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**BEFORE THE TENNESSEE REGULATORY AUTHORITY
NASHVILLE, TENNESSEE**

Petition of Atmos Energy Corporation
For Adjustment of Rates

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)

DOCKET NO. 12-00064

PRE-FILED DIRECT TESTIMONY OF

CHRISTOPHER C. KLEIN, PH.D.

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

October 5, 2012

**IN THE TENNESSEE REGULATORY AUTHORITY
NASHVILLE, TENNESSEE**

IN RE:

**PETITION OF ATMOS ENERGY
CORPORATION FOR ADJUSTMENT
OF RATES**

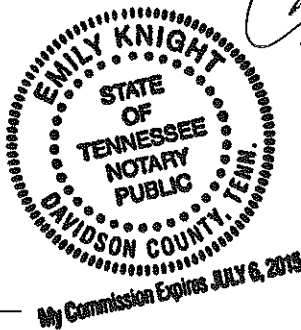
DOCKET NO. 12-00064

AFFIDAVIT

I, 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.

Sworn to and subscribed before me
this the 1st day of October, 2012.

Emily Knight
NOTARY PUBLIC



Christopher C. Klein
CHRISTOPHER C. KLEIN

My commission expires: July 6, 2015

**BEFORE THE TENNESSEE REGULATORY AUTHORITY
NASHVILLE, TENNESSEE**

October 5, 2012

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**PRE-FILED DIRECT TESTIMONY OF
DR. CHRISTOPHER C. KLEIN**

1 **Q. Please state your name and your current position.**

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

5 **Q. What is your educational background?**

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

8 **Q. What is your professional experience involving regulated industries?**

9 **A.**I was employed as an Economist in the Antitrust Division of the Bureau of Economics at
10 the Federal Trade Commission (FTC) in Washington, D.C., for six years starting in 1980.
11 In 1986, I was hired as the first Economist for the Tennessee Public Service Commission
12 (TPSC). Although my title changed over the years, I functioned as the Chief Economist
13 for the TPSC and, after 1996, the Tennessee Regulatory Authority (TRA), until August of
14 2002, when I assumed my current position with MTSU.

15 **Q. What were your duties at the FTC?**

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

1 **Q. What was your primary responsibility at the TPSC?**

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

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

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

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

17 **A.** Yes. I was a member of the National Association of Regulatory Utility Commissioners
18 (NARUC) Staff Subcommittee on Gas. I was a member of, and Chaired, the Research
19 Advisory Committee to the Board of Directors of the National Regulatory Research
20 Institute (NRRI). I also served on the State Staff of the FCC's Federal-State Joint Board
21 in CC Docket No.80-286 (the "Separations" Joint Board) and as a Group Leader on the
22 NARUC Staff Subcommittee on Accounts Multi-state Audit Team that produced the
23 1988 Report on Bell Communications Research.

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

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

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

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

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

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

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

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

22

23

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

2 **A.** Yes. I have testified before various committees of the Tennessee General Assembly on
3 regulatory issues, especially telecommunications issues and competition in the
4 telecommunications industry, as well as before the Tennessee Advisory Commission on
5 Intergovernmental Relations and the Tennessee Regulatory Authority. A complete list is
6 provided in my Vita beginning on page 6 of my Exhibit 7.

7
8 **PURPOSE OF TESTIMONY**
9

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

11 **A.** I will address the Cost of Capital for Atmos Energy Corporation (Atmos) and recommend
12 an allowed rate of return to be adopted for ratemaking purposes. This includes issues
13 regarding capital structure, cost of debt and cost of equity.

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

15 **A.** Yes. I concur with the capital structure, cost of long term debt, and cost of short term
16 debt recommended by Atmos's witness Dr. Vander Weide. This capital structure is an
17 average of the company's structure on March 31, 2010, 2011 and 2012. The TRA has
18 adopted or accepted three-year average capital structures in the most recent rate cases for
19 Chattanooga Gas Company and Piedmont Natural Gas.

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

21 **A.** I recommend a cost of equity of 9.0% based on the Discounted Cash Flow (DCF) and
22 Capital Asset Pricing Model (CAPM) methods shown on pages 3 through 8 of my

1 Exhibit. I recommend no additional adjustments for issuance costs or quarterly payment
2 of dividends.

3 **Q. What overall cost of capital do you recommend for use as the allowed rate of return**
4 **for Atmos?**

5 A. I recommend an overall weighted cost of capital of 7.72% as shown on page 2 of my
6 Exhibit.

7 **Q. How is your testimony organized?**

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

10
11 **COST OF CAPITAL**
12

13 **Q. What do you mean by cost of capital?**

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

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

19 A. The cost of capital concept embodies the economic principles for determining the
20 allowed rate of return set out by the U.S. Supreme Court in *Bluefield Water Works v.*
21 *P.S.C.* (262 U.S. 679, 1923) and *F. P. C. v. Hope Natural Gas Co.* (320 U. S. 591, 1944).
22 For instance, the Court stated in *Hope* that, "...the return to the equity owner should be
23 commensurate with returns on investments in other enterprises having corresponding

1 risks. That return, moreover, should be sufficient to assure confidence in the financial
2 integrity of the enterprise, so as to maintain its credit and to attract capital." (320 U.S.
3 603) In my opinion, the allowed rate of return on the capital employed by Atmos
4 should be set equal to its cost of capital.

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

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

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

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

18 19 **CAPITAL STRUCTURE AND COST OF DEBT**

20
21 **Q. What was your first step in estimating the cost of capital for Atmos?**

22 A. My first step was to determine the appropriate capital structure and cost of debt for
23 Atmos. I started with the capital structure proposed by Atmos's witness Dr. Vander

1 Weide and compared it to the historical capital structures of Atmos submitted in response
2 to CAPD First Discover Request, Question 29. The structure proposed by Dr. Vander
3 Weide is the average structure for 2010-2012. This differs only slightly from previous
4 years' capital structures and the proportions of each component lie within their historical
5 ranges. In this context, the capital structure proposed by Atmos likely represents the
6 longer term average capital structure of Atmos. For this reason, I concur with Dr. Vander
7 Weide's proposed capital structure reproduced on page 2 of my Exhibit.

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

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

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

13 A. Again, I started with the cost of long term and short term debt proposed by Dr. Vander
14 Weide. He proposes the weighted average costs for the year ending March 31, 2012. I
15 found these to be reasonable and have adopted them in my recommended capital
16 structure.

17
18 **COST OF EQUITY**
19

20 **Q. How do you estimate Atmos Energy's cost of equity?**

21 A. I use the Discounted Cash Flow (DCF) and Capital Asset Pricing Model (CAPM)
22 methods.
23

1 **Q. Can you explain the Discounted Cash Flow method?**

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

9 **Q. Have you computed a DCF cost of equity for Atmos?**

10 A. Yes. Page 3 of my Exhibit shows this calculation for Atmos, eight natural gas
11 distribution utilities and six water companies for which growth rates are available
12 selected from Value Line. I start with dividend yields reported by Value Line, as well as
13 more recent yields reported by the *Wall Street Journal*. I use both expected growth in
14 earnings per share and in dividends per share for the growth rate in the DCF formula.
15 Earnings are the source of dividend payments to stockholders, so earnings growth is often
16 an indicator of dividend growth. For Atmos, Value Line projects an annual earnings
17 growth rate of 4% and a dividend growth rate of 1.5%. Consequently the calculated DCF
18 indicates a range of 4.31% to 8.3%, with a midpoint of 6.305%. The midpoints of the
19 DCF ranges for natural gas utilities and water utilities are both higher at 8.15%. Thus
20 the DCF estimate for Atmos appears to be out of line with that of comparable firms.

21 **Q. Did you examine the historical dividend growth for Atmos?**

22 A. I examined the data on historical dividend payments per share for Atmos shown on page
23 4 of my Exhibit. Quarterly dividend payments have increased by about 1.5% each year

1 for the past five years. Note also that dividends increase once per year in November
2 rather than increasing by a uniform amount each quarter as quarterly-dividend growth
3 models assume.

4 **Q. How did you select the eight natural gas utilities and six water utilities for your DCF**
5 **analysis?**

6 A. I looked for water and natural gas utilities covered by Value Line's "Ratings and
7 Reports" that were comparable in size and riskiness to Atmos. I limited the natural gas
8 companies to those with total capital of over \$1.0 billion. Due to the small number of
9 water utilities, I included all of the water utilities covered by Value Line. I then
10 eliminated companies for which adequate earnings and dividend data were not available.
11 I also examined the "beta", a measure of relative risk, for the remaining companies.
12 Betas for these companies ranged from 0.6 to 0.85, all less than 1.0, and encompassing
13 Atmos's beta of 0.70, indicating that they are all of similar riskiness.

14 **Q. What do you conclude from the DCF analysis?**

15 A. The midpoint of the DCF cost of equity range for Atmos 6.305% and is considerably
16 smaller than the midpoints of the DCF ranges for the comparable firms of 8.15%. This
17 suggests that the appropriate DCF cost of equity estimate for Atmos is nearer to the top of
18 its range of 8.3%. To try to confirm the DCF analysis, I turn to the Capital Asset Pricing
19 Model or CAPM.

20 **Q. Can you explain the CAPM?**

21 A. Yes. In the CAPM, an investor's required return on an investment is based on the
22 relative riskiness of the investment. That is, an investor must be compensated with a
23 higher expected return for investing in a riskier investment. The CAPM begins by

1 estimating the risk premium required on a broad portfolio of common stocks relative to a
2 risk-free asset. This risk premium is then adjusted for a particular stock's riskiness
3 relative to the market – that is, the broad portfolio of stocks. This is done by using the
4 stock's beta, which measures the riskiness of the stock relative to the market. The
5 resulting CAPM cost of equity consists of the risk-free return plus beta times the market
6 risk premium.

7 **Q. How do you estimate the risk premium?**

8 A. I calculate risk premia from 2012 Ibbotson® SBB® *Stocks, Bonds, Bills and Inflation®*
9 *Valuation Yearbook*, submitted in response to CAPD First Discovery Request, question
10 32. I calculate these risk premia by subtracting the income portion of the return on long
11 term government bonds, intermediate government bonds and short term bills from the
12 total return on large company stocks. U. S. government bills and bonds are widely
13 considered to have the lowest risk of default of all available debt instruments.

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

15 A. Technically, the lowest risk is associated with very short term Treasury bills, because the
16 short time frame provides the least opportunity for default and little chance that the
17 expected inflation rate will not be realized over the life of the investment. Nevertheless,
18 these short term bills also embody short term returns that may not reflect all factors
19 affecting the expected return on a stock for a multi-year period. If one chooses longer
20 term bonds as the "risk-free" instrument, however, then expected returns over multiple
21 years may be better captured, but more risk is also introduced. This is the risk that the
22 actual inflation rate over the life of the bond may differ from expectations. If this occurs,
23 then the real, inflation adjusted, return on the bond also differs from expectations. This

1 inflation risk in a longer term bond raises the necessary return above the risk-free rate.
2 The analyst must then trade-off any bias introduced by higher risk in longer term
3 instruments against capturing the factors affecting the risk-free return over a longer
4 period.

5 **Q. How do you make this trade-off?**

6 A. Since current interest rates on Treasury bills (T-bills) are at historically very low levels,
7 some consideration for longer term bonds is appropriate. The risk premium of stocks
8 over T-bills from Ibbotson is 8.2%, while the risk premium of stocks over the income
9 component of intermediate term bonds (5-year) is 7.2%, and the risk premium over long
10 term bonds is 6.6%. The most recent yield for five-year T-bonds is 0.721% and has been
11 below 1.0% since November of 2011. Using the figures for five-year bonds, the CAPM
12 cost of equity for an "average" stock – a stock whose beta is 1.0 - is 7.921 to 8.2%.

13 **Q. How do you adjust these estimates for specific companies such as Atmos?**

14 A. The risk premium is adjusted using a stock's beta. I use betas for Atmos and the water
15 and gas utilities previously selected as reported by Value Line. These companies are less
16 risky than the average stock, so their betas range from 0.6 to 0.80. An average stock, or a
17 broad portfolio of stocks representing the market return, has a beta of 1.0. Page 8 of my
18 Exhibit shows the resulting range of CAPM cost of equity estimates. For Atmos, the
19 CAPM cost of equity is 6.04%. Since the CAPM for each company is determined by
20 each company's beta, the comparable water and natural gas utilities all have very similar
21 CAPM cost of equity estimates between 5.32% and 7.12%.

1 **Q. Are there other factors that can affect the CAPM cost of equity estimates?**

2 A. Yes. The pertinent factor at this time is the tendency for the risk premium to expand
3 when interest rates, and bond returns, are low and shrink when interest rates are high.
4 Consequently, because short term interest rates are near zero, the CAPM cost of equity
5 estimates likely underestimate the current cost of equity slightly. Also, as Dr. Vander
6 Weide points out in his testimony, there is some evidence that the CAPM underestimates
7 the cost of equity for firms with betas less than one. Nevertheless, it is reasonable to
8 expect that the cost of equity of relatively low-risk utilities is less than the cost of equity
9 of the market portfolio – that is, the CAPM estimate for a beta of one.

10 **Q. What range of cost of equity estimates is associated with a beta equal to one?**

11 A. Using short term instruments, a stock with a beta of one has a cost of equity equal to the
12 current T-bill rate (0.109%) plus the risk premium for stocks over T-bills (8.2%) or
13 8.309%. Using 5-year instruments, the cost of equity for a stock with a beta of one is
14 $0.721\% + 7.2\% = 7.921\%$. Similarly, using long term bonds, the current rate is 3.092%
15 on 30-year T-bonds and the risk premium is 6.6%, which yields a cost of equity of
16 9.692%.

17 **Q. What do you conclude on the cost of equity for Atmos?**

18 A. The DCF estimates suggest a cost of equity for Atmos of about 8.3%. The maximum
19 CAPM cost of equity results from using a beta of one and the long term treasury bond as
20 the risk-free rate yielding 9.692%. This is an upper bound on the cost of equity for
21 Atmos. The midpoint between the DCF estimate of 8.3% and the upper-bound CAPM
22 estimate of 9.692% is 8.996%. On this basis, I recommend a cost of equity for Atmos of
23 9.0%.

1 **Q. How does your cost of equity of 9.0% compare to that recommended by Atmos's**
2 **witness Dr. Vander Weide?**

3 A. Dr. Vander Weide recommends a cost of equity range for Atmos of 10.7% to 11.3% with
4 a midpoint of 11.0%, but this includes several items with which I disagree, especially the
5 adjustment for flotation or issuance costs and quarterly payment of dividends.

6 **Q. What aspects of Dr. Vander Weide's analysis prompt his recommendation of**
7 **11.0%?**

8 A. His choice of "comparable" firms and I/B/E/S growth rates, his risk premium analysis,
9 and his adjustments for flotation costs and quarterly payment of dividends appear to be
10 the main drivers of his recommendation.

11 **Q. Do you agree with Dr. Vander Weide's choice of comparable firms?**

12 A. No. Although Dr. Vander Weide's natural gas and water utilities selected from Value
13 Line often overlap with those I select, some are not comparable to Atmos. The primary
14 difficulties arise with his choice of two gas companies, ONEOK and Questar, that Value
15 Line does not list as gas utilities. ONEOK does provide natural gas distribution services,
16 but is described as a "diversified energy company that purchases, transports, and
17 distributes natural gas" by Value Line (Ratings and Reports, 9/7/2012). It spun-off its
18 natural gas liquids, pipelines, and storage to ONEOK Partners a few years ago, but
19 continues to holds 43.4% of the equity which affects its earnings and risk. Questar is
20 described similarly, but apparently retains some production capabilities in addition to its
21 pipeline and distribution subsidiaries. ONEOK is particularly questionable since it has the
22 highest earnings growth rate (9.99%) of any of Dr. Vander Weide's gas companies and

1 may bias his DCF estimates upward. The earnings growth rate for Atmos used by Dr.
2 Vander Weide is only 3.53%.

3 **Q. Do you agree with his risk premium analysis?**

4 A. No. He applies the risk premium method to utility equity returns compared to returns on
5 utility bonds. The CAPM employs similar methods, but measures the risk premium of
6 stocks relative to government instruments that are risk-free in that there is little chance of
7 default. Moreover, short term government bills are preferred because the chance that
8 inflation and interest rates will diverge from investor expectations over the life of a short-
9 term bill is virtually nil. The difference between stock returns and a risk-free rate of
10 return reflects *only* the added return required for the risk embodied in stocks over and
11 above the return required to offset the time value of money.

12 The problem with Dr. Vander Weide's utility risk premium is that the returns on
13 utility bonds do not embody only the time value of money, but also include some return
14 for inflation or interest rate risk, as well as the risk of default. Stocks are not subject to
15 inflation risk, because stock prices and stock returns will adjust for changes in inflation as
16 firms adjust their prices for their products, nor are they subject to default risk in the same
17 way that bonds are, since stocks returns can rise when profits far exceed default levels
18 even if the probability of default does not change. Consequently, there is no reason to
19 expect this difference in returns on utility bonds and utility stocks to be stable over time
20 and this can introduce bias into these risk premium estimates.

1 **Q. Do you agree with Dr. Vander Weide's adjustments for flotation costs and quarterly**
2 **dividend payments?**

3 **A.** No. These adjustments, properly conceived, are offsetting and can be ignored for
4 ratemaking purposes. The quarterly dividend payment adjustment, for example, is based
5 on the idea that since the firm has to pay these sums out over the course of the year,
6 rather than all at once at the end, then the firm has to borrow that money at a cost that
7 should be recognized in its cost of equity. The problem with this is that it ignores the
8 profits the firm will earn over the course of the year. The profits of the firm for
9 regulatory purposes are not calculated in this way, but we all know that the firm's profits
10 are not earned all at once at the end of the year. Consequently, a firm earning profits over
11 the course of the year will have the money available to pay quarterly dividends out of
12 those profits and still have profits left to invest to earn an additional return before the end
13 of the year. The end result is that the firm earns higher profits, even after paying
14 quarterly dividends, than those calculated for regulatory purposes when these timing
15 issues are taken into account. These higher profits are sufficient to cover any adjustment
16 for flotation costs as well.

17 I should point out that I am not advocating trying to capture these timing effects
18 for regulatory purposes. Assuming that profits for return purposes are earned all at once
19 at the end of the year is a convenient fiction that removes countless small and difficult to
20 resolve issues from rate proceedings. If one were to try to account for the time value of
21 profits earned over the course of the year, then one would have to decide how often to
22 measure them (daily, weekly, monthly, or quarterly) – shorter periods will require much
23 finer measurement of costs and revenues – and at what rate to value them over time. The

1 timing of rate cases could also become issues for companies affected by weather. The
2 result for a natural gas company with a test year beginning in October would be far
3 different than the result for a test year beginning in June, for example. As I have
4 suggested, many of these timing effects will be offsetting, very difficult to measure
5 accurately, or to some degree arbitrary, making them best ignored for most purposes.
6

7 **CONCLUSION**
8

9 **Q. Can you summarize your recommendations for cost of capital for Atmos?**

10 A. Yes. I concur with Dr. Vander Weide in using a three-year average capital structure for
11 Atmos as shown on page 2 of my Exhibit. I also agree with Dr. Vander Weide on the
12 cost rates of long term debt and short term debt. I recommend a cost of equity of 9.0%
13 resulting in an overall cost of capital of 7.72%.

14 **Q. Does this conclude your testimony at this time?**

15 A. Yes.
16

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

September 25, 2012

Atmos Energy Corporation
Capital Structure and Cost of Capital

<u>Component</u>	<u>%</u>	<u>Cost Rate</u>	<u>Wtd. Cost</u>
Short Term Debt	1.26%	1.34%	0.02%
Long Term Debt	47.42%	6.50%	3.08%
Common Equity	<u>51.32%</u>	9.00%	<u>4.62%</u>
Total	100%		7.72%

**Discounted Cash Flow Analysis
Water and Gas Distribution Utilities**

<u>Company</u>	<u>Beta</u>	<u>Total Capital</u>	<u>Div. Yield</u>	<u>Projected Growth Rates</u>		<u>DCF Range</u>
				<u>Earnings</u>	<u>Dividends</u>	
Atmos En. Midpoint	0.70	\$7.0b	3.81-4.3%	4.0%	1.5%	4.31-8.3% 6.305%
<u>Natural Gas Utilities</u>						
AGL Res.	0.75	\$7.260b	4.54-4.9%	5.5%	2.0%	6.54-10.40%
NiSource	0.85	\$11.655b	3.8%	8.0%	Nil	3.8-11.8%
NJR	0.65	\$1.48b	3.33-3.6%	5.5%	4.0%	7.33-9.1%
NW Nat. Gas	0.60	\$1.44b	3.66-3.8%	4.0%	3.0%	6.66-7.8%
Piedmont	0.70	\$1.99b	3.78-4.0%	2.5%	3.5%	6.18-7.5%
SJI	0.65	\$1.60b	3.06-3.5%	9.0%	9.0%	12.06-12.5%
SW Gas	0.75	\$3.60b	2.65-2.9%	9.0%	8.0%	10.65-11.9%
WGL	0.65	\$2.115b	3.0-3.95%	2.5%	3.0%	5.5-6.95%
Overall Range (without Atmos)						3.8-12.5%
Midpoint (Gas)						8.15%
<u>Water Utilities</u>						
AWWC	0.65	\$11.550b	2.64-2.9%	8.0%	6.5%	9.14-10.9%
Am. States	0.70	\$0.805b	2.8-3.26%	5.5%	4.0%	6.8-8.76%
Aqua Am.	0.65	\$2.885b	2.55-2.6%	7.0%	5.0%	7.55-9.6%
Artesian*	0.55	\$0.245b	3.51-3.7%	na	na	
Cal. Water	0.65	\$1.200b	3.38-3.4%	6.0%	4.0%	7.38-9.4%
Conn. Water*	0.75	\$0.355b	3.05-3.2%	na	na	
Middlesex*	0.70	\$0.320b	3.9%	5.5%	1.5%	5.4-9.4%
SJW	0.85	\$0.825b	3.0%	7.0%	4.0%	7.0-10.0%
York*	0.65	\$0.181b	2.93-3.0%	na	na	
Overall Range (water)						5.4-10.9%
Midpoint (water)						8.15%

Sources: 1) Beta, Total Capital, Dividend Yield, and Growth Rates from Value Line, *Ratings and Reports*, July 20, 2012(Water Companies) and June 8, 2012 (Gas Companies).

2) Dividend Yield, *Wall Street Journal* (WSJ.com), August 8, 2012.

*Listed on NASDAQ only.

Atmos Energy
Quarterly Dividends Paid on Common Stock
Jan. 1, 2007-June 30, 2012

Date	Dividends	Close Price	Annual Yield(%)	Growth(%)
5/23/2012	0.345	32.38	4.26	0
2/23/2012	0.345	32.05	4.31	0
11/22/2011	0.345	33.11	4.17	1.470588235
8/23/2011	0.34	32.20	4.22	0
5/23/2011	0.34	33.08	4.11	0
2/23/2011	0.34	33.37	4.08	0
11/23/2010	0.34	29.97	4.54	1.492537313
8/23/2010	0.335	28.48	4.71	0
5/21/2010	0.335	26.80	5.00	0
2/23/2010	0.335	27.18	4.93	0
11/23/2009	0.335	27.99	4.79	1.515151515
8/21/2009	0.33	27.90	4.73	0
5/21/2009	0.33	24.06	5.49	0
2/23/2009	0.33	22.62	5.84	0
11/21/2008	0.33	24.03	5.49	1.538461538
8/21/2008	0.325	27.05	4.81	0
5/22/2008	0.325	27.53	4.72	0
2/21/2008	0.325	26.85	4.84	0
11/21/2007	0.325	26.47	4.91	1.5625
8/23/2007	0.32	27.35	4.68	0
5/23/2007	0.32	32.51	3.94	0
2/22/2007	0.32	32.53	3.93	

**Capital Asset Pricing Model
Water and Natural Gas Distribution Companies**

<u>Company</u>	<u>Beta</u>	<u>Risk Premium</u>	<u>Weighted RP</u>	<u>5-year T-bond Current Yield</u>	<u>CAPM</u>
Atmos En.	0.70	7.2%	5.04%	1.00%	6.04%
AGL Res.	0.75	7.2%	5.40%	1.00%	6.40%
NiSource	0.85	7.2%	6.12%	1.00%	7.12%
NJR	0.65	7.2%	4.68%	1.00%	5.68%
NW Nat. Gas	0.60	7.2%	4.32%	1.00%	5.32%
Piedmont	0.70	7.2%	5.04%	1.00%	6.04%
SJI	0.65	7.2%	4.68%	1.00%	5.68%
SW Gas	0.75	7.2%	5.40%	1.00%	6.40%
WGL	0.65	7.2%	4.68%	1.00%	5.68%
AWWC	0.65	7.2%	4.68%	1.00%	5.68%
Aqua Am.	0.65	7.2%	4.68%	1.00%	5.68%
Am. States	0.70	7.2%	5.04%	1.00%	6.04%
Cal. Water	0.65	7.2%	4.68%	1.00%	5.68%
SJW	0.85	7.2%	6.12%	1.00%	7.12%
Market	1.0	7.2%	7.20%	1.00%	8.20%

Sources: Beta: Value Line, *Ratings and Reports*, October 22 and December 10, 2010.

Risk Premium: calculated from 2012 *Ibbotson® S&P® Stocks, Bonds, Bills and Inflation® Valuation Yearbook*, submitted in response to the First Discover Request of the Consumer Advocate and Protection Division, Question 7.

Current Yields: 3-month T-bill 0.109%; 1-year T-Note 0.170%; 5-year T-Note 0.721%; 10-year T-note 1.869%; 30-year T-Bond 3.092% : *Wall Street Journal* (WSJ.com), September 14, 2012.

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 Attorney General, Consumer Advocate and Protection Division; 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: *Applied Economics*, *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, 2012.

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 4620/5620, 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

"Econometrics as a Capstone Course in Economics," submitted to *Journal of Economic Education*, 2012.

"Do State Funded Merit Scholarships Reduce High School Dropout Rates?" with Elizabeth A. Perry-Sizemore, submitted to the *Southern Economic Journal*, 2012.

"The Price of Quality: Hedonic Estimation of Implicit Market Models for Higher Education," with Reuben Kyle, submitted to *Journal of Economics and Finance*, 2012.

"Identifying the Best Buys in U.S. Higher Education," with E. Anthon Eff and Reuben Kyle, forthcoming, *Research in Higher Education*, 2012.

"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

- "Supply Innovation and Sales of Recorded Music: 1990-2010," Southern Economic Association Annual Conference, New Orleans, LA, November 2012, forthcoming.
- "Econometrics as a Capstone Course in Economics," American Economic Association National Conference on Teaching Economics, Boston, MA, May 2012.
- "Music Supply, Chart Turnover, and the Random Copying Hypothesis in the Digital Age," with Shea Slonaker, International Industrial Organization Conference, Arlington, VA, March 2012.
- "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 Utilities," 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 Berry's Chapel Utility, Inc. to Change and Increase Rates and Charges (11-00198), April 2012.

Petition of Piedmont Natural Gas, 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, (11-00144), December 2011.

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.**

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

** Oral testimony as well as written.

Klein Exhibit
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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.**