

**BEFORE THE  
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

**Pennsylvania Public Utility Commission**

**:**

**v.**

**:**

**Docket No. 00016750**

**Philadelphia Suburban Water Company**

**:**

**DIRECT TESTIMONY**

**OF**

**DR. J. RANDALL WOOLRIDGE**

**FOR THE**

**PENNSYLVANIA OFFICE OF CONSUMER ADVOCATE**

**February, 2002**

**Philadelphia Suburban Water Company**  
**Docket No. R-00016750**

**Direct Testimony of**  
**Dr. J. Randall Woolridge**

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**LIST OF SCHEDULES**

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<b><u>Schedule</u></b>	<b><u>Title</u></b>
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JRW-2	Summary Financial Statistics
JRW-3	Monthly Dividend Yields
JRW-4	Growth Rate Indicators
JRW-5	Risk Premium Study
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JRW-7	Industry Average Betas
JRW-8	Three-Stage Dividend Discount Model
JRW-9	Risk Premium Assessment

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1 **Q. PLEASE STATE YOUR FULL NAME, ADDRESS, AND OCCUPATION.**

2 A. My name is J. Randall Woolridge and my business address is 120 Haymaker Circle, State  
3 College, PA 16801. I am a Professor of Finance and the Goldman, Sachs & Co. and Frank P.  
4 Smeal Endowed University Fellow in Business Administration at the University Park Campus of  
5 the Pennsylvania State University. In addition, I am affiliated with the Columbia Group Inc., a  
6 public utility consulting firm based in Ridgefield, CT. A summary of my educational background,  
7 research, and related business experience is provided in Appendix A.

8

**I. SUBJECT OF TESTIMONY AND**

**SUMMARY OF RECOMMENDATIONS**

10

11

12 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?**

13 A. I have been asked by the Office of Consumer Advocate ("OCA") to provide an opinion as  
14 to the overall fair rate of return for Philadelphia Suburban Water Company ("PSC" or "Company")  
15 and to evaluate PSC's rate of return testimony in this proceeding.

16 **Q. PLEASE REVIEW YOUR COST OF CAPITAL RETURN FINDINGS.**

17 A. I have independently arrived at a cost of capital for the Company. I have established an  
18 equity cost rate of 9.00% for PSC primarily by applying the discounted cash flow (DCF) approach  
19 to a group of publicly-held water service companies. I have also performed a risk premium study.  
20 Utilizing my equity cost rate, capital structure ratios, and senior capital cost rates, I am

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1 recommending an overall fair rate of return for the Company of 7.47%. This recommendation is  
2 summarized in Schedule JRW-1.

3 **Q. PLEASE SUMMARIZE YOUR ASSESSMENT OF THE COMPANY'S RATE OF**  
4 **RETURN POSITION.**

5 A. The Company's rate of return testimony is offered by Mr. Paul R. Moul. Mr. Moul provides  
6 a recommendation for the Company's capital structure, senior capital cost rates, equity cost rate, and  
7 overall rate of return. The Company's proposed rate of return is inflated due to an inappropriate  
8 capital structure and an overstated equity cost rate. Mr. Moul excludes short-term debt, a source of  
9 capital that PSC has consistently employed in the past. Mr. Moul's estimated equity cost rate of  
10 11.75% is unreasonably high primarily due to 1) an inflated growth rate forecast he uses in his DCF  
11 equity cost rate, (2) the use of a group of local gas distribution companies as a barometer group for  
12 PSC, (3) outdated and seriously flawed risk premium and Capital Asset Pricing Model (CAPM)  
13 studies, and (4) inappropriate adjustments to his equity cost rate estimates.

14

15

**II. COMPARISON GROUP SELECTION**

16

17 **Q. PLEASE DESCRIBE YOUR APPROACH TO DEVELOPING A FAIR RATE OF**  
18 **RETURN RECOMMENDATION FOR PSC.**

19 A. To develop a fair rate of return recommendation for PSC, I evaluate the return requirements  
20 of investors on the common stock of a group of publicly-held water service companies.

1 **Q. PLEASE DESCRIBE YOUR GROUP OF WATER SERVICE COMPANIES.**

2 A. The group, which I refer to as the comparison or water group, were selected on the  
3 following basis: (1) listed as water utility companies and covered by the *Value Line Investment*  
4 *Survey Expanded Edition* and *C.A. Turner Utility Reports*, and (2) water revenues of at least 90% of  
5 total revenues. These screens produced a group of five companies - American States Water  
6 Company, California Water Service Co., Connecticut Water Service Co., Middlesex Water, and  
7 Philadelphia Suburban Corp. American Waterworks and SJW Corp were removed from the group  
8 because they were acquisition targets over the past year.

9 Summary financial statistics for the group are provided on page 1 of Schedule JRW-2. The  
10 mean net plant and operating revenues for the group are \$506.7M and \$168.6M, respectively. On  
11 average, the group has a common equity ratio of 45.6% and a current earned return on common  
12 equity of 10.2%. PSC, which is the largest water company in the group, has net plant of  
13 \$1,198.1M, total revenues of \$301.4M, a common equity ratio of 43%, and a return on equity of  
14 13.6%.

15

16 **III. CAPITAL STRUCTURE RATIOS AND DEBT COST RATES**

17

18 **Q. WHAT CAPITAL STRUCTURE RATIOS AND SENIOR CAPITAL COST RATES**  
19 **ARE YOU USING TO ESTIMATE AN OVERALL RATE OF RETURN FOR PSC?**

20 A. The Company's proposed capital structure, as shown in Schedule 1 of PSC Exhibit No. 4-A,

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1 consists of 47.74% common equity and 52.26% long-term debt. The Company's proposed long-  
2 term debt cost rate is 7.03%.

3 In response to OCA Interrogatory V-8, Mr. Moul has provided the quarterly capitalization  
4 ratios, including and excluding short-term debt, for the past three years. These data are summarized  
5 on page 2 of Schedule JRW-1. There are two issues with respect to PSC's proposed capitalization.  
6 First, it is clear that PSC has consistently used short-term debt as a source of capital. Second, Mr.  
7 Moul has made the claim that PSC will have no short-term debt outstanding as of the end of the test  
8 year. In PSC's last rate case, Mr. Moul proposed a capital structure consisting of 48.7% common  
9 equity, 0.14% preferred stock, and 51.16% long-term debt for the test year ending June 30, 2000.  
10 Mr. Moul stated, 'The Company projects no short-term debt to be outstanding at June 30, 2000.'<sup>1</sup>  
11 As shown below, the Company's actual capitalization as of June 30, 2000 was much different than  
12 Mr. Moul proposed:

Capital	Proposed in R-00994868	Balance @ 6/30/2000	Ratios @ 6/30/2000	Three Year Quarterly Average
Short-Term Debt		63,330,200	8.80%	9.0%
Long-Term Debt	51.16%	361,527,195	50.1%	46.3%
Preferred Stock	0.14%	1,000,000	0.1%	0.1%
Common Equity	48.7%	295,948,845	41.0%	44.6%

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<sup>1</sup> Pennsylvania Public Utility Commission v. Philadelphia Suburban Water Company, (Docket No. R-00994868),

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1 As shown on page 2 of Schedule JRW-1, PSC has consistently used short-term debt as a source  
2 of capital. In addition, unlike as claimed by Mr. Moul, short-term debt has not represented  
3 “temporary interim financing which will be refinanced in the desired proportions of permanent  
4 capital.” As such, I propose using the three-year quarterly average capitalization ratios for PSC  
5 including short-term debt. I have added the preferred stock component of the three-year average,  
6 which is only 0.1%, to common equity. My proposed capital structure ratios and senior capital  
7 cost rates are shown listed below.

Capital	Ratio	Cost Rate
Short-Term Debt	9.0%	2.095%
Long-Term Debt	46.3%	7.03%
Common Equity	44.7%	

8  
9 As indicated, I am using the Company’s proposed long-term debt cost rate of 7.03%. For short-  
10 term debt, I am employing a cost rate of 2.095%, which is indicated by Mr. Moul as the Company’s  
11 short-term debt rate in response to OCA Interrogatory V-8.

**IV. THE COST OF COMMON EQUITY CAPITAL**

**A. OVERVIEW**

1 **Q. WHY MUST AN OVERALL COST OF CAPITAL OR FAIR RATE OF RETURN**  
2 **BE ESTABLISHED FOR A PUBLIC UTILITY?**

3 A. In a competitive industry the return on a firm's common equity capital is determined  
4 through the competitive market for its goods and services. Due to the capital requirements needed  
5 to provide utility services, however, and to the economic benefit to society from avoiding  
6 duplication of these services, public utilities are monopolies. It is not appropriate to permit utilities  
7 to set their own prices because of the lack of competition and the essential nature of the services.  
8 Thus, regulation seeks to establish prices which are fair to consumers and at the same time are  
9 sufficient to meet the operating and capital costs of the utility, i.e., provide an adequate return on  
10 capital to attract investors.

11 **Q. PLEASE PROVIDE AN OVERVIEW OF THE COST OF CAPITAL IN THE**  
12 **CONTEXT OF THE THEORY OF THE FIRM.**

13 A. The total cost of operating a business includes the cost of capital. The cost of common  
14 equity capital is the expected return on a firm's common stock that the marginal investor would  
15 deem sufficient to compensate for risk and the time value of money. In equilibrium, the expected  
16 and required rates of return on a company's common stock are equal.

17 Normative economic models of the firm, developed under very restrictive assumptions,  
18 provide insight into the relationship between firm performance or profitability, capital costs, and the  
19 value of the firm. Under the economist's ideal model of perfect competition, where entry and exit is  
20 costless, products are undifferentiated, and there are increasing marginal costs of production, firms



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1 produce up to the point where price equals marginal cost. Over time, a long-run equilibrium is  
2 established where price equals average cost, including the firm's capital costs. In equilibrium, total  
3 revenues equal total costs, and because capital costs represent investors' required return on the  
4 firm's capital, actual returns equal required returns and the market value and the book value of the  
5 firm's securities must be equal.

6 In the real world, firms can achieve competitive advantage due to product market  
7 imperfections - most notably through product differentiation (adding real or perceived value to  
8 products) and achieving economies of scale (decreasing marginal costs of production). Competitive  
9 advantage allows firms to price products above average cost and thereby earn accounting profits  
10 greater than those required to cover capital costs. When these profits are in excess of that required  
11 by investors, or when a firm earns a return on equity in excess of its cost of equity, investors  
12 respond by valuing the firm's equity in excess of its book value.

13 James M. McTaggart, founder of the international management consulting firm Marakon  
14 Associates, has described this essential relationship between the return on equity, the cost of equity,  
15 and the market-to-book ratio in the following manner:<sup>2</sup>

16 Fundamentally, the value of a company is determined by the cash flow it  
17 generates over time for its owners, and the minimum acceptable rate of return  
18 required by capital investors. This "cost of equity capital" is used to discount the  
19 expected equity cash flow, converting it to a present value. The cash flow is, in turn,  
20 produced by the interaction of a company's return on equity and the annual rate of  
21 equity growth. High return on equity (ROE) companies in low-growth markets, such

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<sup>2</sup> James M. McTaggart, "The Ultimate Poison Pill: Closing the Value Gap," *Commentary* (Spring 1988), p. 2.

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1 as Kellogg, are prodigious generators of cash flow, while low ROE companies in  
2 high-growth markets, such as Texas Instruments, barely generate enough cash flow  
3 to finance growth.  
4

5 A company's ROE over time, relative to its cost of equity, also determines  
6 whether it is worth more or less than its book value. If its ROE is consistently  
7 greater than the cost of equity capital (the investor's minimum acceptable return), the  
8 business is economically profitable and its market value will exceed book value. If,  
9 however, the business earns an ROE consistently less than its cost of equity, it is  
10 economically unprofitable and its market value will be less than book value.  
11

12 As such, the relationship between a firm's return on equity, cost of equity, and market-to-book ratio  
13 is relatively straightforward. A firm, which earns a return on equity above its cost of equity will see  
14 its common stock, sell at a price above its book value. Conversely, a firm which earns a return on  
15 equity below its cost of equity will see its common stock sell at a price below its book value.

16 **Q. WHAT ECONOMIC FACTORS HAVE AFFECTED THE COST OF EQUITY**  
17 **CAPITAL FOR PUBLIC UTILITIES?**

18 A. Schedule JRW-6 provides indicators of public utility equity cost rates for recent years.  
19 Page 1 shows the dividend yields for the fifteen utilities in the Dow Jones Utilities Average over  
20 the past decade. These yields peaked in 1994 at 6.4% and bottomed out in 1998 at 4.3%. Since  
21 that time they have slowly increased to 5.1% as of the year 2000.

22 Average earned returns on common equity and market-to-book ratios are given on page 2 of  
23 Schedule JRW-6. Over the past decade, earned returns on common equity have consistently been  
24 in the 10.0 - 12.0 percent range. The low point was 10.1% in 1997 and they have gradually  
25 increased to 11.9% as of the year 2000. Over the past decade market-to-book ratios for this group

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1 bottomed out at 138% in 1995 and they steadily increased to the 190% range as of the year 2000.

2           The indicators in Schedule JRW-6, coupled with the overall decrease in interest rates,  
3 suggest that capital costs for the Dow Jones Utilities have decreased over the past decade.  
4 Specifically for the equity cost rate, the significant increase in the market-to-book ratio since 1995,  
5 coupled with only a much small increase in the average return on equity, suggests a substantial  
6 decline in the overall equity cost rate.

7 **Q.    WHAT FACTORS DETERMINE INVESTORS' EXPECTED OR REQUIRED**  
8 **RATE OF RETURN ON EQUITY?**

9 A.     The expected or required rate of return on common stock is a function of market-wide, as  
10 well as company-specific, factors. The most important market factor is the time value of money as  
11 indicated by the level of interest rates in the economy. Common stock investor requirements  
12 generally increase and decrease with like changes in interest rates. The perceived risk of a firm is  
13 the predominant factor that influences investor return requirements on a company-specific basis.  
14 Firm risk is often separated into business and financial risk. Business risk encompasses all factors  
15 that affect a firm's operating revenues and expenses. Financial risk results from incurring fixed  
16 obligations in the form of debt in financing its assets.

17 **Q.    COMPARE THE BUSINESS AND FINANCIAL RISK OF PUBLIC UTILITIES**  
18 **AND OTHER INDUSTRIES.**

19 A.     Due to the essential nature of their service as well as their regulated status, public utilities  
20 are exposed to a lesser degree of business risk than other, non-regulated businesses. The relatively

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1 low level of business risk allows public utilities to meet much of their capital requirements through  
2 borrowing in the financial markets, thereby incurring greater than average financial risk.  
3 Nonetheless, the overall investment risk of public utilities is below most other industries. Schedule  
4 JRW-7 provides an assessment of investment risk for 97 different industries as measured by beta,  
5 which according to modern capital market theory is the only relevant measure of investment risk  
6 that need be of concern for investors. These betas come from the *Value Line Investment Survey* and  
7 are compiled by Aswath Damodaran of New York University. They may be found on the Internet  
8 at <http://www.stern.nyu.edu/~adamodar/> (see Updated Data Section). The investment risk of water  
9 utilities is ranked the 3<sup>rd</sup> lowest of the 97 industries. Only alcoholic beverages and electric utilities  
10 (central) have lower measures of investment risk than water utilities.

11 **Q. HOW CAN THE EXPECTED OR REQUIRED RATE OF RETURN ON COMMON**  
12 **EQUITY CAPITAL BE DETERMINED?**

13 A. The costs of debt and preferred stock are normally based on historic or book values and can  
14 be determined with a great degree of accuracy. The cost of common equity capital, however,  
15 cannot be determined precisely and must instead be estimated from market data and informed  
16 judgment. The return to the equity owner should be commensurate with returns on investments in  
17 other enterprises having comparable risks.

18 According to valuation principles, the present value of an asset equals the discounted value  
19 of its expected future cash flows. Investors discount these expected cash flows at their required rate  
20 of return that, as noted above, reflects the time value of money and the perceived riskiness of the

1 expected future cash flows. As such, the cost of common equity is the rate at which investors  
2 discount expected cash flows associated with common stock ownership.

3 Models have been developed to ascertain the cost of common equity capital for a firm.  
4 Each model, however, has been developed using restrictive economic assumptions. Consequently,  
5 judgment is required in selecting appropriate financial valuation models to estimate a firm's cost of  
6 common equity capital, in determining the data inputs for these models, and in interpreting the  
7 models' results. All of these decisions must take into consideration the firm involved as well as  
8 conditions in the economy and the financial markets.

9 **Q. HOW DO YOU PLAN TO ESTIMATE THE COST OF EQUITY CAPITAL FOR**  
10 **THE COMPANY?**

11 A. I rely primarily on the discounted cash flow (DCF) model to estimate the cost of equity  
12 capital. I believe that the DCF model provides the best measure of equity cost rates for public  
13 utilities. I have also performed a risk premium (RP) study, but I give these results less weight  
14 because I believe that risk premium studies provide a less reliable indication of equity cost rates for  
15 public utilities.

16

17 **B. DISCOUNTED CASH FLOW ANALYSIS**

18

19 **Q. BRIEFLY DESCRIBE THE THEORY BEHIND THE TRADITIONAL DCF**  
20 **MODEL.**

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1 A. According to the discounted cash flow (DCF) model, the current stock price is equal to the  
2 discounted value of all future dividends that investors expect to receive from investment in the firm.  
3 As such, stockholders' returns ultimately result from current as well as future dividends. As  
4 owners of a corporation, common stockholders are entitled to a pro-rata share of the firm's earnings.  
5 The DCF model presumes that earnings that are not paid out in the form of dividends are  
6 reinvested in the firm so as to provide for future growth in earnings and dividends. The rate at  
7 which investors discount future dividends, which reflects the timing and riskiness of the expected  
8 cash flows, is interpreted as the market's expected or required return on the common stock.  
9 Therefore this discount rate represents the cost of common equity. Algebraically, the DCF model  
10 can be expressed as:

11  
12 
$$P = \frac{D_1}{(1+k)^1} + \frac{D_2}{(1+k)^2} + \dots + \frac{D_n}{(1+k)^n}$$
  
13  
14  
15

16 where P is the current stock price,  $D_n$  is the dividend in year n, and k is the cost of common equity.

17 **Q. HOW DO YOU ESTIMATE STOCKHOLDERS' EXPECTED OR REQUIRED**  
18 **RATE OF RETURN USING THE DCF MODEL?**

19 A. Under certain assumptions, including a constant and infinite expected growth rate, and  
20 constant dividend/earnings and price/earnings ratios, the DCF model can be simplified to the  
21 following:

22  
23

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1  
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$$P = \frac{D_1}{k - g}$$

5 where  $D_1$  represents the expected dividend over the coming year and  $g$  is the expected growth rate  
6 of dividends. This is known as the constant-growth version of the DCF model. To use the  
7 constant-growth DCF model to estimate a firm's cost of equity, you solve for  $k$  in the above  
8 expression and obtain the following:

9  
10  
11  
12  
13

$$k = \frac{D_1}{P} + g$$

14 In the constant-growth version of the DCF model, the current dividend payment and stock price are  
15 directly observable. Therefore, the primary problem and controversy in applying the DCF model to  
16 estimate equity cost rates entails estimating investors' expected dividend growth rate.

17 **Q. WHAT FACTORS SHOULD ONE CONSIDER WHEN APPLYING THE DCF**  
18 **METHODOLOGY?**

19 A. One should be sensitive to several factors when using the DCF model to estimate a firm's  
20 cost of equity capital. In general, one must recognize the assumptions under which the DCF model  
21 was developed in estimating its components (the dividend yield and expected growth rate). The  
22 dividend yield can be measured precisely at any point in time, but tends to vary somewhat over  
23 time. Estimation of expected growth is considerably more difficult. One must consider recent firm

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1 performance, in conjunction with current economic developments and other information available  
2 to investors, to accurately estimate investors' expectations.

3 **Q. IS THE CONSTANT GROWTH DCF MODEL CONSISTENT WITH**  
4 **VALUATION TECHNIQUES EMPLOYED BY INVESTMENT FIRMS?**

5 A. Yes. Virtually all investment firms use some form of the DCF model as a valuation  
6 technique. Schedule JRW-8 provides a description of a three-stage DCF or dividend discount  
7 model (DDM), which is commonly referred to as the Merrill Lynch DDM.<sup>3</sup> This model presumes  
8 that a company's dividend payout progresses initially through a growth stage, then proceeds  
9 through a transition stage, and finally assumes a steady state stage. The dividend payment stage of  
10 a firm depends on the profitability of its internal investments, which, in turn, is largely a function of  
11 the life cycle of the product or service. Given the regulated status of public utilities, and especially  
12 the fact that their returns on investment are effectively set through the ratemaking process, the  
13 industry would be in the steady-state stage of a three-stage DDM. The DCF valuation procedure  
14 for companies in this stage is the constant-growth DCF.

15 **Q. WHAT DIVIDEND YIELD DO YOU EMPLOY IN YOUR DCF ANALYSIS FOR**  
16 **THE WATER GROUP?**

17 A. The dividend yields on the common stock for the group are provided in Schedule JRW-3  
18 for the twelve-month period ending February, 2002. Over this period, the average monthly

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<sup>3</sup> A description of this model is found in William F. Sharp, Gordon J. Alexander, and Jeffrey V. Bailey, *Investments* (Prentice-Hall, 1995), pp. 590-1.



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1 dividend yield for this group has ranged from a high of 4.0 to a low of 3.3%. The 12-month  
2 average for the group is 3.6 %. For the group, I will employ the average of the 12-month mean  
3 (3.6%) and the February, 2002 (3.5%) dividend yields, which is 3.55%.

4 **Q. PLEASE DISCUSS THE APPROPRIATE ADJUSTMENT TO THE SPOT**  
5 **DIVIDEND YIELD.**

6 A. According to the traditional DCF model, the dividend yield term relates to the dividend  
7 yield over the coming period. As indicated by Professor Myron Gordon, who is commonly  
8 associated with the development of the DCF model for popular use, (1) multiplying the expected  
9 dividend over the coming quarter by 4, and (2) dividing this dividend by the current stock price to  
10 determine the appropriate dividend yield for a firm, which pays dividends on a quarterly basis.<sup>4</sup>

11 In applying the DCF model, it is common to adjust the current dividend for growth over the  
12 coming year as opposed to the coming quarter. This can be complicated because firms tend to  
13 announce changes in dividends at different times during the year. As such, the dividend yield  
14 computed based on presumed growth over the coming quarter as opposed to the coming year can be  
15 quite different. Consequently, it is common to adjust the dividend yield by some fraction of the  
16 long-term expected growth rate.

17 The appropriate adjustment to the dividend yield is further complicated in the regulatory  
18 process when the overall cost of capital is applied to a projected or end-of-future-test-year rate base.

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<sup>4</sup> See Direct Testimony of Myron J. Gordon and Lawrence I. Gould before the FCC at FCC Docket No. 79-05, in the Matter of ATT Petition for Modification of Prescribed Rate of Return, April 1980, p. 62.

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1 The net effect of this application is an overstatement of the equity cost rate estimate derived from  
2 the DCF model. In the context of the constant-growth DCF model, both the adjusted dividend  
3 yield and the growth component are overstated. Put simply, the overstatement results from  
4 applying an equity cost rate computed using current market data to a future or test-year-end rate  
5 base which includes growth associated with the retention of earnings during the year.

6 **Q. GIVEN THIS DISCUSSION, WHAT ADJUSTMENT FACTOR WILL YOU USE**  
7 **FOR YOUR DIVIDEND YIELD?**

8 A. I will adjust the dividend yield for the two groups by 1/2 the expected growth so as to  
9 reflect growth over the coming year.

10 **Q. PLEASE DISCUSS THE GROWTH RATE COMPONENT OF THE DCF MODEL.**

11 A. There is much debate as to the proper methodology to employ in estimating the growth  
12 component of the DCF model. By definition, this component is investors' expectation of the long-  
13 term dividend growth rate. Presumably, investors use some combination of historic and/or  
14 projected growth rates for earnings and dividends per share and for internal or book value growth to  
15 assess long-term potential. Alternative approaches to measure these expectations tend to generate  
16 different results, and therein lies the debate.

17 **Q. HOW ARE YOU DETERMINING A GROWTH RATE COMPONENT FOR YOUR**  
18 **DCF MODEL?**

19 A. I have analyzed many measures of growth for the companies in the water company group.  
20 Initially, I evaluated historic earnings, dividends, and book value per share growth rates as provided

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1 in the *Value Line Investment Survey*. I have also used *Value Line's* 5-year projected growth rate  
2 estimates for earnings, dividends, and book value per share. In addition, I have utilized earnings  
3 growth rate forecasts as provided by Zacks, Multex Global, and First Call. These services solicit 5-  
4 year earning growth rate projections for securities analysts and compile and publish the averages of  
5 these forecasts on a monthly basis. They are readily available on the Internet. Finally, I have also  
6 assessed prospective growth as measured by prospective earnings retention rates and returns on  
7 average common equity.

8 **Q. PLEASE DISCUSS HISTORIC GROWTH IN EARNINGS AND DIVIDENDS AS**  
9 **WELL AS INTERNAL GROWTH.**

10 A. Historic growth rates for earnings, dividends, and book value per share are readily available  
11 to virtually all investors and presumably an important ingredient in forming expectations  
12 concerning future growth. However, one must use historic growth numbers as measures of  
13 investors' expectations with caution. In some cases, past growth may not reflect future growth  
14 potential. Also, employing a single growth rate number (for example, for five or ten years), is  
15 unlikely to accurately measure investors' expectations due to the sensitivity of a single growth rate  
16 figure to fluctuations in individual firm performance as well as overall economic fluctuations (i.e.,  
17 business cycles). However, one must appraise the context in which the growth rate is being  
18 employed. According to the conventional DCF model, the expected return on a security is equal to  
19 the sum of the dividend yield and the expected long-term (actually **infinite**) growth in dividends.  
20 Therefore, to best estimate the cost of common equity capital using the conventional DCF model,

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1 one must look to long-term growth rate expectations.

2 Internally generated growth is a function of the percentage of earnings retained within the  
3 firm (the earnings retention rate) and the rate of return earned on those earnings (the return on  
4 equity). The internal growth rate is computed as the retention rate times the return on equity.  
5 Internal growth is significant in determining long-run earnings and, therefore, dividends. Investors  
6 recognize the importance of internally generated growth and pay premiums for stocks of companies  
7 that retain earnings and earn high returns on internal investments.

8 **Q. WHAT GROWTH DATA HAVE YOU REVIEWED FOR THE GROUP OF**  
9 **WATER COMPANIES?**

10 A. Schedule JRW-4 provides the following growth rates for the companies in the group:  
11 historic five- and ten- year historic growth rates in earnings, dividends, and book value per share  
12 (where available) as computed by *Value Line* (using the *Value Line* methodology); and projected 5-  
13 year EPS growth rates from Zacks, Multex Global, and First Call as well as *Value Line's* projected  
14 5-year growth rates for earnings, dividends, and book value per share.

15 **Q. PLEASE SUMMARIZE YOUR ANALYSIS OF THE *VALUE LINE'S* HISTORIC**  
16 **AND PROSPECTIVE GROWTH FOR THE GROUP OF WATER COMPANIES.**

17 A. Page 1 of Schedule JRW-4 provides a summary of historic and prospective growth rates for  
18 the companies in the group as provided in the *Value Line Investment Survey*. Historic growth in  
19 earnings, dividends, and book value for the group range from 2.4% to 4.4%, and the average of the  
20 historic five- and ten- year earnings, dividends, and book value growth is 3.5%. Prospective

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1 internal growth is 5.0%, with *Value Line* average projected retention and equity return rates of  
2 40.0% and 11.3%, respectively. *Value Line* average projected growth rates for earnings, dividends,  
3 and book value per share for the group are 6.8%, 2.8%, and 4.7%, respectively. However, these  
4 projections are for only three of the five companies, as there are no projections for Connecticut  
5 Water Service and Middlesex Water.

6 **Q. PLEASE ASSESS GROWTH FOR THE GROUP AS MEASURED BY ANALYSTS'**  
7 **FORECASTS OF EXPECTED 5-YEAR GROWTH IN EARNINGS PER SHARE (EPS).**

8 A. Zacks, First Call, and Multex Global (formerly I/B/E/S) collect, summarize, and publish  
9 Wall Street analysts' projected 5-year EPS growth rate forecasts for companies. These forecasts are  
10 provided for the comparison group companies on page 2 of Schedule JRW-4. Since (1) there is  
11 considerable overlap in analyst coverage between the three services, and (2) not all of the  
12 companies have forecasts from the different services, I have averaged the expected 5-year EPS  
13 growth rates from the three services (along with the 5-year EPS forecasts from *Value Line*) for each  
14 company to arrive at an expected EPS growth rate by company. The right-hand column shows these  
15 averages, and the resulting mean for the group, which is 4.7%.

16 **Q. PLEASE SUMMARIZE YOUR ANALYSIS OF THE HISTORIC AND**  
17 **PROSPECTIVE GROWTH OF THE WATER COMPANY GROUP.**

18 A. Table 1, shown below, provides a summary of historic and prospective growth rates for  
19 the group. Historic indicators imply an average growth rate for the comparison group in the  
20 range of 2.4% to 4.4%, with an average of 3.5%. Projected growth for the group is a little higher

1 and has a broader range. Given these results and the discussion above, and giving additional  
2 weight to the results for PSC, expected growth appears to be in the 5.00 – 5.50 percent range. I  
3 will use the midpoint of this range - 5.25% - as the expected growth component of my DCF  
4 model.

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<b>Historic Growth</b>	
5-Year Historic EPS Growth	3.6%
5-Year Historic DPS Growth	2.4%
5-Year Historic BVPS Growth	4.4%
10-Year Historic EPS Growth	3.8%
10-Year Historic DPS Growth	2.8%
10-Year Historic BVPS Growth	4.0%
<b>Projected Growth</b>	
Prospective Internal Growth	5.0%
Average Projected DPS Growth (3 Cos)	2.8%
Average Projected BVPS Growth (3 Cos)	4.7%
Average Projected EPS Growth (3 Cos)	6.8%
Average Projected EPS Growth	
American States Water Co.	5.3%
California Water	5.5%
Connecticut Water	3.0%
Middlesex Water	3.0%
Philadelphia Suburban	6.8%
Average Projected EPS Growth	4.7%

17 **Q. WHAT IS YOUR INDICATED COMMON EQUITY COST RATE FROM THE**  
18 **DCF MODEL FOR COMPARISON GROUP?**

19 **A. My DCF-derived equity cost rate for the group is:**

20

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1 DCF Equity Cost Rate = D/P + G

2 Water Group 3.55% \* 1.02625 + 5.25 = 8.90%

3 **Q. IN ADDITION TO A COMPARISON GROUP OF WATER COMPANIES, MR.**  
4 **MOUL HAS USED A GROUP OF GAS COMPANIES (LDCs) TO ESTIMATE PSC'S**  
5 **EQUITY COST RATE. ARE YOU ALSO USING A GROUP OF LDCs TO ESTIMATE**  
6 **PSC'S COST OF COMMON EQUITY CAPITAL?**

7 A. No. As I discuss in my Rebuttal Testimony, I do not believe that it is appropriate to use  
8 LDCs to estimate an equity cost rate for PSC.

9  
10 **C. RISK PREMIUM APPROACH**

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12 **Q. HOW WILL YOU ESTIMATE THE COMPANY'S EQUITY COST RATE USING**  
13 **THE RISK PREMIUM APPROACH?**

14 A. According to the risk premium approach, the cost of equity is the sum of the interest rate on  
15 a risk-free bond ( $R_f$ ) and a risk premium (RP), as in the following:

$$k = R_f + RP$$

16  
17 I use the yield on long-term Treasury securities as the risk-free interest rate, and estimate the risk  
18 premium by assessing investors' return requirements and market-to-book ratios for water service  
19 companies.

20 **Q. PLEASE PROVIDE AN OVERVIEW OF YOUR RISK PREMIUM APPROACH.**

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1 A. My risk premium approach is based on two fundamental economic concepts: the economic  
2 theory of the firm, as discussed earlier in my testimony, and the fundamental financial proposition  
3 of a positive relationship between risk and return. According to economic theory, when a firm's  
4 accounting profits (which include capital costs) are sufficient to meet investors' requirements, the  
5 market value and the book value of the firm will be equal. Accordingly, if a firm is earning profits  
6 greater than required by investors, the market-to-book ratio will be greater than 1.0, and if a firm is  
7 earning profits less than required by investors, the market-to-book ratio will be less than 1.0 In  
8 recent years, the market-to-book ratios for water service companies have been greater than 1.0,  
9 indicating that the earnings of these companies are more than sufficient to meet investors'  
10 requirements. The positive relationship between risk and return requires that, in a world of risk  
11 aversion, investors require a higher expected return for a higher level of perceived risk in an  
12 investment. By definition, the premium for assuming risk is based on the difference between the  
13 expected return on the risky investment and the expected return on a riskless investment.

14 **Q. HOW DO YOU PERFORM YOUR RISK PREMIUM STUDY?**

15 A. As discussed above, a market-to-book ratio of 1.0 indicates that investors' return  
16 requirements are being met. In my approach, the risk premium, defined as the return on common  
17 equity minus the riskless interest rate, is compared to contemporaneous market-to-book ratios. As  
18 such, this methodology shows the additional return that utility common stock investors require  
19 above the risk-free interest rate.

20 To establish a cost of equity for the Company, I examine required rates of return as



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1 indicated by both accounting- and market- based rates of return. I perform the study in three steps  
2 for the companies in the water group: (1) using the companies in the group, I compute the premium  
3 for risk required by investors as the expected return on equity minus the yield on long-term  
4 Treasury securities; (2) I regress the risk premium for each firm on the market-to-book ratio for  
5 different time periods; and (3) I add the indicated average risk premium for the water service  
6 companies to the current yield on long-term Treasury securities.

7 **Q. PLEASE DISCUSS THE FEATURES OF YOUR RISK PREMIUM STUDY.**

8 A. First, by directly comparing the expected returns on equity (minus the risk-free interest rate)  
9 to market-to-book ratios, I am directly measuring the accounting earnings required by investors.  
10 Risk premium studies that measure a risk premium as the difference between bond and stock  
11 returns do not directly address the adequacy of accounting earnings. Second, I am using historic  
12 and forecasted returns on equity and not simply historic bond and stock returns to determine  
13 investor return requirements and an appropriate risk premium. Security prices and capital cost rates  
14 are based on expectations of the future and not on extrapolations of returns from the past. Third, I  
15 am employing a group of water service companies (and not a broader group of companies or  
16 utilities) to measure investors' return requirements. Fourth, I am using the same base in my risk  
17 premium study - the yield on long-term Treasury securities - as I use in estimating the cost of equity  
18 for the Company employing the risk premium approach. I do not establish a risk premium utilizing  
19 bond returns as a base and then estimate an equity cost rate utilizing current bond yields as a base  
20 rate. And finally, since my risk premium study does not evaluate returns derived from a series of

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1 security prices over long time periods, the appropriate measure of central tendency for historic  
2 returns - arithmetic mean or median, or geometric mean returns - is not an issue.

3 **Q. WHAT RISK-FREE RATE OF INTEREST ARE YOU USING IN YOUR**  
4 **ANALYSIS?**

5 A. The riskless or risk-free rate of interest is presumed to be equal to the yields on obligations  
6 of the U.S. Treasury. These obligations are termed riskless because they are presumed to have no  
7 default risk.

8 Page 2 of Schedule JRW-5 shows the yields on long-term Treasury securities over the past  
9 24 months. In recent months these yields have been in the 5.40% to 5.50% range. Considering this  
10 range, I will utilize the 5.50% as the risk-free rate in my risk premium approach.

11 **Q. PLEASE PROVIDE THE DETAILS OF YOUR RISK PREMIUM STUDY.**

12 A. As described above, I examine required rates of return as indicated by both accounting- and  
13 market- based rates of return. My risk premium study uses past and expected returns since capital  
14 cost rates and security prices are based on expectations of the future. I perform a risk premium  
15 study for the companies in the water group. Forecasts of returns on common equity (ROE) are  
16 available from the *Value Line Investment Survey* for these companies. I use a one-year base period  
17 (2001/2002) in my risk premium study. *Value Line* publishes individual company updates four  
18 times per year. For each *Value Line* update, I obtain the year t-1, t, t+1 and the 3-5 year projected  
19 ROE. Market-to-book ratios as of the month of the update are obtained from *C. A. Turner Utility*  
20 *Reports*. The yield on long-term Treasury securities for the appropriate month comes from the

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1 Federal Reserve Website ([www.federalreserve.gov](http://www.federalreserve.gov)). For each company, I compute the risk  
2 premium as the ROE minus the yield on long-term Treasury securities. I average the ROEs for the  
3 different time periods to determine the expected ROE. I then regress the risk premium (using the  
4 average ROE and the risk-free rate) on the market-to-book ratio for the firms in the water group.  
5 Finally, I add the indicated average risk premium to the current yield on long-term Treasury  
6 securities to obtain an equity cost rate for the Company.

7 **Q. PLEASE DISCUSS THE RESULTS OF YOUR RISK PREMIUM ANALYSIS.**

8 A. The table on page 1 of Schedule JRW-5 shows the regression results for the four different  
9 time periods. The results suggest that risk premium has ranged from about 2.8% to 4.4% over the  
10 past year. The average is 3.34%, which I will use as my equity risk premium.

11 **Q. WHAT EQUITY COST RATE DO YOU ESTIMATE FOR THE COMPANY**  
12 **USING THE RISK PREMIUM APPROACH?**

13 A. Given my risk-free rate and risk premium, the indicated equity cost rate for the group using  
14 the risk premium approach is:

15 Risk Premium Equity Cost Rate	=	Riskfree Rate	+	Risk Premium	
16 Water Group		5.50%	+	3.34%	= 8.84%

17

18

**D. EQUITY COST RATE SUMMARY**

19

20 **Q. PLEASE SUMMARIZE YOUR EQUITY COST RATE STUDY.**

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1 A. My DCF analysis for the comparable group indicates an equity cost rate of 8.9%. My risk  
2 premium analysis suggests an equity cost rate of 8.84%.

3 **Q. GIVEN THESE RESULTS, WHAT EQUITY COST RATE RECOMMENDATION**  
4 **ARE YOU MAKING FOR PSC?**

5 A. Given these results, I am recommending an equity cost rate of 9.0% for PSC.

6 **Q. HOW DO YOU TEST THE REASONABLENESS OF YOUR 9.0%**  
7 **RECOMMENDATION?**

8 A. To test the reasonableness of my 9.0% recommendation, I have examined the relationship  
9 between the return on common equity and the market-to-book ratios for the water group.

10 **Q. WHAT DO THE RETURNS ON COMMON EQUITY AND MARKET-TO-BOOK**  
11 **RATIOS FOR THE GROUP INDICATE ABOUT THE REASONABLENESS OF YOUR**  
12 **9.0% RECOMMENDATION?**

13 A. Schedule JRW-2 provides financial performance and market valuation statistics for the  
14 group. The average current return on equity and market-to-book ratio for the group are 10.2% and  
15 2.50, respectively. These results indicate that these companies are earning returns on equity well in  
16 excess of their equity cost rates. As such, this provides clear evidence that my recommended equity  
17 cost rate of 9.0% is reasonable and fully consistent with the financial performance and market  
18 valuation of the water group.

19 **Q. FINALLY, PLEASE DISCUSS THIS RECOMMENDATION IN LIGHT OF**  
20 **RECENT YIELDS ON PUBLIC UTILITY BONDS.**

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1 A. In recent months the yields on public utility bonds have been in the 7.50 percent range. My  
2 equity return recommendation of 9.0% must be viewed in the context of the significant shift in the  
3 risk and return characteristics of bonds and stocks over the past two decades. This change and its  
4 implications for equity risk premiums are discussed further in my critique of Mr. Moul's testimony.

5 In short, the relative risk of stocks and bonds has changed in recent years as stocks have become  
6 less volatile and risky while bonds have become more volatile and risky. This change is readily  
7 evidenced by the high level of real interest rates (nominal yields minus inflation) in the economy.  
8 Today, with 30-year Treasuries yielding about 5.5% and inflation of about 2.0%, the real rate of  
9 interest is approximately 3.5 percent. Historically, this figure has averaged 2.0 percent. The fact  
10 that stocks and bonds are nearly equal in terms of volatility and risk implies that investors' required  
11 rates of returns on stocks and bonds are much closer today than in the past. Accordingly, the return  
12 premium that equity investors require over bond yields is much lower than it was when stock  
13 returns were much more volatile than bond returns.

14 **Q. WHAT IS THE MAGNITUDE OF THE DECLINE OF THE EQUITY RISK**  
15 **PREMIUMS?**

16 A. Most historic assessments of the equity risk premium (such as the analysis performed by  
17 Mr. Moul) suggest an equity risk premium of 5-7 percent above the rate on long-term Treasury  
18 bonds. However, recent studies by leading academic scholars and investment firms suggest that  
19 this equity risk premium is now in the 2-4 percent range.

20 **Q. PLEASE BRIEFLY SUMMARIZE THE NEW ACADEMIC STUDIES ON THE**

1 **DECLINE IN THE EQUITY RISK PREMIUM.**

2 A. Several recent studies suggest that the historic equity risk premium is severely biased as a  
3 measure of the expected risk premium. Jeremy Siegel, a Wharton finance professor and author of  
4 the popular book *Stocks for the Long Term*, recently published a study entitled "The Shrinking  
5 Equity Risk Premium."<sup>5</sup> His concluding observations include the following:

6 "The degree of the equity risk premium calculated from data estimated from 1926 is  
7 unlikely to persist in the future. The real return on fixed-income assets is likely to be  
8 significantly higher than estimated on earlier data. This is confirmed by the yields available  
9 on Treasury index-linked securities, which currently exceed 4%. Furthermore, despite the  
10 acceleration in earnings growth, the return on equities is likely to fall from its historical  
11 level due to the very high level of equity prices relative to fundamentals."  
12

13 The declining equity risk premium, as well as the controversy of alternative approaches for  
14 estimating the cost of equity capital, has been the subject of several very recent studies. The  
15 primary debate revolves around two related issues: (1) the size of equity risk premium which is the  
16 return equity investors require above the yield on bonds; and (2) the fact that estimates of the equity  
17 risk premium using fundamental firm data (earnings and dividends) are much lower than estimates  
18 using historic stock and bond return data. Eugene Fama and Ken French, two of the most  
19 preeminent scholars in finance, recently published a paper entitled "The Equity Premium."<sup>6</sup> They  
20 use dividend and earnings growth models to estimate expected stock returns and equity risk  
21 premiums and compare these results to actual stock returns. For the period 1950-1999, they

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<sup>5</sup>Jeremy J. Siegel, "The Shrinking Equity Risk Premium, *The Journal of Portfolio Management* (Fall, 1999).

<sup>6</sup>Eugene F. Fama and Kenneth R. French, "The Equity Premium," Working Paper, Sloan School of Management,

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1 estimate that the expected equity risk premium from DCF models using dividend and earnings  
2 growth to be 3.40% and 4.83%. These figures are much lower than the equity risk premium  
3 produced from the average stock and bond return return that is 8.28%. They conclude that the  
4 estimates using DCF models and fundamental data are superior to those using historic stock returns  
5 for three reasons: (1) the estimates are more precise (a lower standard error); (2) The Sharpe ratio,  
6 which is measured as the [(expected stock return – risk-free rate)/standard deviation], is constant  
7 over time for the DCF models but more than doubles for the average stock-bond return model; and  
8 (3) valuation theory specifies relations between the market-to-book ratio, return on investment, and  
9 cost of equity capital that favor estimates from fundamentals. They conclude that the high average  
10 stock returns over the past 50 years were the result of low expected returns and that the average  
11 equity risk premium has been in the 3-4 percent range.

12 A soon-to-be published study by James Claus and Jacob Thomas of Columbia University  
13 provides direct support for the findings of Fama and French.<sup>7</sup> These authors compute equity risk  
14 premiums over the 1985-1998 period by (1) computing the discount rate that equates market values  
15 with the present value of expected future cash flows, and (2) then subtracting the risk-free interest  
16 rate. The expected cash flows are developed using analysts' earnings forecasts. They conclude that  
17 over this period the equity risk premium is in the range of 3.0%. They note that over this period  
18 average stock returns overstate the equity risk premium because as the equity risk premium has

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MIT, 2001.

<sup>7</sup>James Claus and Jacob Thomas, "Equity Risk Premia as Low as Three Percent? Empirical Evidence from Analysts' Earnings Forecasts for Domestic and International Stock Market," Forthcoming, *Journal of Finance*.

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1 declined, stock prices have risen (present values increase when required rates of return decline).  
2 The higher stock prices have produced returns that have exceeded expectations and therefore  
3 historic equity risk premium estimates are biased upwards.

4 **Q. DOES THE INVESTMENT COMMUNITY ALSO RECOGNIZE THAT THE**  
5 **EQUITY RISK PREMIUM HAS DECLINED?**

6 A. Yes. One of the first studies in this area was by Stephen Einhorn, one of Wall Street's  
7 leading investment strategists.<sup>8</sup> His study showed that the market or equity risk premium had  
8 declined to the 2.0 to 3.0 percent range by the early 1990s. Among the evidence he provided in  
9 support of a lower equity risk premium is the inverse relationship between real interest rates  
10 (observed interest rates minus inflation) and stock prices. He noted that the decline in the market  
11 risk premium has led to a significant change in the relationship between interest rates and stock  
12 prices. One implication of this development was that stock prices had increased higher than would  
13 be suggested by the historic relationship between valuation levels and interest rates.

14 The equity risk premiums of some of the other leading investment firms today support the  
15 result of the academic studies. An article in *The Economist* indicated that some other firms like J.P.  
16 Morgan are estimating an equity risk premium for an average risk stock in the 2.0 to 3.0 percent  
17 range above the interest rate on U.S. Treasury bonds.<sup>9</sup>

18 **Q. WHAT ECONOMIC DEVELOPMENTS HAVE BEEN ASSOCIATED WITH THE**

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<sup>8</sup> See Steven G. Einhorn, "The Perplexing Issue of Valuation: Will the Real Value Please Stand Up?" *Financial Analysts Journal* (July-August 1990, pp. 11-16).



1 **DECLINE IN THE EQUITY RISK PREMIUM?**

2 A. The expanded business cycle of the 1990's produced the longest continuous period of  
3 economic growth in U.S. business history. Goldman, Sachs published a report on the new economy  
4 entitled "The Brave New Business Cycle" and discussed its implications for corporate profitability  
5 and stock market valuation. According to the report, this "Brave New Business Cycle," which  
6 features longer periods of business expansion, has resulted from heightened competition,  
7 globalization, deregulation, and technology. Among the implications of the new business cycle are  
8 higher stock valuation levels (higher P/E ratios) due to a lower equity risk premium. According to  
9 the report:<sup>10</sup>

10 **Signs of a reduced equity risk premium.** In theory, by stabilizing the growth of the  
11 earnings stream, the Brave New Business Cycle should reduce the premium that investors  
12 require for equity investments. This premium is nothing more than the difference in  
13 expected total return between investing in equities and investing in "safe" fixed-income  
14 assets with similar duration, such as intermediate- to long-term government bonds.  
15 However, although the equity risk premium is easy to define conceptually, it is difficult to  
16 measure because ex post returns are not the same as ex ante expectations, even for periods  
17 of several years. Even so, support for the notion that the equity risk premium has declined  
18 can be found in two related facts. First, the P/E multiple for the S&P 500 has been trending  
19 up for more than a decade, whereas it should normally rise in recessions and early  
20 expansions and then fall progressively during expansions, as the excess slack in the  
21 economy is exhausted. Second, this increase has far outstripped the modest decline in real  
22 yields on 10-year government bonds that has occurred since the early 1980s. These  
23 disparate trends strongly suggest that the equity risk premium is probably moving down.  
24

25 **Q. IS THIS DECLINE IN THE EQUITY RISK PREMIUM A GENERALLY**

---

<sup>9</sup> For example, see "Welcome to Bull Country," *The Economist* (July 18, 1998), pp. 21-3, and "Choosing the Right Mixture," *The Economist* (February 27, 1999), pp. 71-2.

<sup>10</sup> Edward F. McKelvey, "The Brave New Business Cycle: Its Implications for Corporate Profitability," U.S. Economic

1 **ACCEPTED NOTION BY GOVERNMENT POLICY MAKERS?**

2 A. Yes. In fact, Alan Greenspan, the Chairman of the Federal Reserve Board, indicated in an  
3 October 14, 1999 speech on financial risk that the fact that equity risk premiums have declined  
4 during the past decade is "not in dispute." He summarized some of the elements of the decline in  
5 the following passage:<sup>11</sup>

6 "There can be little doubt that the dramatic improvements in information technology in  
7 recent years have altered our approach to risk. Some analysts perceive that information  
8 technology has permanently lowered equity premiums and, hence, permanently raised the  
9 prices of the collateral that underlies all financial assets.

10  
11 The reason, of course, is that information is critical to the evaluation of risk. The less that  
12 is known about the current state of a market or a venture, the less the ability to project  
13 future outcomes and, hence, the more those potential outcomes will be discounted.

14  
15 The rise in the availability of real-time information has reduced the uncertainties and  
16 thereby lowered the variances that we employ to guide portfolio decisions. At least part of  
17 the observed fall in equity premiums in our economy and others over the past five years  
18 does not appear to be the result of ephemeral changes in perceptions. It is presumably the  
19 result of a permanent technology-driven increase in information availability, which by  
20 definition reduces uncertainty and therefore risk premiums. This decline is most evident  
21 in equity risk premiums. It is less clear in the corporate bond market, where relative  
22 supplies of corporate and Treasury bonds and other factors we cannot easily identify have  
23 outweighed the effects of more readily available information about borrowers.

24  
25 The marked increase over this decade in the projected slope of technology advance, of  
26 course, has also augmented expectations of earnings growth, as evidenced by the dramatic  
27 increase since 1995 in security analysts' projections of long-term earnings. While it may  
28 be that the expectations of higher earnings embodied in equity values have had a spillover  
29 effect on discount factors, the latter remain essentially independent of the earnings  
30 expectations themselves.

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Research, Goldman, Sachs & Co., p. 7.

<sup>11</sup> Alan Greenspan, "Measuring Financial Risk in the Twenty-First Century," OCC Conference, October 14, 1999.

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1 That equity premiums have generally declined during the past decade is not in dispute.  
2 What is at issue is how much of the decline reflects new, irreversible technologies, and  
3 what part is a consequence of a prolonged business expansion without a significant period  
4 of adjustment. The business expansion is, of course, reversible, whereas the technological  
5 advancements presumably are not.”  
6  
7  
8

9 **V. CRITIQUE OF PSC'S RATE OF RETURN TESTIMONY**

10  
11 **Q. PLEASE SUMMARIZE MR. MOUL'S OVERALL RATE OF RETURN**  
12 **RECOMMENDATION.**

13 A. As summarized below, Mr. Moul's overall rate of return recommendation is 9.28%.

<u>Source</u>	<u>Capital Ratio</u>	<u>Cost Rate</u>	<u>Weighted Cost Rate</u>
L-T Debt	52.26%	7.03%	3.67%
<u>Common Equity</u>	<u>47.74%</u>	<u>11.75%</u>	<u>5.61%</u>
Cost of Capital			9.28%

14  
15  
16  
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19  
20 Whereas I have adopted Mr. Moul's long-term debt cost rate, I believe that his capital structure,  
21 equity cost rate estimate, and overall rate of return recommendation are excessive.

22 **Q. PLEASE REVIEW YOUR OBJECTION TO MR. MOUL'S CAPITAL**  
23 **STRUCTURE FOR PSC.**

24 A. As noted above, PSC has consistently used short-term debt as a source of capital and  
25 therefore it should be included in the Company's capital structure. Page 2 of Schedule JRW-1  
26 provides PSC's quarterly capitalization ratios, including and excluding short-term debt, for the

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1 past three years. On average on a quarterly basis, 9.0% of PSC's capital has been in the form of  
2 short-term debt, with a low of 7.2% and a high of 11.4%. PSC has had short-term debt  
3 outstanding each and every quarter over the past three years. Hence, short-term debt has not  
4 represented temporary interim financing which is refinanced periodically with permanent capital.  
5 Furthermore, also as previously noted, in PSC's last rate case (Docket No. R-00994868), Mr.  
6 Moul proposed a capital structure without short-term debt, claiming that no short-term debt  
7 would be outstanding as of the end of the test year ending June 30, 2000, Nonetheless, as of June  
8 30, 2000, PSC had over \$63.33M of short-term debt outstanding, which represented 8.8% of total  
9 capital.

10 In sum, given PSC's consistent use of short-term debt as a source of capital, Mr. Moul  
11 has erred in not including it in his proposed capital structure for the Company.

12 **Q. BEFORE DISCUSSING THE MR. MOUL'S EQUITY COST RATE ESTIMATE,**  
13 **PLEASE ADDRESS THE BUSINESS RISK OF PSC RELATIVE TO THE WATER**  
14 **GROUP.**

15 A. Standard & Poor's rates the business risk of utilities on a 1 to 10 scale, with 1 being the  
16 lowest business risk and 10 the highest. PSC is rated a 2 on this scale, which indicates a very  
17 low business risk level and which is below that of the Water Group. Furthermore, Pennsylvania  
18 allows for timely recovery of capital expenditures oriented toward system improvements through  
19 the Distribution System Improvement Charge (DSIC). This reduces the business risk for  
20 Pennsylvania water companies. As provided in the Company's response to OCA Interrogatory

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1 V-5, between 40 and 50 percent of PSC's capital expenditures over the next five years can be  
2 recovered through the DSIC. As such, the S&P business risk ratings and the DSIC indicate that  
3 PSC has less business risk than the Water Group.

4 **Q. PLEASE REVIEW MR. MOUL'S EQUITY COST RATE APPROACHES.**

5 A. Mr. Moul estimates an equity cost rate for PSC by applying several equity cost rate models  
6 to PSC, a Water Group, and an LDC group. His water group includes American States Water  
7 Company, California Water Service Group, Philadelphia Suburban, and SJW Corp. The LDC  
8 group includes eleven local gas distribution companies. His equity cost rate approaches include a  
9 DCF model, a comparable earnings analysis, a historic risk premium, and the CAPM. His equity  
10 cost rate estimates are summarized below:

Summary of Approaches and Results

	<u>PSC</u>	<u>Water Group</u>	<u>LDC Group</u>
DCF	11.69%	10.29%	13.16%
Risk Premium	12.50%	12.50%	13.00%
CAPM	13.98%	14.15%	13.45%
Comparable Earnings	13.55%	13.55%	13.55%

13  
14 Based on these figures, he arrives at an equity cost rate estimate for PSC of 11.75%.

15 The primary errors in his equity cost rate studies are (1) excessive DCF growth rates for  
16 PSC, the Water Group, and the LDC Group which are well above average historic and projected  
17 growth rate measures, (2) an arbitrary adjustment to his DCF estimates to reflect the difference  
18 between book and market values in the firm's capitalizations; (3) outdated and biased equity risk  
19 premium estimates for his risk premium and CAPM analyses, and (4) a flawed comparable earnings

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1 analysis. I also believe that he has erred (a) in his choice of companies for his Water Group and (b)  
2 by using a group of LDCs to estimate PSC's equity cost rate. These errors are discussed in detail  
3 below.

4 **Q. PLEASE SUMMARIZE MR. MOUL'S DCF ESTIMATES.**

5 A. Mr. Moul performs a traditional DCF analysis and then adjusts this result upwards to reflect  
6 the difference between the market and book value capitalizations of his water group. Mr. Moul  
7 uses the following adjusted dividend yields for PSC and the Water and LDC Groups:<sup>12</sup>

	PSC	Water Group	LDC Group
Adjusted Dividend Yield	2.58%	3.57%	4.90%

8  
9 For the growth component of the DCF, he reviews historic and projected growth rate data for the  
10 group for earnings per share, dividends per share, book value per share, cash flow per share, and  
11 internal growth. Based on these data, he arrives at the following DCF growth rates:<sup>13</sup>

	PSC	Water Group	LDC Group
DCF Growth Rate	8.0%	6.25%	7.25%

12  
13 The sum of the adjusted dividend yield and the growth rate provide the equity cost rate estimate  
14 using the DCF model. His estimates for PSC and the two groups are:<sup>14</sup>

	PSC	Water Group	LDC Group
DCF Equity Cost Rate	10.58%	9.82%	12.15%

15

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<sup>12</sup> PSC Exhibit No. 4, page 28, ll. 21-23, and Appendix E.

<sup>13</sup> PSC Exhibit No. 4, page 32, l. 21 to page 33, l. and Appendix E.

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1 Instead of using these estimates as his DCF equity cost estimate, Mr. Moul makes an adjustment to  
2 reflect the difference between the book value capitalization employed in the rate setting process and  
3 the groups' market value capitalization. The adjusted DCF estimates for PSC and the two groups  
4 are:

	PSC	Water Group	LDC Group
Adjusted DCF Estimate	11.69%	10.29%	13.16%

5  
6 As such, this adjustment adds an additional 111, 47, and 101 basis points to the DCF equity cost  
7 estimates for PSC, the Water Group, and the LDC Group, respectively.

8 **Q. PLEASE EXPRESS YOUR CONCERNS WITH MR. MOUL'S DCF STUDY.**

9 A. I have four primary concerns with Mr. Moul's DCF equity cost rate study: (1) the  
10 composition of his Water Group; (2) the use of the LDC group to estimate PSC's equity cost rate;  
11 (3) his DCF growth rates; and (4) the book value/market value adjustment.

12 **Q. WHAT ISSUES DO YOU HAVE WITH MR. MOUL'S WATER GROUP?**

13 A. I have one primary issue with Mr. Moul's Water Group. He has excluded Connecticut  
14 Water Company and Middlesex Water, two water companies located in the Northeast that he has  
15 used in previous rate of return studies for water companies.

16 **Q. WHY IS IT INAPPROPRIATE FOR MR. MOUL TO USE A GROUP OF LOCAL  
17 DISTRIBUTION GAS COMPANIES TO ESTIMATE PSC'S EQUITY COST RATE?**

18 A. Mr. Moul has employed a group of eleven LDC's to estimate PSC's equity cost rate. This

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<sup>14</sup> PSC Exhibit No. 4, page 23, ll. 15-20, and Appendix E.

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1 is not appropriate. Obviously, the business risks of the two businesses are quite different.  
2 Furthermore, the group that he has used is especially inappropriate because they are not even pure  
3 LDCs. As shown below, the group, on average, only receives 69% of their revenues from gas  
4 operations. Hence, using this group is entirely inappropriate.

<b>AGL Resources</b>	<b>87%</b>
<b>Chesapeake Utilities</b>	<b>31%</b>
<b>Energen Corp.</b>	<b>71%</b>
<b>Keyspan Corp.</b>	<b>53%</b>
<b>New Jersey Res.</b>	<b>49%</b>
<b>Nicor, Inc</b>	<b>84%</b>
<b>Peoples Energy</b>	<b>69%</b>
<b>Peidmont Nat'l</b>	<b>87%</b>
<b>Semco Energy</b>	<b>71%</b>
<b>South Jersey Inds.</b>	<b>58%</b>
<b>WGL Holdings</b>	<b>100%</b>
<b>Average</b>	<b>69%</b>

Data Source: C.A. Turner Utility Reports, February, 2002

5

6 **Q. PLEASE CRITIQUE MR. MOUL'S DCF GROWTH RATE ESTIMATES.**

7 A. The growth rate estimates for PSC and the Water and LDC Groups are out of line with  
8 historic as well as analysts' projections of growth. The table below shows *Value Line's* growth rate  
9 measures for PSC and the Water Group. It shows six measures of historic growth and four  
10 measures of projected growth for PSC and the companies in the group. For PSC, for whom Mr.  
11 Moul uses a DCF growth rate of 8.0%, the average of the historic and projected measures of growth  
12 are 6.4% and 6.3%, respectively. Only two of the ten measures are as large as Mr. Moul's 8.0%



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1 growth rate. For the Water Group, Mr. Moul employs a 6.25% DCF growth rate. However, the  
 2 average historic and projected figures for the group are only 4.1% and 5.0%, respectively, and only  
 3 one of the ten measures are as large as Mr. Moul's 6.25% growth rate.

**Value Line  
Historic Growth**

Company	Past 10 Years			Past 5 Years		
	Earnings	Dividends	Book Value	Earnings	Dividends	Book Value
American States Water Co.	3.5%	2.0%	5.0%	3.0%	1.0%	3.5%
California Water Services	1.5%	2.5%	3.0%	3.0%	2.0%	3.0%
Philadelphia Suburban	6.5%	4.0%	5.0%	10.0%	5.0%	8.0%
SJW Corp.				5.5%	3.0%	7.8%
<b>Mean</b>	<b>3.8%</b>	<b>2.8%</b>	<b>4.0%</b>	<b>5.4%</b>	<b>2.8%</b>	<b>5.6%</b>

Company	Value Line Projected Growth			Value Line Internal Growth		
	Est'd. '98-'00 to '04-'06			Return on Equity	Retention Rate	Internal Growth
	Earnings	Dividends	Book Value			
American States Water Co.	7.0%	2.0%	5.0%	11.5%	47.0%	5.4%
California Water Services	6.0%	1.5%	2.0%	13.5%	41.0%	5.5%
Philadelphia Suburban	7.5%	5.0%	7.0%	12.5%	46.0%	5.8%
SJW Corp.						
<b>Mean</b>	<b>6.8%</b>	<b>2.8%</b>	<b>4.7%</b>	<b>12.5%</b>	<b>44.7%</b>	<b>5.6%</b>

Data Sources: Value Line Investment Survey, February 1, 2002.

4  
 5 Several other specific observations are worth noting concerning Mr. Moul's growth rate  
 6 estimates for PSC and the Water Group:

- 7 (1) Mr. Moul has virtually ignored historic growth rate figures for the group. This  
 8 observation is especially relevant for his group since historic growth rate figures  
 9 are provided by virtually all investment firms and presumably influence  
 10 investors' expectations;

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1           (2) For the Water Group, of the historic and five-year projected figures employed by  
2           Mr. Moul in arriving at his 6.25% growth rate (see PSC Exhibit No. 4-A,  
3           Schedule 9, page 2, and Schedule 10, page 2), only one of eighteen is as large as  
4           6.25%. All of the other seventeen measures are below 6.25%! Furthermore, the  
5           average of the eighteen growth indicators that he reviewed is only 4.9%.  
6           Clearly, Mr. Moul gave little or no weight to most of the growth indicators; and

7           (3) The *Value Line* projected dividend growth rates for the PSC and the Water  
8           Group group are only 5.0% and 2.8%, respectively. He apparently gave no  
9           weight to these growth indicators, which is especially significant *since the*  
10          *relevant growth variable in the DCF model is dividends.*

11 **Q.     IS MR. MOUL'S DCF GROWTH RATE FOR THE LDC GROUP SIMILARLY**  
12 **UPWARDLY BIASED?**

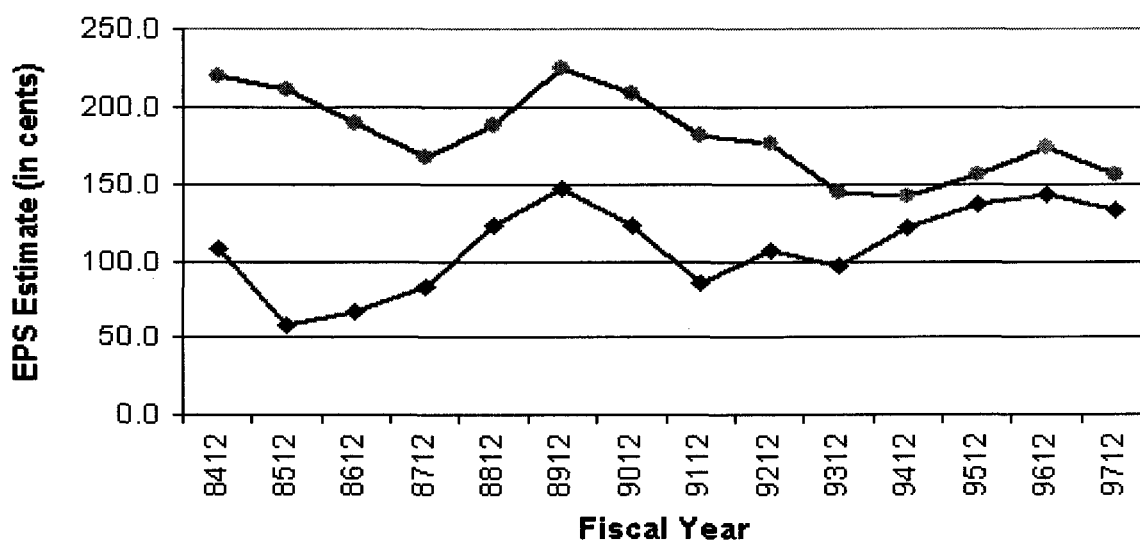
13 A.     Yes. Mr. Moul's DCF growth rate exceeds historic and projected growth rate measures for  
14 the group. For the LDC Group, only three of the eighteen historic and projected figures reviewed  
15 by Mr. Moul are as large as his 7.25% DCF growth rate for the group (see PSC Exhibit No. 4-A,  
16 Schedule 9, page 3, and Schedule 10, page 3). Furthermore, the average of the eighteen growth rate  
17 measures is only 5.30% and the projected dividend growth rate for the group is only 2.78%. As  
18 such, his 7.25% DCF growth rate is well out of line with the historic and projected growth  
19 measures for the group.

20 **Q.     WHY ARE MR. MOUL'S DCF GROWTH RATES FOR PSC AND THE WATER**

1 AND LDC GROUPS EXCESSIVE?

2 A. Mr. Moul's DCF growth rates are all excessive due to his sole reliance on analysts' five-  
3 year forecasts for EPS growth. These growth rate forecasts are collected and published by Zacks,  
4 First Call and Multex (I/B/E/S). These services retrieve and compile EPS forecasts from Wall  
5 Street Analysts. These analysts come from both the sell side (Merrill Lynch, Paine Webber) and the  
6 buy side (Prudential Insurance, Fidelity Investments) investment firms. It is well known that the  
7 EPS forecasts of these analysts, especially those on the sell side, are overly optimistic and therefore  
8 biased upwards. The chart below, which comes from a study I am currently doing, shows the  
9 magnitude of the bias. The top line is the analysts' forecasts of earnings (one-year ahead) and the  
10 bottom line is the actual earnings. Whereas the upward bias has declined in recent years, it still is in  
11 the 10% range for the one-year ahead forecasts.

12 **One-Year Ahead EPS Estimates vs. Actual EPS**  
13 **(Average)**



1           **PLEASE ADDRESS MR. MOUL'S CRITICISMS OF THE DCF MODEL IN**  
2 **GENERAL AND, SPECIFICALLY, THE ADJUSTMENT TO HIS DCF EQUITY COST**  
3 **RATE TO ACCOUNT FOR THE CAPITALIZATION CHANGES ASSOCIATED WITH**  
4 **THE DIVERGENCE OF MARKET AND BOOK VALUES.**

5 A.       Between pages 24 to 36 of his testimony and in Appendix E, Mr. Moul criticizes the use of  
6 the DCF model to estimate equity cost rates in today's market conditions and makes an adjustment  
7 for one of these factors. His criticisms can be summarized as follows: (1) there are problems in  
8 using the DCF model in this case because the share prices of water utility stocks have risen due to  
9 takeover speculation; (2) the assumptions used in the theoretical derivation of the DCF model; (3)  
10 in conjunction with the DCF assumptions, which include the assumption of a constant P/E ratio, the  
11 fact that P/E ratios are not constant but change over time, and (4) the DCF model produces  
12 insufficient earnings when market-to-book ratios are above 1.0. I will address these issues in order.

13           (1) Problems with the DCF model due to rising prices attributed to takeover speculation -  
14 the share prices of water stocks have risen in recent years for a number of reasons, part of which  
15 may be the possibility of being acquired. The fact that prices rise simply means that either expected  
16 returns have changed or that there has been a reassessment of risk. This may also mean that equity  
17 cost rates have changed as well. Nonetheless, these conditions by themselves do not mean that the  
18 DCF model does not provide an accurate indicator of equity cost rates.

19           (2) The assumptions used in the derivation of the DCF model - First, it must be noted that  
20 all economic models are derived using fairly restrictive assumptions. In the DCF model,

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1 assumptions such as constant P/E and dividend payout ratios make the model internally consistent.  
2 Criticisms of the assumptions of the model are valid if it can be demonstrated that the model is not  
3 robust with respect to obvious real world conditions that deviate from these assumptions. No such  
4 evidence has been provided in this proceeding. The fact that the DCF model is used almost  
5 universally in the investment community and in utility ratemaking is indicative of the robustness of  
6 the methodology. The model does not require that investors have an infinite investment horizon.  
7 Simply put, the DCF model only presumes that stocks are priced on the basis of current and  
8 prospective dividends. Especially in the case of public utility stocks, I believe that this is a  
9 reasonable assumption.

10 (3) The assumption of a constant P/E ratio, given that P/E ratios are not constant but change  
11 over time - P/E ratios change constantly as new information comes to the market that causes  
12 investors to revalue a company's shares (the numerator of the P/E ratio) relative to current earnings  
13 (the denominator of the P/E ratio). This new information may be associated with changes in the  
14 economic landscape that result in changes in equity cost rates (such as changes in interest rates or  
15 investors' risk/return tradeoff). In the context of the DCF model, the fact that P/E ratios change  
16 only provides an indication of changes in a firm's share price relative to past earnings. Share prices  
17 look forward and are determined by a firm's prospective cash returns discounted to the present by  
18 investors' required return. Earnings look backwards and are a function of firm performance and  
19 generally accepted accounting conventions.

20 Thus, in the context of the DCF model, the fact that P/E ratios change is simply an

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1 indication that new information relating to the economic environment is available and this has  
2 caused investors to revalue shares. The DCF is based on expectations, and thus it is also likely that  
3 the new information actually results in a change in equity cost rates.

4       (4) The DCF model produces insufficient earnings when market-to-book ratios are above  
5 1.0. - The market value of a firm's equity exceeds the book value of equity when the firm is  
6 expected to earn more on the book value of investment than investors require. In other words, the  
7 expected return on equity capital is greater than the cost of equity capital (the return that investors  
8 require). Given the almost universal application of the DCF model in regulatory and investment  
9 circles, it is rather obvious that public utilities would not be selling in excess of 2.00 times book  
10 value if the DCF model produced insufficient earnings. As such, Mr. Moul's hypothesis is  
11 incorrect.

12 **Q. PLEASE PROVIDE A FURTHER EVALUATION OF MR. MOUL'S**  
13 **ADJUSTMENT FOR MARKET AND BOOK VALUE DIVERGENCE.**

14 A. Mr. Moul makes a specific adjustment to his DCF equity cost rate to account for the  
15 divergence of market and book values. This adjustment adds 111, 47, and 101 basis points to the  
16 DCF equity cost estimates for PSC, the Water Group, and the LDC Group, respectively. His  
17 adjustment is based on a procedure for adjusting returns based on alternative debt/equity  
18 capitalizations. In previous testimonies, Mr. Moul has cited two studies published by Miller and  
19 Modigliani that he claims support the adjustment procedure. In these studies the authors develop  
20 their classic capital structure irrelevance theory. At no point do they demonstrate or support Mr.

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1 Moul's equity cost adjustment procedure.

2 **Q. PLEASE REVIEW MR. MOUL'S RISK PREMIUM ANALYSIS.**

3 A. Mr. Moul arrives at a risk premium derived equity cost rate of 12.50% for the Water Group  
4 and 13.00% for the LDC Group. These figures include a base yield of 7.50% and equity risk  
5 premiums of 5.00% for the Water Group and 5.50% for the LDC Group. These equity cost  
6 estimates are excessive due to an overstated base yield and biased and inflated equity risk premiums  
7 that does not reflect today's investment fundamentals.

8 **Q. PLEASE DISCUSS THE BASE YIELD OF MR. MOUL'S RISK PREMIUM**  
9 **ANALYSIS.**

10 A. The base yield in Mr. Moul's risk premium analyses is the prospective yield on long-term,  
11 'A' rated public utility bonds. Using the yield on these securities inflates the required return on  
12 equity for PSC in two ways: (1) long-term bonds are subject to interest rate risk, a risk which does  
13 not affect common stockholders since dividend payments (unlike bond interest payments) are not  
14 fixed but tend to increase over time and (2) the base yield in Mr. Moul's risk premium study is  
15 subject to credit risk since it is not default risk-free like an obligation of the U.S. Treasury. As a  
16 result, its yield-to-maturity includes a premium for default risk and therefore is above its expected  
17 return. Hence using such a bond's yield-to-maturity as a base yield results in an overstatement of  
18 investors' return expectations.

19 **Q. PLEASE REVIEW MR. MOUL'S RISK PREMIUM STUDY.**

20 A. Mr. Moul performs a historic risk premium study that appears in PSC Exhibit No. 4-A,

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1 Schedule 11. This study involves an assessment of the historic difference between S&P Public  
2 Utility Index stock returns and 'A' rated public utility bond returns over various time periods  
3 between the years 1928-2000. This type of historic evaluation of stock returns is often called the  
4 "Ibbotson approach" after Professor Roger Ibbotson who popularized this method of assessing  
5 historic financial market returns. Mr. Moul evaluates the stock-bond return differentials using  
6 different measures of central tendency (the geometric and arithmetic means and the median) over  
7 four alternative time intervals (1928-2000, 1952-2000, 1974-2000, and 1979-2000). From the  
8 results of his study, he concludes that an appropriate risk premium for the S&P Public Utilities is  
9 6.65%. To recognize the lower risk of water and gas utilities, he arbitrarily adjusts this figure  
10 downwards to 5.00% for the Water Group and 5.50% for the LDC Group.

11 **Q. PLEASE SUMMARIZE YOUR ASSESSMENT OF MR. MOUL'S RISK PREMIUM**  
12 **STUDY.**

13 A. Using the historic relationship between stock and bond returns to measure an equity risk  
14 premium is erroneous and, especially in this case, overstates the true market equity risk premium.  
15 The equity risk premium is based on expectations of the future and when past market conditions  
16 vary significantly from the present, historic data does not provide a realistic or accurate barometer  
17 of expectations of the future. Currently, using historic returns to measure the equity risk premium  
18 masks the dramatic change in the risk and return relationship between stocks and bonds which  
19 suggests that the equity risk premium has declined in recent years. As discussed above, the notion  
20 that the equity risk premium has declined in the 1990s, resulting in higher stock prices and returns,



1 is a well-recognized and accepted fact in today's capital markets.

2 **Q. PLEASE DISCUSS THE ERRORS IN USING HISTORIC STOCK AND BOND**  
3 **RETURNS TO ESTIMATE AN EQUITY RISK PREMIUM.**

4 A. There are several flaws in using historic returns over long time periods to estimate expected  
5 equity risk premiums. Most significant is the implicit assumption that (1) risk premiums do not  
6 change over time, and (2) there has been no change in the relative risk of stocks and bonds.  
7 Specific problems with the methodology include:

8 (A) Biased historical bond returns;

9 (B) The arithmetic versus the geometric mean return;

10 (C) Unattainable and biased stock historical returns; and

11 (D) The change in risk and return.

12 These issues will be addressed in this order.

13 **Q. HOW ARE HISTORIC BOND RETURNS BIASED?**

14 A. An essential assumption of these studies is that over long periods of time investors'  
15 expectations are realized. However, the experienced returns of bondholders in the past violate this  
16 critical assumption. Historic bond returns are biased downward as a measure of expectancy because  
17 of capital losses suffered by bondholders in the past. As such, risk premiums derived from this data  
18 are biased upwards.

19 **Q. PLEASE DISCUSS THE ISSUE RELATING TO THE USE OF THE**  
20 **ARITHMETIC VERSUS THE GEOMETRIC MEAN RETURNS IN THE IBBOTSON**

1 **METHODOLOGY.**

2 A. The measure of investment return has a significant effect on the interpretation of the risk  
3 premium results. When analyzing a single security price series over time (i.e., a time series), the  
4 best measure of investment performance is the geometric mean return. Using the arithmetic mean  
5 overstates the return experienced by investors. In a study entitled "Risk and Return on Equity: The  
6 Use and Misuse of Historical Estimates," Carleton and Lakonishok make the following  
7 observation: "The geometric mean measures the changes in wealth over more than one period on a  
8 buy and hold (with dividends invested) strategy."<sup>15</sup> Since Mr. Moul's study covers more than one  
9 period (and he assumes that dividends are reinvested), he should be employing the geometric mean  
10 and not the arithmetic mean.

11 **Q. PLEASE PROVIDE AN EXAMPLE DEMONSTRATING THE PROBLEM WITH**  
12 **USING THE ARITHMETIC MEAN RETURN.**

13 A. To demonstrate the upward bias of the arithmetic mean, consider the following example.  
14 Assume that you have a stock (that pays no dividend) that is selling for \$100 today, increases to  
15 \$200 in one year, and then falls back to \$100 in two years. The table below shows the prices and  
16 returns.

17

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<sup>15</sup> Willard T. Carleton and Josef Lakonishok, "Risk and Return on Equity: The Use and Misuse of Historical Estimates," *Financial Analysts Journal* (January-February, 1985), pp. 38-47.

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<b>Time Period</b>	<b>Stock Price</b>	<b>Annual Return</b>
0	\$100	
1	\$200	100%
2	\$100	-50%

1

2 The arithmetic mean return is simply  $(100\% + (-50\%))/2 = 25\%$  per year. The geometric mean  
3 return is  $((1 * .50)^{(1/2)) - 1 = 0\%$  per year. Hence, the arithmetic mean return suggests that your  
4 stock has appreciated at an annual rate of 25%, while the geometric mean return indicates an annual  
5 return of 0%. Since after two years, your stock is still only worth \$100, the geometric mean return  
6 is the appropriate return measure. For this reason, when stock returns and earnings growth rates are  
7 reported in the financial press, they are normally reported using the geometric mean. This is  
8 because of the upward bias of the arithmetic mean. Hence, Mr. Moul's arithmetic mean return  
9 measures are biased and should be disregarded.

10 **Q. YOU NOTE THAT HISTORIC STOCK RETURNS ARE BIASED USING THE**  
11 **IBBOTSON METHODOLOGY. PLEASE ELABORATE.**

12 A. Returns developed using Ibbotson's methodology are computed on stock indexes and  
13 therefore (1) cannot be reflective of expectations because these returns are unattainable to investors,  
14 and (2) produce biased results. This methodology assumes (a) monthly portfolio rebalancing and  
15 (b) reinvestment of interest and dividends. Monthly portfolio rebalancing presumes that investors  
16 rebalance their portfolios at the end of each month so as to have an equal dollar amount invested in  
17 each security at the beginning of each month. The assumption would obviously generate extremely

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1 high transactions costs and, as such, these returns are unattainable to investors. In addition, an  
2 academic study demonstrates that the monthly portfolio rebalancing assumption produces biased  
3 estimates of stock returns.<sup>16</sup>

4 Transaction costs themselves provide another bias in historic versus expected returns. The  
5 observed stock returns of the past were not the realized returns of investors due to the much higher  
6 transactions costs of previous decades. These higher transactions costs were not only the higher  
7 commissions on stock trades, but also the lack of low cost mutual funds like index funds.

8 **Q. FINALLY, PLEASE DISCUSS THE NOTION THAT MR. MOUL'S RISK**  
9 **PREMIUM STUDIES DO NOT REFLECT THE CHANGE IN RISK AND RETURN IN**  
10 **TODAY'S FINANCIAL MARKETS.**

11 A. The methodology employed by Mr. Moul is also unrealistic in that it makes the explicit  
12 assumption that (1) the chosen time horizon is appropriate for estimating the current market risk  
13 premium, and (2) risk premiums do not change over time. These assumptions are not valid in  
14 today's environment. Economic developments over the past decade have changed the economy and  
15 business cycle and have resulted in a dramatic change in the risk/return relationship between stocks  
16 and bonds. The nature of the change is that bonds have increased in risk relative to stocks.

17 Page 1 of Schedule JRW-9 shows interest rates on long-term government bonds since 1926.  
18 Obviously, the interest rate levels of the past twenty years are significantly above those of the

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<sup>16</sup> See Richard Roll, "On Computing Mean Returns and the Small Firm Premium," *Journal of Financial Economics* (1983), pp. 371-86.

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1 previous 50 years. Page 2 of Schedule JRW-9 provides the annual market risk premiums for the  
2 1926 to 2000 period where the annual premium is defined as the return on common stock minus the  
3 return on long-term Treasury Bonds. There is considerable variability in this series and a clear  
4 decline in recent decades. The high was 54% in 1933 and the low was -38% in 1931. Clear  
5 evidence of a change in the relative riskiness of bonds and stocks is provided on page 3 of Schedule  
6 JRW-9 which plots the standard deviation of annual stock and bond returns since 1926. The plot  
7 shows that, whereas stock returns were much more volatile than bond returns from the 1920s to the  
8 1970s, bond returns became more variable than stock returns during the 1980s. In recent years  
9 stocks and bonds have been almost equally volatile. The decrease in the volatility of stocks relative  
10 to bonds has been attributed to several stock related factors - the impact of technology on  
11 productivity and the new economy, the role of information (see Greenspan's comments on pages  
12 30-31 of my testimony) on the economy and markets, better cost and risk management by  
13 businesses - and several bond related factors - deregulation of the financial system, inflation fears  
14 and interest rates, and the increase in the use of debt financing. Further evidence of the greater  
15 relative riskiness of bonds is shown on page 4 of Schedule JRW-9, which plots real interest rates  
16 (the nominal interest rate minus inflation) from 1926 to 2000. Real rates have been well above  
17 historic norms during the past 10-15 years. These high real interest rates reflect the fact that  
18 investors view bonds as riskier investments.

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1           The net effect of the change in risk and return has been a significant decrease in the return  
2 premium that stock investors require over bond yields. In short, the market risk premium has  
3 declined in recent years. As I highlighted earlier in my testimony, this decline has been discovered  
4 in studies by leading academic scholars and investment firms, and has been acknowledged by  
5 government regulators. As such, Mr. Moul's historic market risk premium analysis is simply  
6 outdated and not reflective of current investor expectations and investment fundamentals.

7 **Q. PLEASE SUMMARIZE YOUR RECOMMENDATIONS CONCERNING MR.**  
8 **MOUL'S RISK PREMIUM ANALYSIS.**

9 A. Mr. Moul's risk premium study is erroneous and should be disregarded in estimating PSC's  
10 equity cost rate. As indicated, the base yield of 7.50% (1) includes interest rate risk, a risk not  
11 generally faced by equity investors, and (2) is above investors' expected return on medium-term  
12 public utility bonds. The equity risk premium of 5.00% for the Water Group and 5.50% for the  
13 LDC Group are based on a historic risk premium study of stock and bond returns over periods of up  
14 to 75 years that (1) employs biased bond returns; (2) uses the arithmetic mean return, (3) utilizes  
15 biased and unattainable stock returns, and (4) most importantly, masks the change in the relative  
16 risk of stocks and bonds and the resulting decline in the equity risk premium.

17 **Q. PLEASE ASSESS MR. MOUL'S USE OF THE CAPITAL ASSET PRICING**  
18 **MODEL.**

19 A. Mr. Moul applies the CAPM to the water group to estimate an equity cost rate for the  
20 Company. For the CAPM, Mr. Moul computes an equity cost rate of 13.40% for PSC, 13.08% for

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1 the Water Group, and 12.87% for the LDC Group. In arriving at these figures, he uses a 30-year  
2 risk-free rate of 5.25%, adjusted betas of .76 for PSC, .73 for the Water Group, and .71 for the LDC  
3 Group, and a market or equity risk premium of 10.73%. The beta he employs has been adjusted  
4 upwards for the book value/market value capitalization difference, and the market or equity risk  
5 premium is an average of the historic risk premium (the difference between the arithmetic mean  
6 returns on the S&P 500 and long-term Treasuries), and expected returns (the difference between  
7 *Value Line's* expected market return and the 30-year Treasury rate).

8 The primary problem with Mr. Moul's CAPM analysis is the size of the market or equity  
9 risk premium. He has also erred in adjusting the beta due to the book value/market value issue.  
10 This issue has been addressed above and will not be discussed here.

11 **Q. PLEASE DISCUSS THE ERRORS IN MR. MOUL'S EQUITY OR MARKET RISK**  
12 **PREMIUM IN HIS CAPM APPROACH.**

13 A. Mr. Moul performs an analysis in PSC Exhibit No. 4-A, Schedule 13, to arrive at his market  
14 risk premium of 10.73%. It is computed as the average of the 1926-2000 results from the Ibbotson  
15 study (7.3%) and *Value Line's* 3-5 year annual return projections (14.16%). The primary problem  
16 with this approach is that both the Ibbotson study and *Value Line* projected return overstate the  
17 market or equity risk premium.

18 Initially, Mr. Moul's CAPM study should be totally ignored due to the size and direction of  
19 his equity risk premium estimate. It is totally out of line with the equity risk premium estimates  
20 discovered in recent academic studies and those employed by leading investment banks (2-4

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1 percent, as cited above). Furthermore, whereas Mr. Moul shows an increasing equity risk premium  
2 in the 1990s, the rest of the investment world, including Mr. Greenspan, believe that the equity risk  
3 premium is declining.<sup>17</sup>

4         The Ibbotson historic risk premium simply represents the difference in the arithmetic mean  
5 stock and bond returns over the 1926-2000 period. The errors in using the relationship between  
6 long-term historic stock and bond returns were discussed above. In short, the procedure is  
7 erroneous and overstates the true market or equity risk premium. Most importantly, using long-  
8 term historic returns masks the dramatic change in the risk and return relationship between stocks  
9 and bonds that suggests that the market risk premium has declined.

10 **Q. PLEASE ADDRESS THE PROBLEMS WITH USING VALUE LINE'S**  
11 **PROJECTED RETURNS.**

12 A. The primary error in using *Value Line's* 3-5 year annual return projections is that these  
13 projections are consistently high relative to actual experienced returns and, as such, provide  
14 upwardly biased market risk premiums. This results in an overstated market risk premium.

15 **Q. USING A MORE REALISTIC EQUITY RISK PREMIUM, WHAT EQUITY COST**  
16 **RATE WOULD MR. MOUL GET USING THE CAPM?**

17 A. Using the current 30-Treasury rate (5.5%), the actual betas for PSC and the Water and LDC  
18 Groups, and the average equity risk premium from the Fama-French study ( $[3.40+4.83]/2 = 4.12\%$ ),

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<sup>17</sup> Using the same methodology in the 1997 Pennsylvania American Water Company base rate case (R-00973944), Mr. Moul estimated an equity risk premium of 6.74%.



1 the following equity cost rates are indicated.

2 **CAPM Equity Cost Rate**

3	=	Risk-Free Rate	+	Beta	*	Equity Risk Premium		
4	PSC	=	5.50%	+	0.55	*	4.11%	= 7.76%
5	Water Group	=	5.50%	+	0.59	*	4.11%	= 7.92%
6	LDC Group	=	5.50%	+	0.57	*	4.11%	= 7.82%

7 **Q. PLEASE DISCUSS MR. MOUL'S COMPARABLE EARNINGS ANALYSIS.**

8 A. Mr. Moul also estimates an equity cost rate for the Company employing the comparable  
9 earnings approach. His methodology involves averaging historic and prospective returns on  
10 common equity for a proxy group of non-utility companies "comparable" in risk to his barometer  
11 group as determined from screening *Value Line's* Value Screen database. Mr. Moul screens the  
12 database on six risk measures and arrives at a group of nine unregulated "comparable" companies.  
13 The average of the historic and projected median returns on common equity for the group is  
14 13.55%.

15 This approach is fundamentally flawed for several reasons. He has not performed any  
16 analysis to examine whether his return on equity figures are likely measures of long-term earnings  
17 expectations. More importantly, however, since Mr. Moul has not evaluated the market-to-book  
18 ratios for these companies, he cannot indicate whether the past and projected returns on common  
19 equity are above or below investors' requirements. These returns on common equity are excessive  
20 if the market-to-book ratios for these companies are above 1.0. For example, Coca Cola's projected

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1 return on common equity is in excess of 30% and its market-to-book ratio is nearly 20. But, I doubt  
2 if any financial analyst, including Mr. Moul, would suggest that Coca Cola's equity cost rate is  
3 30%. I have used market-to-book ratios relative to earned returns on equity as a means of testing  
4 my overall rate of return recommendation. As discussed above, this procedure involves a  
5 straightforward relationship between a firm's return on equity, cost of equity, and market-to-book  
6 ratio. A firm which earns a return on equity above (below) its cost of equity will see its common  
7 stock sell at a price above (below) its book value.

8 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

9 A. Yes it does.

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Appendix A

EDUCATIONAL BACKGROUND, RESEARCH,  
AND RELATED BUSINESS EXPERIENCE

J. RANDALL WOOLRIDGE

J. Randall Woolridge is a Professor of Finance, the Goldman, Sachs & Co. and Frank P. Smeal Endowed Faculty Fellow in Business Administration, and Director of the Smeal College Trading Room in the College of Business Administration of the Pennsylvania State University in University Park, PA. He is also a Vice President of the Columbia Group, a public utility consulting firm based in Ridgefield, CT, and serves on the Investment Committee of ARIS Corporation, an asset management company based in State College, PA.

Professor Woolridge received a Bachelor of Arts degree in Economics from the University of North Carolina, a Master of Business Administration degree from the Pennsylvania State University, and a Doctor of Philosophy degree in Business Administration (major area-finance, minor area-statistics) from the University of Iowa. At Iowa he received a Graduate Fellowship and was awarded membership in Beta Gamma Sigma, a national business honorary society. He has taught Finance courses at the University of Iowa and Cornell College as well as the Pennsylvania State University. These courses include corporation finance, commercial and investment banking, and investments at the undergraduate and graduate levels.

Professor Woolridge's research has centered on the theoretical and empirical foundations of corporation finance and financial markets and institutions. He has published over 25 articles in the best academic and professional journals in the field, including the *Journal of Finance*, the *Journal of Financial Economics*, and the *Harvard Business Review*. His research has been cited extensively in the business press. His work has been featured in the *New York Times*, *Forbes*, *Fortune*, *The Economist*, *Financial World*, *Barron's*, *Wall Street Journal*, *Business Week*, *Washington Post*, *Investors' Business Daily*, *Worth Magazine*, *USA Today*, and other publications. In addition, he has provided commentary on CNN's *Money Line* and CNBC's *Business Today*.

Dr. Woolridge co-authored two books that have been published in 1999 – *Spin-Offs and Equity Carve-Outs: Achieving Faster Growth and Better Performance* (Financial Executives Research Foundation) and *The Streetsmart Guide to Valuing a Stock* (McGraw Hill).

Professor Woolridge has consulted with and prepared research reports for private businesses, investment banking firms, and government agencies (including the National Association of Security Dealers, the Federal Home Loan Bank Board, and the Securities and Exchange Commission). In addition, he has directed and participated in over 350 company-sponsored professional development programs for executives in more than 20 countries in North and South America, Europe, Asia, and Africa. His clients have included major corporations and financial institutions around the world.

Dr. Woolridge has prepared testimony on behalf of the Pennsylvania Office of Consumer Advocate in the

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1 following cases before the Pennsylvania Public Utility Commission: Bell Telephone Company (R-811819), Peoples  
2 Natural Gas Company (R-832315), Pennsylvania Power Company (R-832409), Western Pennsylvania Water Company  
3 (R-832381), Pennsylvania Power Company (R-842740), Pennsylvania Gas and Water Company (R-850178),  
4 Metropolitan Edison Company (R-860384), Pennsylvania Electric Company (R-860413), North Penn Gas Company (R-  
5 860535), Philadelphia Electric Company (R-870629), Western Pennsylvania Water Company (R-870825), York Water  
6 Company (R-870749), Pennsylvania-American Water Company (R-880916), Equitable Gas Company (R-880971), the  
7 Bloomsburg Water Co. (R-891494), Columbia Gas of Pennsylvania, Inc. (R-891468), Pennsylvania-American Water  
8 Company (R-90562), Breezewood Telephone Company (R-901666), York Water Company (R-901813), Columbia Gas  
9 of Pennsylvania, Inc. (R-901873), National Fuel Gas Distribution Company (R-911912), Pennsylvania-American Water  
10 Company (R-911909), Borough of Media Water Fund (R-912150), UGI Utilities, Inc. - Electric Utility Division (R-  
11 922195), Dauphin Consolidated Water Supply Company - General Waterworks of Pennsylvania, Inc. (R-932604),  
12 National Fuel Gas Distribution Company (R-932548), Commonwealth Telephone Company (I-920020), Conestoga  
13 Telephone and Telegraph Company (I-920015), Peoples Natural Gas Company (R-932866), Blue Mountain  
14 Consolidated Water Company (R-932873), National Fuel Gas Company (R-942991), UGI - Gas Division (R-953297),  
15 UGI - Electric Division (R-953534), Pennsylvania-American Water Company (R-973944), Pennsylvania-American  
16 Water Company (R-994638), Philadelphia Suburban Water Company (R-004868), Pennsylvania-American Water  
17 Company (R-00011663). He has prepared testimony on behalf of the Pennsylvania Office of Consumer Advocate in  
18 the following case before the Federal Energy Regulatory Commission (National Fuel Gas Supply Corporation (RP-92-  
19 73-000). He has prepared testimony for the New Jersey Department of the Public Advocate, Division of Rate Counsel:  
20 New Jersey-American Water Company (R-91081399J), New Jersey-American Water Company (R-92090908J), and  
21 Environmental Disposal Corp (R-94070319). He has prepared testimony for the Hawaii Office of the Consumer  
22 Advocate: East Honolulu Community Services, Inc. (Docket No. 7718). He has prepared testimony for the County of  
23 Nassau in New York State: Long Island Lighting Company (PSC Case No. 942354). He has prepared testimony for the  
24 Office of Consumer Counsel in Connecticut: United Illuminating (Docket No. 96-03-29). He has prepared testimony for  
25 the Office of the People's Counsel in the District of Columbia: Potomac Electric Power Company (Formal Case No.  
26 939).  
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