: Hedonic Estimation of Implicit Market Models for Higher Education," with Reuben Kyle, submitted to *Applied Economics*, 2011.

"Do State Funded Merit Scholarships Reduce High School Dropout Rates?" with Elizabeth A. Perry-Sizemore, in revision, 2011.

"Identifying the Best Buys in U.S. Higher Education," with E. Anthon Eff and Reuben Kyle, forthcoming, *Research in Higher Education*, 2011.

"Chart Turnover and Sales in the Recorded Music Industry: 1990-2005," with Shea W. Slonaker, *Review of Industrial Organization*, 36:351-372, 2010.

"What Can We Learn from Education Production Studies?" with E. Anthon Eff, *Eastern Economic Journal*, 36:450-479, 2010.

"Public Transportation Ridership Levels," with Christopher R. Swimmer, *Journal for Economic Educators*, 10(1): 40-46, Summer 2010.

"Analysis of U.S. Foreign Aid Determinants for 2003," with Joshua M. Hill, *Journal for Economic Educators*, 9(1): 48-52, Summer 2009.

"Intra-district Public School Funding Equity and Performance in Nashville, Tennessee," *Journal of Education Finance*, Summer 2008.

"A Tale of Three Inputs: Cost and Production Duality with Time Utilization of Capital," *Applied Economics Research Bulletin*, 1(1) 2008.

"Telephone Penetration in Tennessee: Are Intrastate Universal Service Policies Effective?" with Aster R. Adams and David B. Sapper, *Journal of Applied Regulation*, 2, November 2004, pp. 87-108.

"A Switching Regime Approach to Measuring the Effects of Technological Change in Ocean Shipping," with J. David Bass and Reuben Kyle, *Journal of Productivity Analysis*, 22:1-2, July-September, 2004, pp. 29-49..

"The Financial Implications of Unbundling on Bell Company Profits: A Review of the Evidence," with T. Randolph Beard and George S. Ford, *CommLaw Conspectus: The Journal of Communications Law and Policy*, v. 12 n.1, Fall/Winter 2003.

"Bell Companies as Profitable Wholesale Firms: The Financial Implications of UNE-P," with T. Randolph Beard, *Phoenix Center Policy Paper No. 17*, November 2002, www.phoenix-center.org.

"Connecting Tennessee: Bridging the Digital Divide," with Rose M. Gregory, *NRRI Quarterly Bulletin*, vol. 21 no. 3, Spring 2001.

"Regulation vs. Deregulation: It's All in the Externalities," *Tennessee's Business*, Middle Tennessee State University, v. 11, n. 3 (November), 2001.

"The Role of Public Power in a Restructured Electric Power Industry," with David Sapper, *The Electricity Journal*, August/September 2001.

"Regulator Preferences and Utility Prices: Evidence from Natural Gas Distribution Utilities," with George Sweeney, *Energy Economics*, vol. 21, n. 1, 1999.

"Competition in Telecommunications: A Progress Report for Tennessee," *Tennessee's Business*, Middle Tennessee State University, Murfreesboro, TN; vol. 9, n. 1, 1999.

"Technological Change and the Production of Ocean Shipping Services," with Reuben Kyle, *Review of Industrial Organization*, December 1997.

"The Haunting of Universal Service: Open Markets, Efficient Funding and the Ghost of the Fair Rate of Return," *Proceedings of Tenth NARUC Biennial Regulatory Information Conference*, National Regulatory Research Institute, Columbus, OH, 1996.

"Productivity Growth in Telecommunications: The Case of Tennessee," *Proceedings of Tenth NARUC Biennial Regulatory Information Conference*, National Regulatory Research Institute, Columbus, OH, 1996.

"Capture vs. Compromise: Entry Regulation of Intrastate Trucking," with Reuben Kyle and Jennifer Wilgus, *Logistics and Transportation Review*, v. 32 n. 3, September 1996.

"Price Discrimination: What is 'Undue' for a U.S. Utility?" *Utilities Policy*, vol. 4 no. 4, October 1994.

"Single Service Price Variations and 'Subsidies' in the Pricing of Telecommunications Services," *Proceedings of Ninth NARUC Biennial Regulatory Information Conference*, National Regulatory Research Institute, Columbus, OH, 1994.

"What Is Undue Price Discrimination by a Regulated Utility?" *NRRI Quarterly Bulletin*, March 1994.

"A Comparison of Cost-Based Pricing Rules for Natural Gas Distribution Utilities," *Energy Economics*, July 1993.

"Negotiating a Transportation Rate Under Threat of Bypass: A Case Study," *Proceedings of the Eighth Biennial Regulatory Information Conference*, National Regulatory Research Institute, Columbus, OH, 1992.

"A Multinomial Logit Model of Intrastate Trucking Regulation in Tennessee," with Jennifer Jose and Reuben Kyle, *Papers and Proceedings of the Nineteenth Annual Meeting of the Midsouth Academy of Economics and Finance*, v. 16 ,1992.

"Ramsey Prices for Natural Gas Distribution Utilities," *Proceedings of the Seventh NARUC Biennial Regulatory Information Conference*, National Regulatory Research Institute, Columbus, OH, 1990.

"Intervention as Entry Deterrence: Evidence from Sham Litigation Cases," *Proceedings of the Seventh NARUC Biennial Regulatory Information Conference*, National Regulatory Research Institute, Columbus, OH, 1990.

Book Review, *Changing the Rules: Technological Change, International Competition, and Regulation in Communications*, Edited by Robert W. Crandall and Kenneth Flamm, Brookings 1989; *Review of Industrial Organization*, Fall 1990.

"Double Leverage and Strategic Financing Decisions," *NRRI Quarterly Bulletin*, v. 11, n. 3, September 1990.

"Predation in the Courts: Legal Versus Economic Analysis in Sham Litigation Cases," *International Review of Law & Economics*, June 1990.

"Rate Design for Natural Gas Utilities: A Comparison of Ramsey and Cost of Service Pricing," *NRRI Quarterly Bulletin*, December 1989.

"Dissecting Divestiture: A Telecommunications Book Review Article," *Review of Industrial Organization*, October 1989.

The Economics of Sham Litigation: Theory, Cases, and Policy, Bureau of Economics Staff Report, Federal Trade Commission, April 1989.

"New Agreements, Non-affiliate Revenues, and Economic Issues," with Mike Amato and Francis Fok, in *Report on Bell Communications Research*, National Association of Regulatory Utility Commissioners, 1988.

"Merger Incentives and Cost of Capital Regulation of Subsidiaries," *Midsouth Journal of Economics and Finance*, March 1988.

"Strategic Sham Litigation: Economic Incentives in the Context of the Case Law," *International Review of Law & Economics*, December 1986.

"Is There a Principle for Defining Industries? Comment," *Southern Economic Journal*, October 1985.

"A Note on Defining Geographic Markets," with Ed Rifkin and Noel Uri, *Regional Science and Urban Economics*, February 1985.

"Process Analysis, Capital Utilization, and the Existence of Dual Cost and Production Functions," FTC Bureau of Economics Working Paper No. 116, May 1984.

"A General Theory of Hedonic Pricing of Capital as a Factor of Production," FTC Bureau of Economics Working Paper No. 105, December 1983.

"The International Market for Crude Oil," with Fred Lipson and Harvey Blumenthal, in *Mergers in the Petroleum Industry*, Federal Trade Commission, 1982.

PRESENTATIONS

"Econometrics as a Capstone Course in Economics," Southern Economic Association Annual Conference, Washington, DC, November 2011.

"Do State Funded Merit Scholarships for Higher Education Reduce High School Dropout Rates for All Students?" with Elizabeth A. Perry-Sizemore, Southern Economic Association Annual Conference, Washington, DC, November 2011.

"Do State Funded Merit Scholarships for Higher Education Improve Pre-College Academic Performance?" with Elizabeth A. Perry-Sizemore, Southern Economic Association Annual Conference, Atlanta, GA, November 2010.

"The Effect of State Funded Merit Scholarships for Higher Education on Pre-College Academic Performance," with Elizabeth A. Perry-Sizemore, Southern Economic Association Annual Conference, San Antonio, TX, November 2009.

"The Effect of State Funded Merit Scholarships for Higher Education on High School Graduation Rates," with Elizabeth A. Perry-Sizemore, Southern Economic Association Annual Conference, Washington, DC, November 2008.

"Identifying the Best Buys in U.S. Higher Education," with E. Anthon Eff and Reuben Kyle, Southern Economic Association Annual Conference, Washington, DC, November 2008.

"Product Variety and Sales in the Recorded Music Industry: 1990-2005," with Shea Slonaker, International Industrial Organization Conference, Arlington, VA, May 2008.

"Identifying the Best Buys in U.S. Higher Education," with E. Anthon Eff and Reuben Kyle, Academy of Economics and Finance Annual Meeting, Nashville, TN, February 2008.

"Product Variety and Sales in the Recorded Music Industry: 1990-2005," with Shea Slonaker, Academy of Economics and Finance Annual Meeting, Nashville, TN, February 2008.

"Do State Funded Merit Scholarships Induce Students to Learn more in High school?" with Elizabeth A. Perry-Sizemore, Southern Economic Association Annual Conference, New Orleans, LA, November 2007.

"The Price of Quality: Hedonic Estimation of Implicit Market Models for Higher Education," with Reuben Kyle, Southern Economic Association Annual Conference, New Orleans, LA, November 2007.

"The Shifting Appeal of Sham Litigation: Evidence from Appellate Decisions 1971-2006," International Industrial Organization Conference, Savannah, GA, April 2007.

"The Shifting Appeal of Sham Litigation: Evidence from Appellate Decisions 1980-2006," Scholar's Week Poster Fair, MTSU, April 2007

"Causality Tests for Public School Funding and Performance," Southern Economic Association Meeting, Charleston, SC, November 2006.

"The Price of Quality: Hedonic Estimation of Implicit Market Models for Higher Education," with Reuben Kyle, Southern Economic Association Meeting, Washington, November 2005.

"The Price of Quality: Hedonic Estimation of Implicit Market Models for Higher Education," with Reuben Kyle, International Industrial Organization Conference, Atlanta, April 2005.

"Anticompetitive Litigation and the "Baselessness" Standard for Antitrust Liability," Southern Economic Association Meeting, New Orleans, November 2004.

“The Price of Quality: Hedonic Estimation of Implicit Market Models for Higher Education,” with Reuben Kyle, Southern Economic Association Meeting, New Orleans, November 2004.

“VoIP: Let’s Ask the Right Questions,” Tennessee Regulatory Authority Forum on VoIP, Nashville Public Library, April 30, 2004.

“Telephone Penetration in Tennessee: Are Intrastate Universal Service Policies Effective?” with Aster Rutibablira and David B. Sapper, Southern Economic Association Meeting, San Antonio, TX, November 2003.

“Telephone Penetration in Tennessee: Are Intrastate Universal Service Policies Effective?” with Aster Rutibablira and David B. Sapper, International Industrial Organization Conference, Boston MA, April 4-5, 2003.

“A Critique of Educational Production Functions,” Southern Economic Association meeting, New Orleans, LA, November 2002.

"Connecting Tennessee: Bridging the Digital Divide," with Rose M. Gregory, American Economic Association meeting, joint session with the Transportation and Public Utilities Group, Atlanta, GA, January 2002.

"Long Term Contracts as Anticompetitive Devices in Telecommunications," Southern Economic Association Annual Meeting, Tampa, FL, November 2001.

"The Role of Public Power in a Restructured Electric Power Industry," American Economic Association meeting, joint session with the Transportation and Public Utilities Group, Boston, MA, January 2000.

"Universal Telephone Service in Tennessee: A Pre-Competition Assessment," with David Sapper, Southern Economic Association meeting, New Orleans, LA, November 1999.

“Trucks, Planes, Trains, and Wires? Short-haul vs. Long-haul Long Distance Rates in Telecommunications,” with Reuben Kyle, Southern Economic Association meeting, Baltimore, MD, November 1998.

“The Economics of Time as a Resource,” Southern Economic Association meeting, Atlanta, GA, November 1997.

“Cost and Production Duality with Capital Utilization,” Department of Economics Seminar Series, Vanderbilt University, February 1997.

“Maximum Impropriety: The ‘Baselessness’ Standard for Improper Litigation,” Southern Economic Association meeting, Washington, November 1996.

“Cost and Production Duality with Capital Utilization,” Southern Economic Association meeting, Washington, November 1996.

"The Haunting of Universal Service: Open Markets, Efficient Pricing, and the Ghost of the Fair Rate of Return,” Tenth NARUC Biennial Regulatory Information Conference, Columbus, OH, September 1996.

"Productivity Growth in Telecommunications: The Case of Tennessee," Tenth NARUC Biennial Regulatory Information Conference, Columbus, OH, September 1996.

"Productivity Growth in Telecommunications: The Case of Tennessee," Advanced Workshop in Regulation and Public Utility Economics, 15th Annual Conference, Lake George, NY, May 1996.

"A Switching Regime Approach to Measuring the Effects of Technological Change in Ocean Shipping," with Reuben Kyle, Southern Economic Association meeting, New Orleans, November 1995.

"Productivity Growth in Telecommunications: The Case of Tennessee," Southern Economic Association meeting, New Orleans, November 1995.

"Local Service Price Variations and 'Subsidies' in Telecommunications," Southern Economic Association meeting, Orlando, November 1994.

"Dynamic Effects of Regulatory Policy on Intrastate Long Distance Telephone Rates," Southern Economic Association meeting, Orlando, November 1994.

"Single Service Price Variations and 'Subsidies' in the Pricing of Telecommunications Services," Ninth NARUC Biennial Regulatory Information Conference, Columbus, OH, September 1994.

"Suit, Countersuit, and Settlement in Sham Litigation," Annual Meeting of the Midsouth Academy of Economics and Finance, Nashville, February 1994.

"New Evidence on the Effect of Regulation on Intrastate Long Distance Telephone Rates," Annual Meeting of the Midsouth Academy of Economics and Finance, Nashville, February 1994.

"What is Undue Price Discrimination for a Public Utility?" Southern Economic Association meeting, New Orleans, November 1993.

"Regulated Utility Prices and the Preferences of Regulators," with George Sweeney, Southern Economic Association meeting, New Orleans, November 1993.

"A Test for Strategic Behavior Under Rate of Return Regulation," Southern Economic Association meeting, Washington, November 1992.

"New Evidence on the Effect of Regulatory Policy on Intrastate Long Distance Telephone Rates," Southern Economic Association meeting, Washington, November 1992.

"Technological Change and the Production of Ocean Shipping Services," with Reuben Kyle, Atlantic Economic Association meeting, Plymouth, MA, October 1992.

"Negotiating a Transportation Rate Under Threat of Bypass: A Case Study," Eighth Biennial Regulatory Information Conference, Columbus, OH, September 1992.

"A Multinomial Logit Model of Intrastate Trucking Regulation in Tennessee," with Jennifer W. Jose and Reuben Kyle, Midsouth Academy of Economics and Finance annual meeting, Mobile, February 1992.

"Technological Change and the Production of Ocean Shipping Services," with Reuben Kyle, Southern Economic Association meeting, Nashville, November 1991.

"Suit, Countersuit, and Settlement in Sham Litigation Cases," Southern Economic Association meeting, Nashville, November 1991.

"Implementing Third Best Pricing Rules for Natural Gas Distribution Utilties," Southern Economic Association meeting, Nashville, November 1991.

"Trucking Regulation in Tennessee," with Jennifer Jose and Reuben Kyle, Southern Economic Association meeting, Nashville, November 1991.

"Research and Development in Regulated Markets: The Case of Bell Communications Research," Southern Economic Association meeting, New Orleans, November 1990.

"Incentives for Trial and Settlement in Sham Litigation," Southern Economic Association meeting, New Orleans, November 1990.

"Ramsey Prices for Natural Gas Distribution Utilities," Seventh NARUC Biennial Regulatory Information Conference, Columbus, OH, September 1990.

"Intervention as Entry Deterrence: Evidence from Sham Litigation Cases," Seventh NARUC Biennial Regulatory Information Conference, Columbus, OH, September 1990.

"Funding Research and Development in Regulated Industries: The Case of Bell Communications Research," Ninth Annual Conference of the Advanced Workshop in Regulation and Public Utility Economics, New Paltz, NY, May 30 - June 1, 1990.

"Incentives for Trial and Settlement in Sham Litigation," Bureau of Economics Seminar, Federal Trade Commission, February 1990.

"Estimating Ramsey Prices for Natural Gas Utilities," Southern Economic Association meeting, Orlando, November 1989.

"Incentives for Trial and Settlement in Sham Litigation," Department of Economics Seminar Series, Auburn University, November 1989.

"Natural Gas Rate-Making: Now and In the Future," Associated Valley Industries Natural Gas Seminar, Nashville, October 1989.

"Estimating Ramsey Prices for Natural Gas Utilities," Advanced Workshop in Regulation and Public Utility Economics, Eighth Annual Conference, Newport, RI, May 29-31, 1989.

"The Role of Bell Communications Research in the Telecommunications Markets," Midsouth Academy of Economics and Finance Annual Conference, Nashville, February 1989.

"The Organizational Structures of Public Utilities Under Different Regulatory Regimes," Southern Economic Association meeting, San Antonio, November 1988.

"New Agreements, Non-affiliate Revenues, and Economic Issues," Report on Bell Communications Research, NARUC Multi-state Audit Team, presented to NARUC Staff Sub-committee on Accounts, Kalispell, Montana, September 1988.

"Predation in the Courts: Empirical Analysis of Sham Litigation Cases," Joint Session of the Industrial Organization Society and the American Economic Association, Chicago, December 1987.

"Rate of Return on Equity," National Conference on Unit Valuation Standards, Nashville, December 1987.

"Merger Incentives and Organizational Structures Under Cost of Capital Regulation," Southern Economic Association meeting, Washington, November 1987.

"Merger Incentives and Cost of Capital Regulation of Subsidiaries," Midsouth Academy of Economics and Finance Annual Conference, Mobile, February 1987.

"The Incidence of Predatory Sham Litigation," Southern Economic Association meeting, New Orleans, November 1986.

"A Welfare Analysis of the Department of Justice Merger Guidelines," Southern Economic Association meeting, Dallas, November 1985.

"A Duality Approach to Labor Costs and Shiftwork," Southern Economic Association meeting, Atlanta, November 1984.

"Strategic Sham Litigation: Economic Incentives in the Context of the Case Law," Southern Economic Association meeting, Atlanta, November 1984.

"A General Theory of Hedonic Pricing of Capital as a Factor of Production," Southern Economic Association meeting, Washington, November 1983.

ECONOMIC TESTIMONY

Testimony before the Public Service Commissions of Alabama, Louisiana, North Carolina, and South Carolina on behalf of the Reseller Coalition, various docket numbers, August 2010-May 2011.

In the United States District Court for the Middle District of Tennessee: Owner-Operator Independent Drivers Association Inc. v. Keith Bissell, No. 3-90-0251, March 1992, (Affidavit).

Before the Federal Communications Commission: Represcribing the Authorized Rate of Return for Interstate Services of Local Exchange Companies, CC Docket No. 89-624, March 1990.

Before the Tennessee General Assembly: various Committees, 1994 - present.

Before the Tennessee Advisory Commission on Intergovernmental relations:
"Report on Pole Attachment Rate Study," with Reuben Kyle, January 18, 2007.

Before the Tennessee Regulatory Authority (docket numbers in parentheses):

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, (11-00189), April 2011.

Petition of Chattanooga Gas Company for General Rate Increase, Implementation of the EnergySmart Conservation Programs, and Implementation of a Revenue Decoupling Mechanism, (09-00183), April 2010.

Petition of Piedmont Natural Gas Company, Inc. to Implement a Margin Decoupling Tracker (MDT) and Related Energy Efficiency and Conservation Programs, (09-00104), December 2009.

Tennessee Rural Coalition Petition for Suspension and Modification Pursuant to 47 U.S.C. 1251(f)(2), (06-00228), May 2007.

Complaint of US LEC of Tennessee, Inc. against Electric Power Board of Chattanooga (02-00562), Feb. 2004.

Before the Tennessee Public Service Commission* (docket numbers in parentheses):

BellSouth D/B/A South Central Bell (95-02614) October 1995.**
United Telephone - Southeast (95-02615) September 1995.
United Telephone - Southeast (93-04818) January 1994.**
Chattanooga Gas Company (93-06946) December 1993.
South Central Bell Tariff 93-039 (93-03038) May 1993.**
South Central Bell (92-13527, et al) April 1993.**
Kingsport Power Co. (92-04425) October 1992.
United Cities Gas Co.(92-02987) Sept. 1992.
L & L Trucking, Inc. (91-06786) February 1992.**
Chattanooga Gas Company (91-03765) October 1991.
GTE South (91-05738) August 1991.**
Nashville Gas Company (91-02636) August 1991.
Intra-LATA "Competition" (89-11065, et al) Feb. 1991.
United Intermountain Tel. Co.(90-07832) Dec. 1990.**
Kingsport Power Company (90-05736) Nov. 1990.**
AT&T - South Central States (90-07460) Oct. 1990.**
L & L Trucking (90-03514; 90-04786) August 1990.**
South Central Bell Tel. Co. (90-05953) August 1990.**
GTE South (90-01273) June 1990.
Radio Common Carriers (89-11234) Nov. 1989.**
Nashville Gas Co. (89-10491) Oct. 1989.
United Cities Gas Co. (89-10017) Sept. 1989.
Crockett Telephone Co. (89-02325) May 1989.
ALLTEL Tennessee (89-02324) May 1989.
West Tennessee Telephone Co. (89-02323) May 1989.
Peoples Telephone Co. (89-02322) May 1989.
Ooltewah-Collegedale Telephone Co. (89-02321) May 1989.
Kingsport Power Co. (89-02126) March 1989.**
Chattanooga Gas Co. (88-01363) February 1989.**
Tennessee-American Water Co. (U-87-7534) March 1988.
Tellico Telephone Co. (U-87-7532) February 1988.
Claiborne Telephone Co. (U-87-7508) November 1987.**
Nashville Gas Co. (U-87-7499) October 1987.**
Kingsport Power Co. (U-86-7472) May 1987.**
United Cities Gas Co. (U-86-7442) February 1987.**
General Telephone of the South (U-86-7437) Nov. 1986.**

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* Written (prefiled) testimony on cost of capital, rate design, competitive effects, and/or other issues.

** Oral testimony as well as written.