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EXHIBITS

W-01303A-05-0405

PART 3 OF 4
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BEFORE THE ARIZONA CORPORATION COMMISSION

EXHIBIT
A-9
admitted

COMMISSIONERS

JEFF HATCH-MILLER, Chairman
WILLIAM A. MUNDELL
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MIKE GLEASON
KRISTIN K. MAYES

IN THE MATTER OF THE APPLICATION OF ARIZONA-AMERICAN WATER COMPANY, INC., AN ARIZONA CORPORATION, FOR A DETERMINATION OF THE CURRENT FAIR VALUE OF ITS UTILITY PLANT AND PROPERTY AND FOR INCREASES IN ITS RATES AND CHARGES BASED THEREON FOR UTILITY SERVICE BY ITS PARADISE VALLEY WATER DISTRICT.	DOCKET NO. W-01303A-05-

DIRECT TESTIMONY
OF
MICHAEL J. VILBERT
ON BEHALF OF
ARIZONA AMERICAN WATER COMPANY
JUNE 3, 2005

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I. INTRODUCTION AND SUMMARY

Q1. Please state your name and address for the record.

A1. My name is Michael J. Vilbert. My business address is The Brattle Group, 44 Brattle Street, Cambridge, MA 02138, USA.

Q2. Please describe your job and your educational experience.

A2. I am a Principal of The Brattle Group, ("Brattle"), an economic, environmental and management consulting firm with offices in Cambridge, Washington, London and San Francisco. My work concentrates on financial and regulatory economics. I hold a B.S. from the U.S. Air Force Academy and a Ph.D. in finance from the Wharton School of Business at the University of Pennsylvania.

Q3. What is the purpose of your testimony in this proceeding?

A3. My colleague, Dr. A. Lawrence Kolbe and I have been asked by Arizona-American Water Company ("Arizona-American" or the "Company") to estimate the cost of equity that the Arizona Corporation Commission ("ACC" or the "Commission") should allow Paradise Valley Water Company ("Paradise Valley") an opportunity to earn on the equity financed portion of its rate base.

To accomplish this task, I estimate the overall cost of capital for two samples of regulated companies using the discounted cash flow ("DCF") and the risk positioning models. In turn, Dr. Kolbe evaluates the relative risk of Paradise Valley and the sample companies to determine the recommended cost of equity at Paradise Valley's equity thickness of 36.7 percent, which is the percent equity in Paradise Valley's capital structure in the filings in this proceeding.

Q4. Please summarize any parts of your background and experience that are particularly relevant to your testimony on these matters.

A4. Brattle's specialties include financial economics, regulatory economics, and the gas and electric industries. I have worked in the areas of cost of capital, investment risk and related matters for many industries, regulated and unregulated alike, in many forums. I have testified on the cost of capital before the Alberta Energy and Utilities Board, the National Energy Board, the Newfoundland & Labrador Board of Commissioners of Public Utilities, and the Public Service Commission of West Virginia. I have also filed testimony before the U.S. Federal Energy Regulatory Commission. I have not previously testified before this Commission. Appendix A contains more information on my professional qualifications.

Q5. Please summarize how you approached this task.

A5. I review the evidence from two samples, a sample of regulated water utilities and a sample of natural gas local distribution companies ("LDC"). I use the results of the gas LDC sample as a check on the results of the water sample, but I give the results from the water sample predominant weight. My analyses consider cost of capital evidence from the risk positioning and discounted cash flow estimation methods, but I rely primarily on the risk positioning results, because I do not believe that the DCF method is completely reliable at this time.

Specifically, I estimate the cost of equity for the companies in the two benchmark samples using both cost of equity estimation methods. Given the cost of equity estimates for each company and the company's market costs of debt and preferred stock, I calculate each firm's overall cost of capital, i.e., its after-tax weighted-average cost of capital ("ATWACC"), using the company's market value capital structure. For each method of estimating the return on equity, I report the sample average ATWACC and the cost of equity for a capital structure with 36.7 percent equity. I thus present the cost of equity that is consistent with the sample's market information and Paradise Valley's regulatory capital structure. (By "regulatory capital structure," I mean the capital structure that Paradise Valley utilizes in its application.)

This method automatically avoids problems that can arise when an analyst focuses on the individual components of the overall cost of capital separately. The danger in that approach is that the estimated cost of equity may correspond to a very different level of financial risk than would exist at the regulated company's capital structure. The result could be an inconsistency between the allowed return on equity and the regulatory capital structure.

For both samples, the results of the DCF model are more variable and are less reliable than those based upon the risk positioning model; however, I provide results using the DCF method because it is a method that has been used extensively in the past. In addition, the DCF model results serve as a check on the results from the equity risk positioning approach. Risk positioning estimates that rely on the short-term risk-free rate are unreliable at this time because some of the resulting cost of equity estimates are less than the corresponding sample company's cost of debt and because the short-term risk-free rate is likely to increase substantially in the near term.

Q6. What is your conclusion on the market-determined cost of capital for the two samples of regulated companies you selected?

A6. The midpoint of the water sample's overall cost of capital is 6¾ percent with a range of 6½ to 7 percent, and the midpoint of the gas LDC's overall cost of capital is 6½ with a range of 6¼ to 6¾ percent for an overall range of 6¼ to 7 percent. The corresponding cost of equity at Paradise Valley's 36.7 percent equity thickness is 12½ percent (with a range of 12 to 13 percent) for the water sample and 12 percent (with a range of 11½ to 12½ percent) for the gas LDC sample, resulting in an overall range of 11½ to 13 percent.

Note, that I specify a plus or minus ½ percent range for the return on equity and specify the point estimate to the nearest ¼ percent because I do not believe that it is possible to estimate the cost of capital more precisely than that.

Q7. How is your testimony organized?

A7. *Section II* formally defines the cost of capital and touches on the principles relating to the cost of capital and capital structure for a business. Dr. Kolbe's testimony provides additional detail on these points. *Section III* presents the methods used to estimate the cost of capital for the benchmark samples and the associated numerical analyses, and explains the basis of my conclusions for the benchmark samples' returns on equity and overall costs of capital. Appendices B and C support *Section III* with additional details on the risk positioning and DCF approaches, respectively, including the details of the numerical analyses. Note that portions of the testimony are repeated in the appendices in order to give the reader the context of the issues before additional technical detail and further discussion are presented.

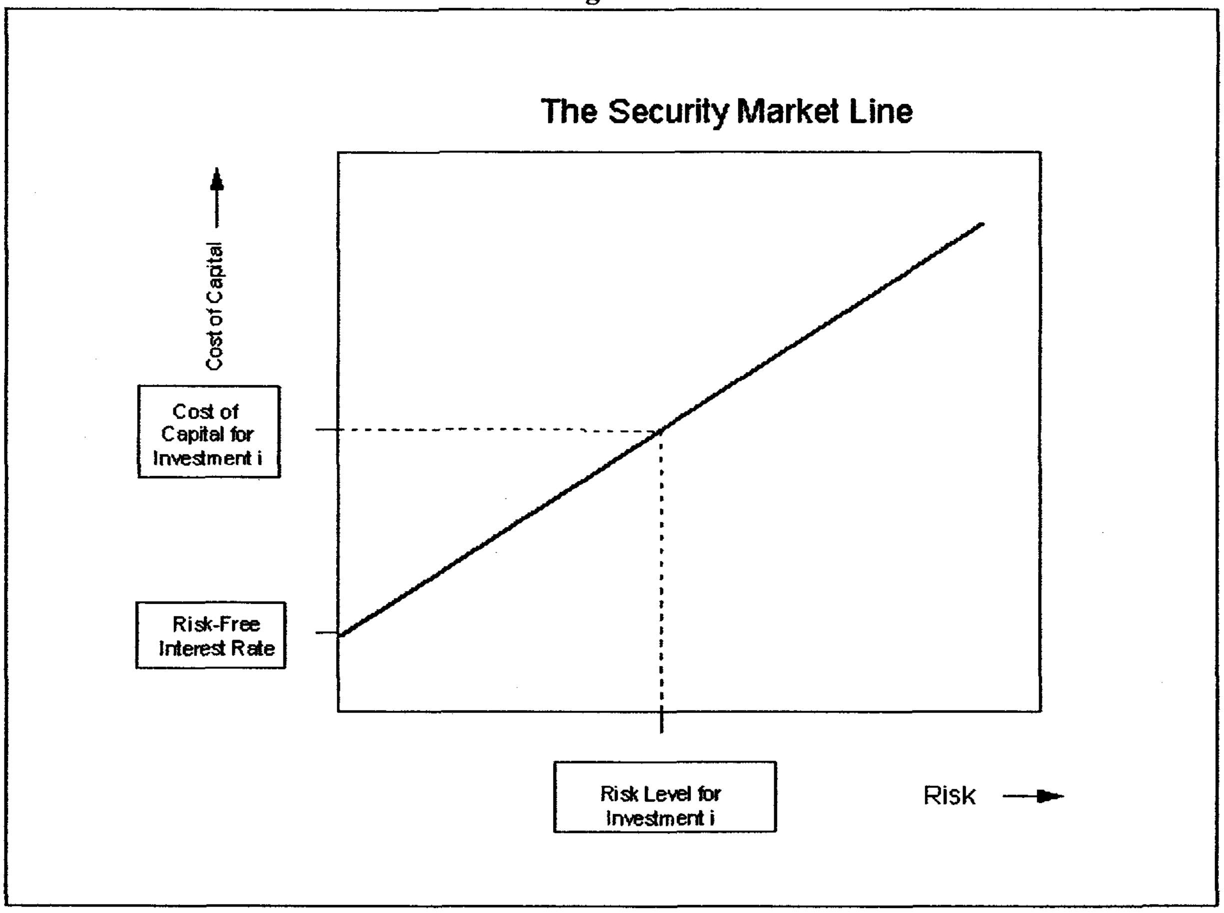
II. DETERMINANTS OF THE COST OF CAPITAL

A. THE COST OF CAPITAL AND RISK

Q8. Please formally define the "cost of capital."

A8. The *cost of capital* can be defined as *the expected rate of return in capital markets on alternative investments of equivalent risk.* In other words, it is the rate of return investors require based on the risk-return alternatives available in competitive capital markets. The cost of capital is a type of opportunity cost: it represents the rate of return that investors could expect to earn elsewhere without bearing more risk. "Expected" is used in the statistical sense: the mean of the distribution of possible outcomes. The terms "expect"and "expected" in this testimony, as in the definition of the cost of capital itself, refer to the probability-weighted average over all possible outcomes.

Figure 1



The definition of the cost of capital recognizes a tradeoff between risk and return that is known as the "security market risk-return line," or "security market line" for short. This line is depicted in Figure 1. The higher the risk, the higher the cost of capital. A version of Figure 1 applies for all investments. However, for different types of securities, the location of the line may depend on corporate and personal tax rates.

Q9. Why is the cost of capital relevant in rate regulation?

A9. It has become routine in U.S. rate regulation to accept the "cost of capital" as the right expected rate of return on utility investment.[1] From an economic perspective, rate levels that give investors a fair opportunity to earn the cost of capital are the lowest levels that compensate investors for the risks they bear. Over the long run, an expected return above the cost of capital makes customers overpay for service. Regulatory commissions normally try to prevent such outcomes, unless there are offsetting benefits (e.g., from incentive regulation that reduces future costs). At the same time, an expected return below the cost of capital shortchanges investors. In the long run, such a return denies the company the ability to attract capital, to maintain its financial integrity, and to expect a return commensurate with that of other enterprises attended by corresponding risks and uncertainties. Dr. Kolbe's testimony discusses the consequences of a systematic failure to give investors a fair opportunity to earn the cost of capital.

Of course, the cost of capital cannot be estimated with perfect certainty, and other aspects of the way the revenue requirement is set may mean investors expect to earn more or less than the cost of capital even if the allowed rate of return equals the cost of capital

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[1] To the best of my knowledge, the first paper formally to link the cost of capital as defined by financial economics with the right expected rate of return for utilities is Stewart C. Myers, *Application ofFinance Theory to Public Utility Rate Cases, The Bell Journal of Economics and Management Science*, 3:58-97 (Spring 1972).

exactly. However, a commission that on average sets rates so investors expect to earn the cost of capital treats both customers and investors fairly, and acts in the long-run interests of both groups.

B. THE RELATIONSHIP BETWEEN CAPITAL STRUCTURE AND THE COST OF EQUITY

Q10. Please explain why it is necessary to report the cost of equity adjusted for capital structure.

A10. Dr. Kolbe's testimony covers this topic in detail. Briefly, rate regulation in North America evolved to focus on the components of the overall cost of capital, and in particular, on what the "right" cost of equity and capital structure should be. The overall cost of capital depends primarily on the business the firm is in, while the costs of the debt and equity components depend not only on the business risk but also on the distribution of revenues between debt and equity. The overall cost of capital is thus the more basic concept. As Dr. Kolbe's testimony explains, the overall cost of capital is constant within a broad middle range, but the distribution of the costs and risks among debt and equity is not. Appendix B of Dr. Kolbe's testimony sets out the principles and procedures on which I rely.

C. IMPLICATIONS FOR ANALYSIS

Q11. Please explain the implications of the relationship between capital structure and the cost of equity on your testimony.

A11. An approach that estimates the cost of equity for each of the sample firms without explicit consideration of the market value capital structure underlying those costs risks material errors. The costs of equity of the sample companies at their actual market-value capital structures do not necessarily correspond to the financial risk faced by equityholders in the regulated company, and thus could lead to an unfair rate of return. I avoid this problem by calculating each sample company's ATWACC using its market value capital structure. Using the sample's average overall cost of capital, I then determine the corresponding return on equity at Paradise Valley's regulatory capital structure. This procedure ensures that the capital structure and the estimated cost of equity are consistent.

In the following analyses, I estimate the cost of equity for each of the sample firms using the traditional estimation methods. I use each company's estimated cost of equity along with Arizona-American's marginal tax rate and each company's cost of debt and market-value capital structure to estimate the sample company's overall cost of capital. I then calculate the sample average overall cost of capital for each equity estimation method for both of the samples. Using the procedure discussed above, I then determine the cost of equity at Paradise Valley's regulated capital structure for each estimation method that is consistent with the sample's overall cost of capital information.

III. THE COST OF CAPITAL FOR THE BENCHMARK SAMPLES

Q12. How is this section of your testimony organized?

A12. As noted in *Section II*, I estimate the cost of capital using two samples of comparable risk companies. This section first covers matters such as sample selection, market-value capital structure determination, and the sample companies' costs of debt. It then covers estimation of the cost of equity for the sample companies and the resulting estimates of the sample's overall after-tax cost of capital. Next, it analyzes these data to reach a conclusion on the overall cost of capital and the corresponding cost of equity at Paradise Valley's regulatory capital structure for both of the benchmark samples.

A. PRELIMINARY DECISIONS

Q13. What preliminary decisions are needed to implement the above principles?

A13. I must select the benchmark samples, calculate the sample companies' market-value capital structures, and determine the sample companies' market costs of debt and preferred equity.

1. The Samples: Water Utilities and Gas Local Distribution Companies

Q14. Why is it necessary to use two samples?

A14. The overall cost of capital for a part of a company depends on the risk of the business in which the *part* is engaged, *not* on the overall risk of the parent company on a consolidated basis. According to financial theory, the overall risk of a diversified company equals the market-value-weighted average of the risks of its components.

Estimating the cost of capital for Paradise Valley's regulated assets is the subject of this proceeding. The ideal sample would be a number of companies that are publicly traded "pure plays" in the water production, storage, treatment, transmission and distribution line of business. "Pure play" is an investment term referring to companies with operations only in one line of business. Publicly traded firms, firms whose shares are freely traded on stock exchanges, are ideal because the best way to infer the cost of capital is to examine evidence from capital markets on companies in the given line of business.

In this case, a sample of companies whose operations are concentrated solely in the regulated portion of the water industry would be ideal. Unfortunately, the available sample of pure "water" companies in the U.S. is relatively small and has serious data deficiencies. See Section III.C.1 for a description of these deficiencies.

My standard selection procedures require data from Moody's, *Value Line*, IBES and Compustat, along with a high percentage of revenue from regulated operations, no merger activity, no dividend cuts or other activity that could cause the growth rates or beta estimates to be biased. However, if these standards were applied to the companies in the water sample it would leave at most only two companies in the sample.[2] Even these two companies have relatively low trading volumes and other data issues that make cost of

[2] American States Water Co. and California Water Service.

capital estimation procedures less reliable.[3] A two company sample is simply too small to provide reliable results so I keep the other companies in my sample.

Q15. But if this is the best available sample of regulated water utilities, what else can be done?

A15. Given the weaknesses of the water sample, it is prudent to compare the cost of capital estimates from the water sample to estimates from another, more reliable sample of regulated companies. Absent a comparison to another sample, the expert can have insufficient confidence that the estimates from the water sample are valid, because one or two observations in a small sample can have a disproportionate impact on the results.

To address the weaknesses noted for the water sample, a sample of companies whose operations are concentrated in the natural gas distribution business is used. This sample, whose operations are in a regulated portion of the natural gas industry, provides an additional benchmark against which to compare the results of the water sample. The gas LDC sample consists of larger companies with very high proportion of revenues from rate regulated activities and has been selected to eliminate those companies with company-specific factors that may affect the cost of capital estimates.

Additional details of the sample selection process for each sample are described below as well as in Appendix B.

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[3] American States Water Co. has some merger activity and only one IBES forecast.

Q16. If the business risk of the second sample differs from the water sample, would not that invalidate any comparison between the cost of equity estimated for the second sample and the risk a water company?

A16. No. Even though the business and financial risk of the two samples may differ, the analyst can still make use of the information from the more reliable sample to evaluate the reliability of the estimates from the water sample.

Q17. Please elaborate on the way two samples with different business and financial risks can be compared.

A17. The overall cost of capital for a part of a company depends on the risk of the business in which the *part* is engaged, *not* on the overall risk of the parent company on a consolidated basis. According to financial theory, the overall risk of a diversified company equals the market value weighted-average of the risks of its components.

Calculating the overall after-tax weighted average cost of capital for each sample company as described above allows the analyst to estimate the average overall cost of capital for the sample. The ATWACC captures both the business risk and the financial risk of the sample companies in one number. This allows comparison of the cost of capital between two samples on a much more informed basis. If the alternative (more reliable) sample is judged to have slightly different risk than the water sample, but the results show wide differences in the ATWACC estimates, the analyst should carefully consider the validity of the water sample estimates, whether they are materially higher or lower than the alternative sample's estimates. Of course, the alternative sample could be the source of the error, but that is less likely because the alternative sample has been selected precisely because of its expected reliability.

Q18. Please compare the characteristics of the water utility sample and the gas LDC sample.

A18. The two samples differ primarily in that they operate in two different (regulated) industries, but they are very similar in terms of the percentage of revenues from regulated operations and the customers they serve. Both samples earn a large percentage of their revenue from regulated activities and serve a mix of residential, industrial, and other customers. However, the gas LDC sample has fewer of the data and estimation issues identified above for the water sample. Please refer to Appendix B for addition details comparing the two samples.

2. Market-Value Capital Structure

Q19. What capital structure information do you require?

A19. For reasons discussed in Dr. Kolbe's testimony and explained in detail in his Appendix B, explicit evaluation of the market-value capital structures of the sample companies is vital for a correct interpretation of the market evidence on the return on equity. This requires estimates of the market values of common equity, preferred equity and debt, and the current market costs of preferred equity and debt.

Q20. Please describe how you calculate the market values of common equity, preferred equity and debt.

A20. I estimate the capital structure for each sample company by estimating the market values of common equity, preferred equity and debt from the most recent publicly available data. The details are in Appendix B.

Briefly, the market value of common equity is the price per share times the number of shares outstanding. For the risk positioning approach, I use the last five trading days of each year to calculate the market value of equity for the year. I then calculate the average capital structure over the corresponding five-year period used to estimate the "beta" risk measures for the sample companies. This procedure matches the estimated beta to the degree of financial risk present during its estimation period. In the DCF analyses, I use the average stock price over 15 trading days ending on the release date of the IBES growth rate forecasts utilized in the DCF analysis.[4]

The market value of debt is estimated at its book value, because market and book values of debt do not differ much in the U.S. at this time. The market value of preferred stock for the samples is also set equal to its book value because the market values and book values do not differ much and because the percent of preferred stock in the capital structures of the sample companies is relatively small compared to the debt and common equity components.

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[4] April 1, 2005 for both the water utility sample and the gas LDC sample except for Aqua American whose estimate is from April 8, 2005.

3. Market Costs of Debt and Preferred

Q21. How do you estimate the current market cost of debt?

A21. The market cost of debt for each company in the DCF analysis is the current yield reported in the Mergent Bond Record for an index of public utility company bonds corresponding to the sample company's current debt rating (or the five-year average debt rating for the risk positioning models) as classified by Moody's.[5] Calculation of the after-tax cost of debt uses the Company's estimated marginal income tax rate for 2005 of 39.5 percent.

Q22. How do you estimate the market cost of preferred equity?

A22. For both samples, the cost of preferred equity is set equal to the yield on an index of preferred stock as reported in the Mergent Bond Record corresponding to Moody's rating of each sample company's preferred stock.

B. COST OF EQUITY ESTIMATION METHODS

Q23. How do you estimate the cost of equity for your sample companies?

A23. Recall the definition of the cost of capital from the outset of my testimony: the expected rate of return in capital markets on alternative investments of equivalent risk. My cost of capital estimation procedures address three key points implied by the definition:

[5] For some companies in the water utility sample, S&P's ratings were used. Details are in Appendix B.

1. Since the cost of capital is an *expected* rate of return, it cannot be directly observed; it must be inferred from available evidence.
2. Since the cost of capital is determined *in capital markets* (*e.g.*, the New York Stock Exchange), data from capital markets provide the best evidence from which to infer it.
3. Since the cost of capital depends on the return offered by alternative investments *of equivalent risk*, measures of the risks that matter in capital markets are part of the evidence that needs to be examined.

Q24. How does the above definition help in cost of capital estimation?

A24. The definition of the cost of capital recognizes a tradeoff between risk and expected return, plotted above in Figure 1, the security market line. Cost of capital estimation methods take one of two approaches: (1) they try to identify a comparable-risk sample of companies and to estimate the cost of capital directly; or (2) they establish the location of the security market line and estimate the relative risk of the security, which jointly determine the cost of capital. In terms of Figure 1, the first approach focuses directly on the vertical axis, while the second focuses both on the security's position on the horizontal axis and on the position of the security market line.

The first type of approach is more direct, but ignores the wealth of information available on securities not thought to be of precisely comparable risk. The "discounted cash flow" or "DCF" model is an example. The second type of approach, sometimes known as "equity risk premium approach," requires an extra step, but as a result can make use of information on all securities, not just a very limited subset. The capital asset pricing model ("CAPM") is an example. While both approaches can work equally well if conditions are right, one may be preferable to the other under other circumstances. In particular, approaches that rely on the entire security market line are less sensitive to deviations from the assumptions that underlie the model, all else equal. I examine both DCF and risk positioning approach evidence for the samples.

1. Risk Positioning Approach

Q25. Please explain the risk positioning method.

A25. The risk positioning method estimates the cost of equity as the sum of a current interest rate and a risk premium. It is therefore sometimes also known as the "risk premium" approach. This approach may sometimes be applied informally. For example, an analyst or a commission may check the spread between interest rates and what is believed to be a reasonable estimate of the cost of capital at one time, and then apply that spread to changed interest rates to get a new estimate of the cost of capital at another time.

More formal applications of the risk positioning approach take full advantage of the security market line depicted in Figure 1: they use information on all securities to identify the security market line and derive the cost of capital for the individual security based on that security's relative risk. This reliance on the entire security market line makes the method less vulnerable to the kinds of problems that arise for the DCF method, which relies on one stock at a time. The risk positioning approach is widely used and underlies most of the current research published in academic journals on the nature, determinants and magnitude of the cost of capital.

Section I of Appendix B to this testimony provides more detail on the principles that underlie the risk positioning approach. Section II of Appendix B provides the details of the risk positioning approach empirical estimates I obtain.

Q26. How are the "more formal" applications of risk positioning approach implemented?

A26. The first step is to specify the current values of the benchmarks that determine the security market line. The second is to determine the security's, or investment's, relative risk. The third is to specify exactly how the benchmarks combine to produce the security market line, so the company's cost of capital can be calculated based on its relative risk.

a. Security Market Line Benchmarks

Q27. What benchmarks are used to determine the location of the security market line?

A27. The essential benchmarks that determine the security market line are the risk-free interest rate and the premium that a security of average risk commands over the risk-free rate. This premium is commonly referred to as the "market risk premium" ("MRP"), *i.e.*, the excess of the expected return on the average common stock over the risk-free interest rate. In the risk positioning approach, the risk-free interest rate and MRP are common to all securities.

A security-specific measure of relative risk (beta) is estimated separately and combined with the MRP to obtain the company-specific risk premium.

Q28. What benchmark do you use for the MRP?

A28. I estimate two versions of the risk positioning model. The first version measures the risk premium versus a long-term Government interest rate. The second version measures the market risk premium as the risk premium of average-risk common stocks over short-term Treasury bills, which is the usual measure of the MRP used in capital market theories. To determine the cost of capital in a regulatory proceeding, the market risk premium should be used with a *forecast* of the same interest rate (*i.e.*, the short-term or long-term Government bond rate).

Q29. How do you estimate the MRP?

A29. As explained in Appendix B, there is presently little consensus on "best practice" for estimating the MRP. (Note: this is not the same thing as saying that all practices are equally good). For example, the leading graduate textbook in corporate finance, after recommending for many years use of the arithmetic average realized excess return on the market (which for a while was noticeably over 9 percent in the U.S.), now reviews the current state of the research and expresses the view that a range between 6 to 8.5 percent is reasonable for the U.S.[6]

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[6] Richard A. Brealey and Stewart C. Myers, *Principles of Corporate Finance*, 7th ed., New York: McGraw-Hill/Irwin (2003), pp. 153-160.

My testimony considers both the historical evidence and the results of scholarly studies of the factors that affect the risk premium for average-risk stocks in order to estimate the benchmark risk premium investors currently expect. In particular, I rely on historical differences between the S&P 500 Index ("S&P 500") and the risk-free rate.

Considering all the evidence, I conclude that S&P 500 stocks of average risk today command a premium of at least 8.0 percent over the short-term risk-free rate and 6.5 percent over the long-term Government rate. The estimation of the MRP is discussed in greater detail in Appendix B.

Q30. What value do you use for the other benchmark you mentioned, the risk-free interest rate?

A30. I require an interest rate forecast for both long-term Government bonds and short-term Treasury bills which corresponds to the long-term and short-term risk premiums discussed. For the analyses that follow, I use a value of 3.0 percent for the short-term risk-free interest rate and a value of 5.0 percent for the long-term risk-free interest rate as the benchmark interest rates in the risk positioning analyses, but I give no weight to the estimates using the short-term risk-free rate. The derivation of these values is discussed below.

b. Relative Risk

Q31. What measure of relative risk do you use?

A31. I examine the "beta" of the stocks in question. Beta is a measure of the "systematic" risk of a stock — the extent to which a stock's value fluctuates more or less than average when the market fluctuates.

The basic idea behind beta is that risks that cannot be diversified away in large portfolios matter more than those that can be eliminated by diversification. Beta is a measure of the risks that *cannot* be eliminated by diversification. This concept is explored further in Appendix B.

Q32. What does a particular value of beta mean?

A32. By definition, a stock with a beta equal to 1.0 has average non-diversifiable risk: it goes up or down by 10 percent on average when the market goes up or down by 10 percent. Stocks with betas above 1.0 exaggerate the swings in the market: stocks with betas of 2.0 tend to fall 20 percent when the market falls 10 percent, for example. Stocks with betas below 1.0 are less volatile than the market. A stock with a beta of 0.5 will tend to rise 5 percent when the market rises 10 percent.

Q33. How do you estimate beta?

A33. For both samples, I use betas reported by *Value Line* for reasons discussed below.

c. Cost of Equity Capital Calculation

Q34. How do you combine the preceding steps to estimate the cost of equity?

A34. By far the most widely used approach to combine a risk measure with the benchmark market risk premium on common stocks to find a risk premium for a particular firm or industry is the Capital Asset Pricing Model. However, the CAPM is only one risk positioning technique.

I rely on another risk positioning approach in addition to the CAPM. Empirical research has long shown that the CAPM tends to overstate the actual sensitivity of the cost of capital to beta: low-beta stocks tend to have higher risk premia than predicted by the CAPM and high beta stocks tend to have lower risk premia than predicted. A number of variations on the original CAPM theory have been proposed to account for this finding.

This finding can be used directly to estimate the cost of capital, using beta to measure relative risk, without simultaneously relying on the CAPM. Here I examine results from both the CAPM and a version of the security market line based on the empirical finding that risk premia are related to beta, but are not as sensitive to beta as the CAPM predicts, to convert the betas into a risk premium. I refer to this latter model as the "ECAPM," where ECAPM stands for *Empirical* Capital Asset Pricing Model. The formula for the ECAPM is

$$k = r_f + a + \beta \times (MRP - a). \qquad (1)$$

where k is the cost of capital, r_f is the risk-free interest rate, MRP is the market risk premium, β is the measure of relative risk, and a is the empirical adjustment factor.

Research supports values for a of from two to seven percent when using a short-term interest rate. I use baseline values of a of 2 percent for the short-term risk-free rate and 0.5 percent for the long-term risk-free rate. I also conduct sensitivity tests for different values of a. For the short-term risk-free rate I use values for a of 1, 2 and 3 percent. For the long-term risk-free rate I use values for a of 0, 0.5 and 1.5 percent. See Appendix B for a more detailed discussion of the ECAPM model and Table No. MJV-B1 for a summary of the empirical evidence on the size of the required adjustment.

Q35. **Why is it appropriate to use the ECAPM model?**

A35. Empirical tests of the CAPM have repeatedly shown that an investment' s return is related to systematic risk, but that the increase in return for an increase in risk is *less* than is predicted. The empirical tests have also shown that the theoretical intercept, as measured by the return on Treasury bills, is too low to fit the data. In other words, the empirical tests indicate that the slope of the CAPM is too steep and the intercept is too low. The empirical data support for the ECAPM. The ECAPM recognizes the consistent empirical observation that the CAPM underestimates (overestimates) the cost of capital for low (high) beta stocks. The ECAPM corrects the predictions of the CAPM to more closely match the results of the empirical tests. Ignoring the results of the tests of the CAPM would lead to an estimate of the cost of capital that is likely to be less accurate than is possible.

Q36. Is the use of the ECAPM equivalent to increasing the estimated betas for the sample companies?

A36. No. Fundamentally, this is *not* an adjustment (increase) in beta. This can easily be seen by the fact that the expected return on high beta stocks is lower with the ECAPM than when estimated by the CAPM. The ECAPM model is a recognition that the actual slope of the risk-return tradeoff is flatter than predicted and the intercept higher based upon repeated empirical tests of the model. The Merrill Lynch adjustment in betas and the ECAPM capture two distinct features of the risk positioning model. Even if the beta of the sample companies were estimated accurately, the CAPM would still underestimate the required return for low beta stocks. Even if the ECAPM were used, the costs of equity would be underestimated if the betas were underestimated.

2. Discounted Cash Flow Method

Q37. Please describe the discounted cash flow approach.

A37. The DCF model takes the first approach to cost of capital estimation, i.e., to attempt to estimate the cost of capital in one step. The method assumes that the market price of a stock is equal to the present value of the dividends that its owners expect to receive. The method also assumes that this present value can be calculated by the standard formula for the present value of a cash flow stream:

$$P = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \ldots + \frac{D_T}{(1+k)^T} \qquad (2)$$

where "P" is the market price of the stock; "D_i" is the dividend cash flow expected at the end of period i; "k" is the cost of capital; and "T" is the last period in which a dividend cash flow is to be received. The formula just says that the stock price is equal to the sum of the expected future dividends, each discounted for the time and risk between now and the time the dividend is expected to be received.

Most DCF applications go even further, and make very strong (*i.e.*, unrealistic) assumptions that yield a simplification of the standard formula, which then can be rearranged to estimate the cost of capital. Specifically, if investors expect a dividend stream that will grow *forever* at a steady rate, the market price of the stock will be given by a very simple formula,

$$P = \frac{D_1}{(k-g)} \qquad (3)$$

where "D_1" is the dividend expected at the end of the first period, "g" is the perpetual growth rate, and "P" and "k" are the market price and the cost of capital, as before. Equation (3) is a simplified version of Equation (2) that can be solved to yield the well known "DCF formula" for the cost of capital:

$$k = \frac{D_1}{P} + g = \frac{D_0 x (1+g)}{P} + g \qquad (4)$$

where "D_0" is the current dividend, which investors expect to increase at rate g by the end of the next period, and the other symbols are defined as before. Equation (4) says that if Equation (3) holds, the cost of capital equals the expected dividend yield plus the (perpetual) expected future growth rate of dividends. I refer to this as the simple DCF model. Of course, the "simple" model is simple because it relies on very strong (*i.e.*, very unrealistic) assumptions.

Q38. Are there other versions of the DCF models besides the "simple" one?

A38. Yes. I also consider a variant of the DCF model that relies on *slightly* less strong assumptions in that it allows for varying growth rates in the near term before assuming a perpetual growth rate after year ten. This is a variant of the "multi-stage" DCF method. The DCF models are described in detail in Section I. A of Appendix C. (Section II of Appendix C provides the details of my empirical DCF results.)

Q39. What are the merits of the DCF approach?

A39. The DCF approach is conceptually sound if its assumptions are met, but can run into difficulty in practice because those assumptions are so strong, and hence so unlikely to correspond to reality. Two conditions are well known to be necessary for the DCF approach to yield a reliable estimate of the cost of capital: the variant of the present value formula that is used must actually match the variations in investor expectations for the dividend growth path; and the growth rate(s) used in that formula must match current investor expectations. Less frequently noted conditions may also create problems. (See Appendix C for details.)

Q40. Do you agree that estimating the right growth rate is the most difficult part for the implementation of the DCF approach?

A40. Yes. Finding the right growth rate(s) is the usual "hard part" of a DCF application. The original approach to estimation of *g* relied on average historical growth rates in observable variables, such as dividends or earnings, or on the "sustainable growth" approach, which estimates *g* as the average book rate of return times the fraction of earnings retained within the firm. But it is highly unlikely that these historical averages over periods with widely varying rates of inflation and costs of capital will equal current growth rate expectations. This is particularly true for the water sample.

Moreover, the constant growth rate DCF model *requires* that dividends and earnings grow at the same rate for companies that earn their cost of capital on average.[7] It is inconsistent with the theory on which the model is based to have different growth rates in earnings and dividends over the period when growth is assumed to be constant. If the growth in dividends and earnings were expected to vary over some number of years before settling down into a constant growth period, then it would be appropriate to estimate a multistage DCF model. In the multistage model, earnings and dividends can grow at different rates, but *must* grow at the same rate in the final, constant growth rate period. A

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[7] Why must the two growth rates be equal in a steady-growth DCF model? Think of earnings as divided between reinvestment, which funds future growth, and dividends. If dividends grow faster than earnings, there is less investment and slower growth each year. Sooner or later dividends will equal earnings. At that point, growth is zero because nothing is being reinvested (dividends are constant). If dividends grow slower than earnings, each year a bigger fraction of earnings are reinvested. That makes for ever faster growth. Both scenarios contradict the steady-growth assumption. So if you observe a company with different expectations for dividend and earnings growth, you know the company's stock price and its dividend growth forecast are inconsistent with the assumptions of the steady-growth DCF model.

difference between forecasted dividend and earnings rates therefore is a signal that the facts do not fit the assumptions of the simple DCF model.

Q41. How do you estimate the growth rates you use in your DCF analysis?

A41. I use earnings growth rate forecasts from IBES and *Value Line*. Analysts' forecasts are superior to using single variables in time series forecasts based upon historical data as has been documented and confirmed extensively in academic research. Please see Section I in Appendix C for a detailed discussion on this issue.

Q42. Are you aware that the Commission staff relies on an average of historical growth rates of earnings and dividends as well as forecasts of earnings and dividend growth rates to estimate the growth rate for the DCF model?

A42. Yes, but I do not believe that this is the best way to estimate the growth rate for use in the DCF model for the following reasons. First, as mentioned above, the model requires that dividends and earnings grow at the same rate at some point in the future in order to apply the model. The data on historical growth rates do not confirm this condition. Second, analysts have access to historical information and include that information in their forecast of earnings growth rates. In other words, using historical data provides no additional information to that captured in analyst forecasts. Finally, averaging wildly different growth rate estimates in the hopes of having the extremes cancel out calls into question whether the DCF model is applicable at this time to the sample companies.

Q43. What about the evidence that analyst earning growth forecasts have been optimistic (over estimated earnings and dividend growth) in the past?

A43. Although analyst forecasts have been optimistic on average in the past, this problem is less acute for regulated companies. In addition, the use of a two-stage DCF model that substitutes the forecast growth of GDP mitigates analyst optimism by substituting the GDP growth rate for the potentially optimistic (or pessimistic) earnings forecasts of analysts.

Q44. How well are the constant-growth rate conditions necessary for the reliable application of the DCF likely to be met for the sample companies at present?

A44. The requisite conditions for the sample companies are not fully met at this time, particularly for the water sample. Of particular concern for this proceeding is the uncertainty about what investors truly expect the long-run outlook for the sample companies to be. The longest time period available for growth rate forecasts of which I am aware is five years. The long-run growth rate (*i.e.*, the growth rate after the water industry settles into a steady state, which may be *beyond* the next five years for this industry) drives the actual results one gets with the DCF model. Unfortunately, this implies that unless the company or industry in question is stable, so there is little doubt as to the growth rate investors expect, DCF results in practice can end up being driven by the subjective judgment of the analyst who performs the work.

Of the six companies in the water sample relied upon for the DCF analysis, three companies have only two longer term earnings forecasts available (one from *Value Line* and one from IBES).[8] In addition, the average long-term earnings forecasts vary from a low of 6.0 percent to a high of 10.0 percent (Table No. MJV-5), well above the 5.3 percent forecast of the long-term growth rate of GDP.[9] However, the 5-year growth rate estimates for the gas LDC sample are much more homogeneous. The values range from a low of 4.0 percent to a high of 6.7 percent growth rate (Table No. MJV-16), which on average are consistent with the 5.3 percent forecast of the long-term growth in the U.S. GDP. As discussed above, the two-stage DCF model also adjusts for any over optimistic (or pessimistic) growth rate forecasts by adjusting the 5-year growth rate forecasts of the analysts toward the long-term GDP growth rate in the years after year 5. See Appendix C, Section I for a discussion of the two-stage model.

The DCF growth rates whether estimated from historical data or from analyst forecasts are likely to be affected by the fact that there has been a number of mergers and acquisitions in the water industry in recent years, and the industry is showing signs of becoming globalized.[10] Thus, the industry appears to be moving towards a larger degree of consolidation – at least among the privately held water utilities. Additionally, new

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[8] Of these three companies, the *Value Line* earnings forecast for Middlesex Water Co. and York Water Co. pertain to 2006 and is therefore not a 5-year forecast.

[9] Blue Chip Economic Indicators, March 10, 2005 p. 15.

[10] Philadelphia Suburban (renamed Aqua America) completed the acquisition of AquaSource for about $195 million in July 2003. The company also acquired or merged with several local water utilities. Additionally, American Water Works acquired National Enterprises, Inc., Azurix, and the water and wastewater utility assets of Citizens Utilities. American Water Works, in turn, was acquired by RWE AG on January 10, 2003. Domestic energy companies have also invested in the water utility business, although presently many of those investments have or will be sold. Allete has sold its assets in Florida and North Carolina; Indianapolis Water Company was sold by NISource; Suez Lyonnaise des Eaux purchased the remaining shares of United Water Resource that it did not already own; and Thames Water purchased E'Town Corporation. (Sources: *Value Line Investment Survey*, January 30, 2004, *The Business Journal* and company web sites)

environmental regulation may impact the industry as standards for water quality evolve over time, and there is potential for new safety and security requirements in the future. The industry has no federal regulator (other than for environmental and health issues), and state public utility commissions regulate most investor owned water utilities. Different regulatory bodies may lead to differing regulatory requirements for companies operating in adjacent parts of the country. Taken together, these factors mean that it may be some time before the water industry settles into anything investors will see as a stable equilibrium necessary for the application of the DCF model in a completely reliable way.

Such circumstances imply that a commission may often be faced with a wide range of DCF estimates, none of which can be well grounded in objective data on true long-run growth expectations, *because no such objective data now exist.* DCF for firms or industries in flux is *inherently* subjective with regard to the most important parameter, the long-run growth rate, that drives the answer one gets.

In short, the unavoidable questions about the DCF model's strong assumptions cause me to view the DCF method as *inherently* less reliable than the risk positioning approach described above. However, because the DCF method has been widely used in the past and in other forums when the industry's economic conditions were different from today's, I submit DCF evidence in this case. DCF estimates also serve as a check on the values provided by the risk positioning methods.

In this proceeding I give no weight to the DCF results for the water sample, but I give some weight to the DCF results for the gas LDC sample because that segment of the industry has been relatively stable. Although there has been an increase in the pace of mergers and acquisitions in the gas LDC segment of the industry, and some LDC companies reported revenue from trading activities (especially in the 2000-01 period), my sample selection procedures have largely excluded companies affected by these factors. In addition, the 5-year growth rate forecasts for the gas LDC sample companies are very similar indicating a relatively high degree of stability for the companies included in the sample. These factors imply that the results of the DCF model for the gas LDC sample deserve some weight in estimating the cost of capital.

C. THE WATER UTILITY SAMPLE BENCHMARK

1. Water Utility Sample Selection

Q45. How did you select your sample of water utilities?

A45. To construct this sample, I started with the universe of companies classified as water utility companies in *Value Line*. The goal was to create a sample of companies whose primary business is as a regulated water utility with business risk generally similar to that of Paradise Valley. I report all results for both the full sample and for the sample without Southwest Water Company which earns a relatively low percentage (about 40%) of its revenue from regulated water utility activities and without York Water Company because of a series of data issues including the lack of growth forecast and historical bond ratings, its small size and the very thin trading of its equity.[11] Companies in this subsample earned at least 86 percent of their revenue from regulated water utility activities in 2004. Additional details of the sample selection process for the water sample are in Appendix B.

Q46. Earlier you said that the sample of water utilities had serious data weaknesses. Please elaborate on these weaknesses.

A46. In attempting to apply the DCF model to the sample, only three companies have five-year earnings forecasts from more than one Institutional Brokers Estimate System ("IBES") analyst out of the eight water utilities for which data are available. Three of these utilities have only one long-term growth forecast and two have no long-term growth forecast from IBES. Similarly, only three companies have long-term growth forecasts from *Value Line*. The result of this lack of data is that the discounted cash flow model only can be applied to six companies. Of these companies, the estimated cost of capital is based on two analysts for three of the companies. A similar lack of data exists when looking at the companies' bond ratings. For two of the eight companies, neither a Moody's nor a Standard and Poor's ("S&P") bond rating was found.[12]

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[11] York Water traded an average of about 6,000 shares per day in 2004. Additionally, York Water Co. has no long-term *Value Line* earnings growth forecasts, and only one year's (2004) bond rating for the company is available.

[12] For three of the six companies with a Moody's or Standard and Poor's bond rating, the bond rating was only found for some years during the most recent 5-year period. The rating for periods for which no bond rating was found was set equal to the rating for later periods. For companies without a bond rating, an A-rating is used in the analysis. The A-rating is consistent with the average for companies listed as water utilities in *Value Line* and followed by either Moody's or Standard and Poor's. Additionally, interest coverage ratios for the companies without a Moody's or S&P bond rating were computed and were either within or close to the S&P's guidelines for an A-rating. Bond ratings were obtained from www.moodys.com, Compustat, Mergent Bond Record, and S&P's Bond Rating books.

The size of the companies in the water sample also makes cost of capital estimation difficult. All companies except Aqua America and California Water have less than $500 million in market value of equity. More important, however, is the fact that the stock of these companies trades relatively infrequently. For example, three of the eight water utilities traded an average of less than 10,000 shares per trading day during the last five days of 2004 as well as during the year. Only Aqua America and Southwest Water had an average trading volume above 50,000 shares per day in 2004. This compares to an average trading volume of approximately 139,000 shares for the companies in the gas LDC sample.[13] Low trading volume causes concern because there may be a delay between the release of important information and the time that this information is reflected in prices. Such delay is well known to cause beta estimates to be statistically insignificant and possibly biased.

In addition to lack of data and the small size of the companies, there are firm-specific events that render the water utility sample less reliable than would be ideal. First, Aqua America (the largest of the companies) has gone through several mergers and acquisitions in recent years. Normally, I would not include companies with significant merger or acquisition activity in a sample because the individual information about the progress of the proposed merger is so much more important for the determination of the company's stock price than day-to-day market fluctuations. In practice, beta estimates for such companies

[13] Trading volume varies substantially within the gas LDC sample with KeySpan trading being by far the largest volume per day. The average trading volume of the gas LDC sample without KeySpan is around 87,500 shares per day.

tend to be too low. Second, Southwest Water Co. earns only approximately 40 percent of its revenue from regulated activities. I therefore also report my results for the subsample of companies that do not include Southwest Water Co. and York Water Co. which has serious data problems.

It is because of these weaknesses in the water sample that I also utilize a sample of natural gas LDCs.

2. Risk Positioning Cost of Capital Estimates

Q47. How is your testimony on the risk positioning approach cost of capital estimates organized?

A47. This section first describes the input data used in the CAPM and ECAPM models, then reports the resulting cost of equity estimates for the sample. The second section of Appendix B details the empirical analysis.

a. Interest Rate Forecasts

Q48. How do you determine the expected risk-free interest rate?

A48. I start with the current rates from the constant maturity U.S. Government bond yield data available from the St. Louis Federal Reserve Bank. For the period March 28 to April 15, 2005, the average yield on 30-day Treasury bills is about 2.65 percent and the average yield on long-term government bonds is 4.85 percent. See Table No. MJV-12. The Federal Reserve ("Fed") recently raised the Fed funds rate to 3.0 percent, and the press releases associated with the increase suggest that the Fed will continue a measured increase in interest rates in order to dampen inflationary forces in the economy.[14] The actions of the Fed indicate that interest rates are likely to continue to increase in the future.

Q49. Do you apply any adjustment to the current interest rates?

A49. Yes. I round up the values listed in Exhibit No. MJV-12 because forecasts indicate that interest rates are likely to increase in the future as the Fed acts against inflation, but the current yield on Treasury bills is still likely to be unreliable as a measure of the short-term risk-free rate in the CAPM. I use a value of 3.0 percent for the short-term rate and 5.0 percent for the long-term rate in the analysis, but this is likely to be an underestimate of the interest rates prevailing during the period rates from this proceeding are likely to be in effect.

Q50. Please explain why there is a problem with using the yields on Treasury bills as the risk-free rate in risk positioning analysis at this time.

A50. The risk-free interest rate used in the risk positioning model should correspond to the market risk premium used. This is the reason for using a short-term interest rate with the MRP estimated with reference to short-term interest rates and a long-term interest rate with the MRP estimated with reference to long-term rates. However, yields on Government debt

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[14] Federal Reserve Board, Press Release, May 3, 2005. (Note: This press release "corrects previous release") "Fed Again Increases Key Rate by o.25%," by Nell Henderson, *Washington Post*, March 23, 2005, and "Minutes Highlight Federal Reserve Concerns About Inflation," by Jeannie Aversa, *Washington Post*, April 12, 2005.

have fallen in response to interest rate cuts by the Federal Reserve Bank. Yields on Treasury bills in the recent past had fallen to less than 1 percent as the Fed cut interest rates in an effort to stimulate the economy. As the possibility of inflation has reappeared, the Fed has begun to raise interest rates in 25 basis point increments so that the Federal funds rate now stands at 3.0 percent. The expectation is that the Fed will continue its gradual increase in interest rates in an effort to insure that inflation does not again become a problem.

Q51. What is the effect of using the short-term risk-free rate in the risk positioning model at this time?

A51. The result is cost of equity estimates that are *less* than the company's corresponding cost of debt for some of the sample companies. This result is clearly contrary to the most basic of financial theory and can not represent a valid estimate of the cost of equity for those companies. There is no theory of which I am aware that supports the notion that the cost of a company's debt would be more than its cost of equity. The cost of equity estimates for those companies whose estimated cost of equity exceeds the company's corresponding cost of debt are also likely to biased downward because the short-term interest rate is still not at a level that is consistent with its historic relationship to long-term interest rates. It is for this reason that I ascribe no value to the risk positioning estimates based upon the short-term risk-free rate.

Q52. What values do you use for the short-term and long-term risk-free interest rates?

A52. I use a value of 3.0 percent for the short-term risk-free interest rate and a value of 5.0 percent for the long-term risk-free interest rate as the benchmark interest rates in the risk positioning analyses, but I give no weight to the estimates using the short-term risk-free rate.

b. Betas and the Market Risk Premium

Q53. What beta estimates did you use in your analysis for the samples?

A53. I rely upon the most recent betas estimated by *Value Line* for both the water sample and for the gas LDC sample.

Q54. Are the beta values reported by *Value Line* adjusted betas?

A54. Yes. *Value Line* reports betas that are adjusted by a process that is very similar to that used by Merrill Lynch. I use adjusted betas when the sample companies display statistically significant sensitivity to interest rate changes. Please refer to Appendix B for a discussion of the test for interest rate sensitivity. Neither of the two samples in this proceeding display such sensitivity, so I reverse the adjustment process to get "unadjusted" beta values.

Q55. What is Merrill Lynch's adjustment procedure?

A55. Merrill Lynch reports two types of betas, the second is an adjustment of the first to compensate for sampling errors in the directly estimated betas. The Merrill Lynch adjustment moves the estimated betas toward a value of one, the average stock beta. The

Merrill Lynch adjustment is designed as a correction for the tendency of companies with low estimated betas to have negative sampling errors and for companies with high estimated betas to have positive sampling errors, which means that the measured betas of companies tend to be closer to one in subsequent measurement periods. Many practitioners routinely use Merrill Lynch adjusted betas for this reason, but that is not the reason that I use adjusted betas. I use adjusted betas to correct for the underestimation of the betas of companies regulated on the basis of original cost rate base resulting from their increased sensitivity to interest rates.

After reversing the adjustment process discussed above, the average estimated *Value Line* beta for the water sample is 0.46 while the average for the gas LDC sample is 0.56.

Q56. What value do you use for the market risk premium?

A56. For the premium over short-term risk-free interest rate I use 8.0 percent, while for the premium over long-term risk-free interest rate I use 6.5 percent, for the reasons discussed above and in Appendix B.

Q57. Please explain the method to adjust for differences in capital structure.

A57. Starting with the ATWACC, the cost of equity for any capital structure within a broad range of capital structures can be determined by the following formula:

$$\text{Return on equity} = \frac{(\text{ATWACC} - \text{Return on debt} \times \%\ \text{debt in capital structure} \times \text{tax rate})}{\%\ \text{equity in capital structure}}$$

This is the calculation that is displayed in Table No. MJV-11 and in Table No. MJV-22. The tables display the result of converting the sample average ATWACC to a return on equity for a specific capital structure. It is straightforward to determine the cost of equity consistent with capital structure utilizing this method.

c. Risk Positioning Results

Q58. What are the cost of equity estimates derived from the risk positioning approach for the water sample?

A58. Using the long-term interest rate in the two risk positioning models (CAPM and ECAPM), with two values of the ECAPM parameter (0.5% and 1.5%), I obtain three estimates of each sample company's cost of equity. These results are displayed in Table MJV-9, Panel A. The cost of equity estimates are combined with the estimates of the company's cost of debt and preferred to calculate the company's ATWACC. These calculations and the resulting sample average ATWACC are presented in Table No. MJV-10, Panels A-C for each of the estimating methods. The sample average ATWACC and cost of equity at Paradise Valley's 36.7 percent equity capital structure are displayed in Table No. MJV-11. Panel A shows the cost of equity and ATWACC value for all water sample companies, while Panel B shows the results for the subsample of companies with significant revenue from regulated water utility activities.[15] These results are also shown in Table 1 below.

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[15] Also excluding York Water Co. as discussed above.

Using the short-term interest rate in the two risk positioning models (CAPM and ECAPM) and using different values for the ECAPM parameter, *a*, I obtain four estimates of each sample companies' cost of equity. These estimates are displayed in Table No. MJV-9, Panel B. The estimated cost of equity for some companies in the sample is *less* than its corresponding market cost of debt. Such a result is nonsense and I, therefore, do not report or rely upon the results of the short-term risk-free rate version of the risk-positioning model to estimate the cost of capital for Arizona-American.

Table 1: Panel A

Water Regulated Utility Sample
Risk Positioning After-Tax Weighted-Average Cost of Capital and
Cost of Equity Estimates for All Sample Companies

Using Long-Term Risk-Free Rate	ATWACC	Cost of Equity
CAPM	6.4%	11.7%
ECAPM ($a = 0.5\%$)	6.6%	12.2%
ECAPM ($a = 1.5\%$)	7.0%	13.2%

Source: Table No. MJV-11.

Table 1: Panel B

Water Regulated Utility Sample
Risk Positioning After-Tax Weighted-Average Cost of Capital and Cost of Equity Estimates for Companies with a Large Fraction of Revenue from Regulated Water Activities

Using Long-Term Risk-Free Rate	ATWACC	Cost of Equity
CAPM	6.5%	12.0%
ECAPM (a = 0.5%)	6.7%	12.4%
ECAPM (a = 1.5%)	7.1%	13.4%

Source: Table No. MJV-11.

3. The DCF Cost of Capital Estimates

Q59. Did you estimate cost of equity using the DCF method for the water sample?

A59. Yes, I estimate the cost of capital for the water sample companies for which I have IBES or Value Line forecasts.[16]

Q60. What steps do you take in your DCF analyses?

A60. Given the above discussion of DCF principles, the steps are to collect the data, estimate the sample companies' costs of equity at their current capital structures, and then to adjust the sample's estimates to Paradise Valley's 36.7 percent equity ratio.

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[16] For the both samples, I obtained IBES forecasts from Thompson's Research as of April 1, 2005 except for Aqua America Inc. whose IBES forecast is as of April 8, 2005. I obtained *Value Line* growth forecasts from *Value Line Investment Survey* as of January 28, 2005 for the water sample and March 18, 2005 for the gas LDC sample. No DCF analysis was performed for Connecticut Water Services or for SJW Corporation because no current long-term growth forecasts were found for either company.

a. Growth Rates

Q61. What growth rate information do you use?

A61. For reasons discussed above and in Appendix C, historical growth rates today are not relevant as forecasts of current investor expectations for these samples. I therefore use rates forecast by security analysts.

The ideal in a DCF application would be a detailed forecast of future dividends, year by year well into the future until a true steady state (constant) dividend growth rate was reached, based on a large sample of investment analysts' expectations. I know of no source of such data. Dividends are ultimately paid from earnings, however, and earnings forecasts from a number of analysts are available for a few years. Investors do not expect dividends to grow in lockstep with earnings, but for companies for which the DCF approach can be used reliably (*i.e.*, for relatively stable companies whose prices do not include the option-like values described in Appendix C), they do expect dividends to track earnings over the long-run. Thus, use of earnings growth rates as a proxy for expectations of dividend growth rates is a common practice.

Accordingly, the first step in my DCF analysis is to examine a sample of investment analysts' forecasted earnings growth rates from IBES and *Value Line* to the degree such forecasts are available. The details are in Appendix C. At present, *Value Line* data run through a 2007-2009 horizon for the water sample (2008-2010 for the gas LDC sample), which represents on average about a 4 year forecast (from the 1st quarter of 2005 to the end of 2008). IBES also provides a long-term earnings growth rate estimates. The longest-horizon forecast growth rates from these sources underlie my simple DCF model (*i.e.*, the standard perpetual-growth model associated with the "DCF formula," dividend yield plus growth). Unfortunately, the longest growth forecast data only go out for a period of about five years, which is too short a period to make the DCF model completely reliable. I also use the very short-run growth information over the next few years and the long-run GDP growth rate forecast in a modest attempt at obtaining a multi-stage DCF estimate using company-specific growth rates.

Q62. Do these growth rates correspond to the ideal you mentioned above?

A62. No. While forecasted growth rates are the quantity required in principle, the forecasts need to go far enough out into the future so that it is reasonable to believe that investors expect a stable growth path afterwards. As can be seen in Workpaper #3 to Table No. MJV-5, Panel C for the water sample and Workpaper # 3 to Table No. MJV-16, Panel C for the gas LDC sample, the growth rate estimates do not support the view that investors are expecting growth rates equal to the single perpetual growth rate assumed in the simple DCF model. The growth rate forecasts vary substantially in the short-term, and the five-year growth rate forecasts are also quite different from company to company. However, the five-year growth rate forecasts for the gas LDC sample vary much less from company to company than do the five-year growth rate forecasts for the water companies. There are also generally fewer analysts forecasting earnings for the companies in the water sample. It is clear that much longer detailed growth rate forecasts than those currently available from IBES and *Value*

Line would be needed to implement the DCF model in a completely reliable way for these two samples at this time; however, the general stability of the 5-year growth rate forecasts for the gas LDC sample indicates a higher degree of reliability for the gas LDC sample than for the water sample at this time.

b. Dividend and Price Inputs

Q63. What values do you use for dividends and stock prices?

A63. Dividends are for the 1st quarter of 2005, the most recent dividend information available at the time of estimation.[17] This dividend is grown at the estimated growth rate and divided by the price described below to estimate the dividend yield for the simple DCF model.

Stock prices are an average of closing stock prices for the 15-day trading period ending April 1, 2005 except for Aqua America Corp. for which stock price information ends on April 8, 2005. These dates coincide with the release of the IBES growth forecasts for the companies. A 15-day stock price average is used to guard against anomalous price changes in any single day.

c. DCF Results

Q64. What are the DCF estimates for the samples?

A64. The data are used in the two versions of the DCF method to get sample company estimates at the sample company's capital structure. The resulting return on equity at Paradise

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[17] The 1st quarter 2005 dividend information was obtained from Compustat.

Valley's 36.7 percent equity capital structure are shown in Table 2 along with the sample average ATWACC numbers. These results are much higher on average than the water sample's risk positioning approach results, but I do not believe that these results are reliable for the reasons discussed above. I give them no weight in my estimate of the overall cost of capital for the sample.

Table 2: Panel A

Water Regulated Utility Sample
Discounted Cash Flow After-Tax Weighted-Average Cost of Capital and Cost of Equity Estimates for All Companies

	ATWACC	Cost of Equity
Simple DCF Method (Quarterly)	8.1%	16.2%
Multi-Stage DCF Using the Long-Term GDP Forecast as the Perpetual Rate	6.9%	12.9%

Source: Table No. MJV-8.

Table 2: Panel B

**Water Regulated Utility Sample
Discounted Cash Flow After-Tax Weighted-Average Cost of Capital and Cost of Equity Estimates for Companies with a Large Fraction of Revenue from Regulated Water Activities**

	ATWACC	Cost of Equity
Simple DCF Method (Quarterly)	8.2%	16.5%
Multi-Stage DCF Using the Long-Term GDP Forecast as the Perpetual Rate	7.0%	13.2%

Source: Table No. MJV-8.

D. THE GAS LOCAL DISTRIBUTION COMPANIES

1. Sample Selection for the Gas Local Distribution Sample

Q65. How do you select your sample of gas local distribution companies?

A65. One reason for use of the gas LDC sample is to generate a sample of regulated companies whose primary source of revenues is in the regulated portion of the natural gas industry to provide a check for the results of the water sample. Therefore, I started with the universe of publicly traded gas distribution utilities covered by *Value Line Investment Survey*, and I required the sample companies to have revenues from regulated natural gas distribution that is 50 percent or more of total revenue. The final sample includes eight companies. I also report results for a subsample of companies that have had no significant merger activities and no dividend cuts for the last five years. These companies are also characterized by having generated more than 70 percent of their revenue from regulated activities during the relevant period.[18] The subsample consists of six companies for the risk positioning analysis and five companies for the DCF analysis. Appendix B discusses the selection process for the gas LDC sample in more detail.

2. Risk Positioning Cost of Capital Estimates

Q66. What are the cost of equity estimates resulting from the risk positioning model for the gas LDC sample companies?

A66. As with the water sample, the data are used to obtain four cost of equity estimates for risk premium approach for the sample companies using the short-term risk-free rate and three cost of equity estimates using the long-term risk-free rate. Consistent with the results for the water sample, the estimates of the cost of equity using the short-term risk-free rate are less than the market cost of debt for some companies and are unreliable.

The cost of equity estimates for the sample companies using the long-term risk-free rate are displayed in Table No. MJV-20, Panel A. The cost of equity estimates are combined with the estimates of the company's cost of debt and preferred to calculate the company's ATWACC. These calculations and the resulting sample average ATWACC are presented in Table No. MJV-21, Panels A-C for each of the estimating methods. The sample average ATWACC and cost of equity at Paradise Valley's 36.7 percent equity capital structure are displayed in Table No. MJV-22. These results are also shown in Table

[18] The relevant period is the most recent fiscal year (2004) for the DCF analysis and the most recent five years for the risk positioning analysis.

3 below. Panel A shows the cost of equity and ATWACC value for all gas LDC sample companies. Table 3, Panel B shows the results for the subsample of companies with no mergers or dividend cuts. As can be seen by a comparison of Panel A of Tables 1 and 3, the overall cost of capital and resulting cost of equity estimates for the gas LDC sample are nearly identical to those for the water sample for the full sample. A comparison of Panel B of Tables 1 and 3 shows that the gas LDC subsample has a somewhat lower estimated cost of equity than does the water sample. Because I have great confidence in the statistical quality of the gas LDC sample, these results give me a degree of assurance that the results of the water sample are reasonable.

Table 3: Panel A

Gas LDC Sample

Risk Positioning After-Tax Weighted-Average Cost of Capital and Cost of Equity Estimates for All Sample Companies

Long-Term Risk-Free Rate	**ATWACC**	**Cost of Equity**
CAPM	6.4%	11.7%
ECAPM (a = 0.5%)	6.6%	12.0%
ECAPM (a = 1.5%)	6.8%	12.7%

Source: Table No. MJV-22.

Table 3: Panel B

Gas LDC Sample
Risk Positioning After-Tax Weighted-Average Cost of Capital and Cost of Equity Estimates for Companies with No Mergers or Dividend Cuts

Long-Term Risk-Free Rate	**ATWACC**	**Cost of Equity**
CAPM	6.3%	11.3%
ECAPM (a = 0.5%)	6.4%	11.7%
ECAPM (a = 1.5%)	6.7%	12.4%

Source: Table No. MJV-22.

3. The DCF Cost of Capital Estimates

Q67. Is there any difference between gas LDC companies you rely upon for your risk positioning method and for your DCF method?

A67. Yes. Peoples Energy is part of the risk positioning subsample, but it is not part of the DCF subsample because the portion of revenues from regulated activities has declined recently so that it is less than 70 percent in 2004 even though the five-year average is over 70 percent. (See Table No. MJV-13)

Q68. What DCF cost of equity estimates do you obtain for the sample?

A68. The growth rate in the DCF method is the weighted average of the growth estimates from IBES and *Value Line*. The resulting costs of equity and ATWACCs are shown in Table 4. The results for the simple DCF model are more than 1.0 percent lower than for the water sample, but the results for the multi-stage DCF model are mixed. The full sample multistage DCF results are higher for the gas LDC than for the water sample, but the water and gas LDC subsample results are very similar. However, the gas LDC results are much more consistent between the full sample and the subsample and between the simple DCF and the multistage DCF models. As a result of the consistency of the results and the relative stability of the growth rate estimates, I give some slight weight to the DCF results for the gas LDC sample. Specifically, the DCF results together with the risk positioning results for the subsample of the gas LDC sample lead me to round the risk positioning cost of equity estimates upward to the nearest ¼ percent.

Table 4: Panel A

Gas LDC Sample
Discounted Cash Flow After-Tax Weighted-Average Cost of Capital
and Cost of Equity Estimates for All Companies

Discounted Cash Flow Method	**ATWACC**	**Cost of Equity**
Simple DCF (Quarterly)	7.1%	13.6%
Multi-Stage DCF Using the Long-Term GDP Forecast as the Perpetual Rate	7.2%	13.8%

Source: Table No. MJV-19.

Table 4: Panel B

Gas LDC Sample
Discounted Cash Flow After-Tax Weighted-Average Cost of Capital and Cost of Equity Estimates for Companies with No Merger or Dividend Cuts

Discounted Cash Flow Method	ATWACC	Cost of Equity
Simple DCF (Quarterly)	7.0%	13.3%
Multi-Stage DCF Using the Long-Term GDP Forecast as the Perpetual Rate	7.0%	13.1%

Source: Table No. MJV-19.

E. THE TWO SAMPLES' COST OF CAPITAL

Q69. What conclusions do you draw from the above data regarding each sample's cost of equity at Paradise Valley's 36.7 percent equity ratio?

A69. The estimated costs of equity from the DCF model are substantially higher than the estimates from the risk positioning model for both samples. The simple DCF model that relies on company-specific growth rate forecasts vary significantly among companies and are less reliable because the long-run growth rate forecast drives the results, and there are *no* objective data on the long-run growth rate investors truly expect, *nor* on when the industry is expected to settle down into some sort of stable-growth equilibrium.

The cost of equity estimates that rely on the multi-stage DCF model are also uniformly higher than the risk positioning estimates for both samples. Although I do not rely upon the DCF model results for the water sample, I believe that DCF cost capital estimates provide a useful check on the risk positioning results for the gas LDC sample. The uniformly higher DCF results suggest that the risk positioning estimates are probably downward biased for the gas LDC sample and perhaps for the water sample, as well.

Q70. Do you have any comments regarding the results of the risk positioning models?

A70. Yes. The relative risk measure, beta, used in the models is derived from 260 weeks (5 years) of historical data. Ordinarily, using historical data to estimate beta is not a serious problem because the overall business risk of an industry probably does not change rapidly. For an industry undergoing major changes, however, the beta estimates based upon the historical data may not capture the full changes in risk in the industry. This is true even though information on the probability and provisions of industry changes have been available some months ago. However, as explained in Appendix B, such "decoupling" of beta from the market appears to be a common feature of industries undergoing structural changes. This factor also suggests that the risk positioning estimates may be downward biased and is consistent with the information from the DCF models.

Q71. Given your view of the current value of the DCF method for this industry, what conclusions do you draw from the risk positioning results?

A71. The risk positioning results are summarized above in Table 1 and Table 3. Of those results, the CAPM values deserve the least weight, because this method does not adjust for the empirical finding that the cost of capital is less sensitive to beta than predicted by the

CAPM (which my testimony considers by using the ECAPM). Conversely, the ECAPM numbers deserve the most weight, because this method adjusts for the empirical findings. The cost of equity estimates at a 36.7 percent equity thickness range from 11.7 to 13.2 percent for the water sample (12.0 to 13.4 percent for the subsample) and 11.7 to 12.7 percent for the gas LDC sample (11.3 to 12.4 percent for the subsample). The estimates based upon the short-term risk-free rate are unreliable and not reported here.

The middle value in both Table 1 and Table 3 for the full sample shows an ATWACC of 6.6 percent for both the water and the gas LDC samples with a corresponding cost of equity of 12.2 percent and 12.0 percent respectively, . Although the average ATWACC for both full samples is 6.6 percent (ECAPM with a = 0.5), the sample estimated costs of equity displayed in Panel B of Table No. MJV-10 compared to Panel B of Table No. MJV-21 are higher on average for the gas LDC. This result is consistent with the increased financial leverage in the LDC sample (57% market value equity ratio) compared to the water sample (67% market value equity ratio) and demonstrates the importance of considering differences in financial leverage when evaluating the results of cost of capital estimation models. The results for the water subsample are slightly higher than for the full sample which implies that the estimates for the full sample are slightly downward biased. The gas LDC subsample results are about 40 basis points lower than for the full sample. Taken together, the analyses confirm that the overall risk of the two samples is very similar although the market value capital structures differ substantially.

Based upon the evidence, the point estimates for the overall cost of capital estimates for the two samples are 6¾ percent for the water sample and 6½ percent for the gas LDC sample. Although the gas LDC subsample results are slightly lower than the full sample, I round the estimate for the overall cost of capital up to the nearest ¼ percent for the gas LDC sample up because of the DCF results. However, it is more correct to say that the sample results indicate a range of values. The ranges are 6½ to 7 percent for the water sample and 6¼ to 6¾ for the gas LDC sample for an overall range of 6¼ to 7 percent for the two samples combined. The corresponding point estimates for the cost of equity are 12½ percent (12 to 13 percent range) for the water sample and 12 percent (11½ to 12½ range) for the gas LDC sample for a capital structure with 36.7 percent equity. This results in an overall range for the cost of equity of 11½ to 13 percent.

As previously noted, in estimating the cost of equity I round to the nearest ¼ percent (25 basis points) because I do not believe that cost of capital estimates can be made more precisely than that.

Q72. Does this conclude your testimony?

A72. Yes.

Appendix A: QUALIFICATIONS OF MICHAEL J. VILBERT

Michael Vilbert is an expert in cost of capital, financial planning and valuation who has advised clients on these matters in the context of a wide variety of investment and regulatory decisions. He received his Ph.D. in Financial Economics from the Wharton School of the University of Pennsylvania, an MBA from the University of Utah, an M.S. from the Fletcher School of Law and Diplomacy, Tufts University, and a B.S. degree from the United States Air Force Academy. He joined *The Brattle Group* in 1994 after a career as an Air Force officer, where he served as a fighter pilot, intelligence officer, and professor of finance at the Air Force Academy.

REPRESENTATIVE CONSULTING EXPERIENCE

- In a securities fraud case, Dr. Vilbert designed and created a model to value the private placement stock of a drug store chain if there had been full disclosure of the actual financial condition of the firm. He analyzed key financial data and security analysts reports regarding the future of the industry in order to recreate pro forma balance sheet and income statements under a variety of scenarios designed to establish the value of the firm.

- For pharmaceutical companies rebutting price-fixing claims in antitrust litigation, Dr. Vilbert was a member of a team which prepared a comprehensive analysis of industry profitability. The analysis replicated, tested and critiqued the major recent analyses of drug costs, risks and returns. The analyses helped develop expert witness testimony to rebut allegations of excess profits.

- For an independent electrical power producer, Dr. Vilbert created a model that analyzed the reasonableness of rates and costs filed by a natural gas pipeline. The model not only duplicated the pipeline's rates, but it also allowed simulation of a variety of "what if" scenarios associated with cost recovery under alternative time patterns and joint cost allocations. Results of the analysis were adopted by the intervenor group for negotiation with the pipeline.

- For the CFO of an electric utility, Dr. Vilbert developed the valuation model used to support a stranded cost estimation filing. The case involved a conflict between two utilities over the responsibility for out-of-market costs associated with a power purchase contract between them. In addition, he advised and analyzed cost recovery mechanisms that would allow full recovery of the stranded costs while providing a rate reduction for the company's rate payers.

- Dr. Vilbert has assisted in the preparation of testimony and the development of estimation models in numerous cost of capital cases for natural gas pipeline and electric utility clients before the FERC and state regulatory commissions. These have spanned standard estimation techniques (DCF, CAPM) and have also developed and applied more advanced models specific to the industries or lines of business in question, *e.g.*, based on the structure and risk characteristics of cash flows, or based on multi-factor models that better characterize regulated industries.

- Dr. Vilbert has valued several large, residual oil-fired generating stations to evaluate the possible conversion to natural gas or other fuels. In these analyses, the expected pre- and post-conversion station values were computed using a range of market electricity and fuel cost conditions.

- For a major western electric utility, Dr. Vilbert helped prepare testimony that analyzed the prudence of QF contract enforcement. The testimony demonstrated that the utility had not been compensated for major disallowances for QF contract management in its allowed cost of capital.

- Dr. Vilbert was a member of a team which analyzed the economic need for a major natural gas pipeline expansion to the Midwest. This involved evaluating forecasts of natural gas use in various regions of the United States and the effect of additional supplies on the pattern of natural gas pipeline use. The analysis was used to justify the expansion before the FERC and the National Energy Board of Canada.

- For a Public Utility Commission in the northeast, Dr. Vilbert analyzed the auction of an electric utilities purchase power agreements to determine whether the outcome of the auction was in the ratepayers' interest. The work involved the analysis of the auction procedures as well as the benefits to ratepayers of transferring risk of the PPA payments to the buyer.

- Dr. Vilbert led a team tasked to determine whether bridge tolls were "just and reasonable" for a non-profit port authority. Determination of the revenue requirement of the authority required estimation of the ratebase value of the authority's assets using the trended original cost methodology as well as evaluation of the operations and maintenance budgets. Investment costs, bridge traffic information and inflation indices covering a 75 year period were utilized to estimate the value of four bridges and a passenger transit line valued in excess of $1 billion.

- Dr. Vilbert helped a recently privatized railroad in Brazil develop an estimate of its revenue requirements, including an estimate of its cost of capital, and evaluate alternative rate structures designed to provide economic incentives to shippers as well as to the railroad for improved service. This involved the explanation and analysis of the contribution margin of numerous products and shippers, improved cost analysis and evaluation of bottlenecks in the system.

- For a southeastern utility, Dr. Vilbert was part of a team quantifying the company's stranded costs under several legislative electric restructuring scenarios. This involved the evaluation of all of the company's fossil and nuclear generating units, its contracts with Qualifying Facilities and the prudence of those QF contracts. He provided analysis concerning the impact of securitizing the company's stranded costs as a means of reducing the cost to the rate payers and several alternative designs for recovering stranded costs.

- For a recently privatized electric utility in Australia, Dr. Vilbert evaluated the proposed regulatory scheme of the Australian Competition and Consumer Commission for the company's electric transmission system. The evaluation highlighted the elements of the proposed regulation which would impose uncompensated asymmetric risks on the company and the need to either eliminate the asymmetry in risk or provide additional compensation so that the company could expect to earn its cost of capital.

- For an electric utility in the southwest, Dr. Vilbert helped design and create a model to estimate the stranded costs of the company's portfolio of Qualifying Facilities and Power Purchase contracts. This exercise was complicated by the many variations in the provisions of the contracts that required modeling in order to capture the effect of changes in either the performance of the plants or in the estimated market price of electricity.

- Dr. Vilbert helped prepare the testimony responding to a FERC request for further comments on the appropriate return on equity for electric transmission facilities. In addition, Dr. Vilbert was a member of the team that made a presentation to the FERC staff on the expected risks of the unbundled electric transmission line of business.

- Dr. Vilbert and Mr. Frank C. Graves, also of *The Brattle Group*, prepared testimony evaluating an innovative Canadian stranded cost recovery procedure involving the auctioning of the output of the Province's electric generation plants instead of the plants themselves. The evaluation required the analysis of the terms and conditions of the long-term contracts specifying the revenue requirements of the plants for their entire forecast remaining economic life and required an estimate of the cost of capital for the plant owners under this new stranded cost recovery concept.

- Dr. Vilbert served as the neutral arbitrator for the valuation of an petroleum products tanker. The valuation required analysis of the Jones Act tanker market and the supply and demand balance of the available U.S. constructed tanker fleet.

TESTIMONY

Direct and rebuttal testimony before the Alberta Energy and Utilities Board on behalf of TransAlta Utilities Corporation in the matter of an application for approval of its 1999 and 2000 generation tariff, transmission tariff, and distribution revenue requirement, October 1998.

Direct testimony before the Federal Energy Regulatory Commission on behalf of Central Maine Power in Docket No. ER00-982-000, December 1999.

Direct testimony before the Alberta Energy and Utilities Board on behalf of TransAlta Utilities Corporation for approval of its 2001 transmission tariff, May 2000.

Direct testimony before the Federal Energy Regulatory Commission on behalf of Mississippi River Transmission Corporation in Docket No. RP01-292-000, March 2001.

Written evidence, Rebuttal, Reply and further Reply before the National Energy Board in the matter of an application by TransCanada PipeLines Limited for orders pursuant to Part I and Part IV of the *National Energy Board Act*, May 2001, Nov. 2001, Feb. 2002.

Written evidence before the Public Utility Board on behalf of Newfoundland & Labrador Hydro - Rate Hearings, October 2001.

Direct testimony (with Bill Lindsay) before the Federal Energy Regulatory Commission on behalf of DTE East China, LLC in Docket No. ER02-1599-000, April 2002.

Direct and rebuttal reports before the Arbitration Panel in the arbitration of stranded costs for the City of Casselberry, FL, Case No. 00-CA-1107-16-L, July 2002.

Direct reports before the Arbitration Board for Petroleum products trade in the Arbitration of the Military Sealift Command vs. Household Commercial Financial Services, fair value of sale of the Darnell, October 2002

Direct Testimony and Hearing before the Arbitration Panel in the arbitration of stranded costs for the City of Winter Park, FL, In the Circuit Court of the Ninth Judicial Circuit in and for Orange County, FL, Case No. C1-01-4558-39, December 2002.

Direct Testimony before the Federal Energy Regulatory Commission on behalf of Florida Power Corporation, dba Progress Energy Florida, Inc. in Docket No. SC03-___-000, March 2003.

Direct Report before the Arbitration Panel in the arbitration of stranded costs for the Town of Belleair, FL, Case No. 000-6487-01-007, April 2003.

Direct and Rebuttal Report before the Alberta Energy and Utilities Board in the matter of the Alberta Energy and utilities Board Act, R.S.A. 2000, c. A-17, and the Regulations under it; in the matter of the Gas Utilities Act, R.S.A. 2000, c. G-5, and the Regulations under it; in the matter of the Public utilities Board Act, R.S.A. 2000, c. P-45, as amended, and the Regulations under it; and in the matter of Alberta Energy and Utilities Generic Cost of Capital Hearing, Proceeding No. 1271597, July 2003, November 2003

Written Evidence before the National Energy Board in the matter of the National Energy Board Act, R.S.C. 1985, c. N–7, as amended, (Act) and the Regulations made under it; and in the matter of an application by TransCanada PipeLines Limited for orders pursuant to Part IV of the *National Energy Board Act*, for approval of Mainline Tolls for 2004, January 2004.

Direct and Rebuttal Testimony before the Public Service Commission of West Virginia, on Cost of Capital for West Virginia-American Water Company, Case No 04-0373-W-42T, May 2004

DOCKET NO. WS-01303A-05-
Arizona-American Water Company
Appendices to Direct Testimony of Michael J. Vilbert

Appendix B: EQUITY RISK PREMIUM APPROACH METHODOLOGY: DETAILED PRINCIPLES AND RESULTS

TABLE OF CONTENTS

Q1. What is the purpose of this appendix?

A1. This appendix reviews the principles behind the equity risk premium methodology, describes the estimation of the parameters used in the models, the sample selection procedures and the details of the cost of capital estimates obtained from this methodology. This appendix intentionally repeats portions of my direct testimony, because I want the reader to be able to have a full discussion of the issues addressed here, rather than having to continually turn back to the corresponding section of the testimony.

I. EQUITY RISK PREMIUM APPROACH METHODOLOGY PRINCIPLES

Q2. How is this section of the appendix organized?

A2. It first reviews the basic nature of the equity risk premium approach. It then discusses the individual components of the model: the benchmark risk premium, the relative risk of the company or line of business in question, the appropriate interest rate, and the combination of these elements in a particular equity risk premium model.

A. THE BASIC EQUITY RISK PREMIUM MODEL

Q3. How does the equity risk premium model work?

A3. The equity risk premium approach estimates the cost of equity as the sum of a current interest rate and a risk premium. (It therefore is sometimes also known as the "risk premium" or the "risk positioning" approach.)

This approach may sometimes be applied informally. For example, an analyst or a commission may check the spread between interest rates and what is believed to be a reasonable estimate of the cost of capital at one time, and then apply that spread to changed interest rates to get a new estimate of the cost of capital at another time.

More formal applications of equity risk premium method implement the second approach to cost of capital estimation. They use information on all securities to identify the security market line (Figure 1 in the body of the testimony) and derive the cost of capital for the individual security based on that security's relative risk. This equity risk premium approach is widely used and underlies most of the current scholarly research on the nature, determinants and magnitude of the cost of capital.

Q4. How are "more formal applications" put into practice?

A4. The essential benchmarks that determine the security market line are the risk-free interest rate and the premium that a security of average risk commands over the risk-free rate. This premium is commonly referred to as the "market risk premium" ("MRP"), *i.e.*, the excess of the expected return on the average common stock over the risk-free interest rate. In the equity risk premium approach the risk-free interest rate and MRP are common to all securities. A security-specific measure of relative risk (beta) is estimated separately and combined with the MRP to obtain the company-specific risk premium.

In principle, there may be more than one factor affecting the expected stock return, each with its own security-specific measure of relative risk and its own benchmark risk premium. For example, the "arbitrage pricing theory" and other "multi-factor" models have been proposed in the academic literature. These models estimate the cost of capital as the sum of a risk-free rate and several security-specific risk premiums. However, none of these alternative models has emerged in practice as "the" improvement to use instead of the original, single-factor model. I use the traditional single-factor model in this testimony.

Accordingly, the required elements in my formal equity risk premium approach are the market risk premium, an objective measure of relative risk, the risk-free rate that corresponds to the measure of the market risk premium, and a specific method to combine these elements into an estimate of the cost of capital.

B. MARKET RISK PREMIUM

Q5. Why is a risk premium necessary?

A5. Experience (*e.g.*, the U.S. market's October Crash of 1987) demonstrates that shareholders, even well diversified shareholders, are exposed to enormous risks. By investing in stocks instead of risk-free Government bills, investors subject themselves not only to the risk of earning a return well below those they expected in any year but also to the risk that they might lose much of their initial capital. This is why investors demand a risk premium.

I estimate two versions of the Capital Asset Pricing Model ("CAPM"). The first version measures the market risk premium as the risk premium of average risk common stocks over the long-term risk-free rate. The second version measures the risk premium relative to a short-term risk-free rate, which is the usual measure of the "market risk premium" used in capital market theories.

Q6. Please discuss some of the issues involved in selecting the appropriate MRP?

A6. To determine the cost of capital in a regulatory proceeding, the MRP should be used with a *forecast* of the same interest rate used to calculate the MRP (*i.e.*, the short-term Treasury bill rate or the long-term Government rate). For example, it would be inconsistent to utilize a short-term risk-free with an estimate of the MRP derived from comparisons to long-term interest rates. In addition, the appropriate measure of the MRP should be based upon the arithmetic mean not the geometric mean return.[1] The arithmetic mean is the simple average while the geometric mean is the compound rate of return between two periods.

Q7. How do you estimate the MRP?

A7. There is presently little consensus on "best practice" for estimating the MRP. For example, the latest edition of the leading graduate textbook in corporate finance, after recommending use of the arithmetic average realized excess return on the market for many years (which for a while was noticeably over 9 percent), now reviews the current state of the research and expresses the view that the a range between 6 to 8.5 percent is reasonable for the U.S.[2,3]

My written testimony considers both the historical evidence and the results of scholarly studies of the factors that affect the risk premium for average-risk stocks in order to estimate the benchmark risk premium investors currently expect. I consider the historical difference in returns between the Standard and Poor's 500 Index ("S&P 500") and the risk-free rate, recent

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[1] See, for example, Ibbotson Associates, Stocks, Bonds, Bills, and Inflation: Valuation Edition 2005 Yearbook pp. 75-77.

[2] Richard A. Brealey and Stewart C. Myers, *Principles of Corporate Finance,* McGraw-Hill, 7th edition, 2003, pp. 153-160.

[3] In past editions, the authors expressed the view that they are "most comfortable" with values toward the upper end of that range, but this language does not appear in the 7th edition. Although Professor Myers still holds this view, this language and other sections were dropped to accommodate a request to reduce the length of the text.

academic literature on the MRP and the results of recent surveys to estimate the market risk premium.

Q8. Please summarize the recent literature on the MRP and the conclusions you draw from it?

A8. The new research challenges the conventional wisdom of using the arithmetic average historical excess returns to estimate the MRP. However, after reviewing the issues in the debate, I remain skeptical for several reasons that the market risk premium has declined substantially in the U.S.

First, despite eye-catching claims like "equity risk premium as low as three percent,"[4] and "the death of the risk premium,"[5] not all recent research arrives at the same conclusion. In his presidential address to the American Finance Association in 2001, Professor Constantinides seeks to estimate the unconditional equity premium based on average historical stock returns.[6] (Note that this address was based upon evidence just before the major fall in market value.) He adjusts the average returns downward by the change in price-earnings ratio because he assumes no change in valuations in an unconditional state. His estimates for 1926 to 2000 and 1951 to 2000 are 8.0 percent and 6.0 percent, respectively, over the 3-month T-bill rate. In another published study in 2001, Professors Harris and Marston use the DCF method

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[4] Claus, J. and J. Thomas, (2001), "Equity Risk Premium as Low as Three Percent: Evidence from Analysts' Earnings Forecasts for Domestic and International Stocks," *Journal of Finance* 56:1629-1666.

[5] Arnott, R. and R. Ryan, (2001), "The Death of the Risk Premium," *Journal of Portfolio Management* 27(3):61-84.

[6] Constantinides, G.M. (2002), "Rational Asset Prices," *Journal of Finance* 57:1567-1591.

to estimate the market risk premium for the U.S. stocks.[7] Using analysts' forecasts to proxy for investors' expectation, they conclude that over the period 1982-1998 the MRP over the **long-term risk-free rate** is 7.14 percent. As yet another example, the paper by Drs. Ibbotson and Chen (2003) adopts a supply side approach to estimate the forward looking long-term sustainable equity returns and equity risk premium based upon economic fundamentals. Their equity risk premium **over the long-term risk-free rate** is estimated to be 3.97% in geometric terms and 5.90% on an arithmetic basis. They conclude their paper by stating that their estimate of the equity risk premium is "far closer to the historical premium than being zero or negative."[8]

Professor Ivo Welch surveyed a large group of financial economists in 1998 and 1999. The average of the estimated MRP was 7.1 percent in Prof. Welch's first survey[9] and 6.7 percent in his second survey which was based on a smaller number of individuals. However, a more recent survey by Prof. Welch reported only a 5.5 percent MRP.[10] In characterizing these results Prof. Welch notes that "[T]he equity premium consensus forecast of finance and economics professors seems to have dropped during the last 2 to 3 years, a period with low realized equity premia."[11]

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[7] Robert S. Harris and Felicia C. Marston, The Market Risk Premium: Expectational Estimates Using Analysts' Forecasts, *Journal of Applied Finance* 11 (1) 6-16, 2001.

[8] Ibbotson, R. and P. Chen (2003), "Stock Market Returns in the Long Run: Participating in the Real Economy," *Financial Analyst Journal*, 59(1):88-98. Cited figures are on p. 97.

[9] Ivo Welch (2000), "Views of Financial Economists on the Equity Premium and on Professional Controversies," *Journal of Business*, 73(4):501-537. The cited figures are in Table 2 p. 514.

[10] Ivo Welch, 2001, "The Equity Premium Consensus Forecast Revisited," School of Management at Yale University working paper. The cited figure is in Table 2.

[11] *Ibid.*, p. 8.

The above quotation from Prof. Welch emphasizes the caution that must attend survey data even from knowledgeable survey participants: the outcome is likely to change quickly with changing market circumstances. Regulatory commissions should not, in my opinion, attempt to keep pace with such rapidly changing opinions.

Third, some of the evidence for negative or close to zero market risk premium simply does not make sense. Despite the relatively high valuation levels, stock returns remain much more volatile than Treasury bond returns. I am not aware of any empirical or theoretical evidence showing that investors would rationally hold equities and not expect to earn a positive risk premium for bearing the risk.

Fourth, I am unaware of a convincing theory for why the future MRP should have substantially declined. At the height of the stock market bubble in the U.S., many claimed that the only way to justify the high stock prices would be if the MRP had declined dramatically,[12] but this argument is heard less frequently now that the market has declined substantially. All else equal, a high valuation ratio such as price-earnings ratio implies a low required rate of return, hence a low MRP. However, there is considerable debate about whether the high level of stock prices (despite the burst of the internet bubble in the last a couple of years) represents the transition to a new economy or is simply an "irrational exuberance," which cannot be sustained for the long term. If the former case is true, then the MRP may have decreased permanently. Conversely, the long-run MRP may remain the same even if expected market returns in the short-term are smaller.

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[12] See Robert D. Arnott and Peter L. Bernstein, "What Risk Premium is 'Normal'?", *Financial Analysts Journal* 58:64-85, for an example.

Another common argument for a lower expected MRP is that the U.S. experienced very remarkable growth in the 20th century that was not anticipated at the start of the century. As a result, the average realized excess return is overestimated meaning the standard method of estimating the MRP would be biased upward. However, one recent study by Profs. Jorion and Goetzmann[13] finds, under some simplifying assumptions, that the so-called "survivorship bias" is only 29 basis points.[14] Furthermore, "[I]f investors have overestimated the equity premium over the second half of the last century, Constantinides (2002) argues that 'we now have a bigger puzzle on our hands'" Why have investors systematically biased their estimates over such a long horizon?[15]

To sum up the above, I cite two passages from Profs. Mehra and Prescott's review of the theoretical literature on equity premium puzzle:[16]

> Even if the conditional equity premium given current market conditions is small, and there appears to be general consensus that it is, this in itself does not imply that it was obvious either that the historical premium was too high or that the equity premium has diminished.
>
> In the absence of this [knowledge of the future], and based on what we currently know, we can make the following claim: over the long horizon the equity premium is likely to be similar to what it has been in the past and the returns to investment in equity will continue to substantially dominate that in T-bills for investors with a long planning horizon.

Q9. Is there other scholarly support for the conclusion?

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13 Jorion, P., and W. Goetzmann (1999), "Global Stock Markets in the Twentieth Century," *Journal of Finance* 54:953-980.

14 Dimson, Marsh, and Staunton (2003) make a similar point when they comment on the equity risk premia for 16 countries based on returns between 1900 and 2001: "While the United States and the United Kingdom have indeed performed well, compared to other markets there is no indication that they are hugely out of line." p.4.

15 Mehra, R., and E.C. Prescott (2003), "The Equity Premium in Retrospect," in *Handbook of the Economics of Finance*, Edited by G.M. Constantinides, M. Harris and R. Stulz, Elsevier B.V, p. 926

16 *Ibid*, p. 926.

A9. Yes. Another line of research was pursued by Steven N. Kaplan and Richard S. Ruback. They estimate the market risk premium in their article, "The Valuation of Cash Flow Forecasts: An Empirical Analysis."[17] Professors Kaplan and Ruback compare published cash flow forecasts for management buyouts and leveraged recapitalization over the 1983 to 1989 period against the actual market values that resulted from these transactions. One of their results is an estimate of the market risk premium over the long-term Treasury bond yield that is based on careful analysis of actual major investment decisions, not realized market returns. Their median estimate is 7.78 percent and their mean estimate is 7.97 percent.[18] This is considerably higher than my estimate of 6.5 percent. Even if the maturity premium of Treasury bonds over Treasury bills were only 1 percent, well below the best estimate of 1.5 percent the resulting estimate of the market risk premium over Treasury bills is higher than my estimate of 8.0 percent.

Q10. In addition to the scholarly articles and survey evidence you discussed in Section I.B of your Direct Testimony, what other evidence do you consider to estimate the MRP?

A10. I also consider the long-run realized equity premiums reported in Ibbotson Associates *SBBI Valuation Edition 2005 Yearbook.* The data provided cover the period 1926 through 2004. The results are discussed below.

Q11. What is the "long-run realized risk premium"in the U.S.?

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[17] *Journal of Finance*, 50, September 1995, pp. 1059-1093.

[18] *Ibid*, p. 1082.

A11. From 1926 to 2004, the full period reported, Ibbotson Associates data show that the average premium of stocks over Treasury bills is 8.6 percent. I also examine the "post-War" period. The risk premium for 1947-2004 is 8.5 percent.[19] (I exclude 1946 because its economic statistics are heavily influenced by the War years; *e.g.*, the end of price controls yielded an inflation rate of 18 percent. It is not really a "post-War" year, from an economic viewpoint.) These averages often change slightly when another year of data is added to the Ibbotson series. The average premium of stocks over the income returns on long-term Government bonds is 7.2 percent for both the 1926 to 2004 and the 1947 to 2004 periods.

Recently there has been a great deal of academic research on the MRP. This research has put practitioners in a dilemma: there is nothing close to a consensus about how the MRP should be estimated, but a general agreement in the academic community seems to be emerging that the old approach of using the average realized return over long periods gives too high an answer.

Q12. What is your conclusion regarding the MRP?

A12. Estimation of the MRP remains controversial. There is no consensus on its value nor even how to estimate it. Given all of the information, I estimate the risk premium for average risk stocks to be 8.0 percent over Treasury bills and 6.5 percent over long-term Government bonds.

[19] Ibbotson Associates SBBI Valuation Edition 2005 Yearbook, Appendix A.

C. RELATIVE RISK

Q13. How do you measure relative risk?

A13. The risk measure I examine is the "beta" of the stocks in question. Beta is a measure of the "systematic" risk of a stock — the extent to which a stock's value fluctuates more or less than average when the market fluctuates.

Q14. Please explain beta in more detail.

A14. The basic idea behind beta is that risks that cannot be diversified away in large portfolios matter more than those that can be eliminated by diversification. Beta is a measure of the risks that *cannot* be eliminated by diversification.

Diversification is a vital concept in the study of risk and return. (Harry Markowitz won a Nobel Prize for work showing just how important it was.) Over the long run, the rate of return on the stock market has a very high standard deviation, on the order of 15 - 20 percent per year. But many individual stocks have much higher standard deviations than this. The stock market's standard deviation is "only" about 15 - 20 percent because when stocks are combined into portfolios, some of the risk of individual stocks is eliminated by diversification. Some stocks go up when others go down, and the average portfolio return — positive or negative — is usually less extreme than that of individual stocks within it.

In the limiting case, if the returns on individual stocks were completely uncorrelated with one another, the formation of a large portfolio of such stocks would eliminate risk entirely. That is, the market's long-run standard deviation would be not 15 - 20 percent per year, but virtually zero.

The fact that the market's actual annual standard deviation is so large means that, in practice, the returns on stocks *are* correlated with one another, and to a material degree. The reason is that many factors that make a particular stock go up or down also affect other stocks. Examples include the state of the economy, the balance of trade, and inflation. Thus some risk is "non-diversifiable". Single-factor equity risk premium models derive conditions in which all of these factors can be considered simultaneously, through their impact on the market portfolio. Other models derive somewhat less restrictive conditions under which several of them might be individually relevant.

Again, the basic idea behind all of these models is that risks that cannot be diversified away in large portfolios matter more than those that can be eliminated by diversification, because there are a large number of large portfolios whose managers actively seek the best risk-reward tradeoffs available. Of course, undiversified investors would like to get a premium for bearing diversifiable risk, but they cannot.

Q15. Why not?

A15. Well-diversified investors compete away any premium rates of return for diversifiable risk. Suppose a stock were priced especially low because it had especially high diversifiable risk. Then it would seem to be a bargain to well diversified investors. For example, suppose an industry is subject to active competition, so there is a large risk of loss of market share. Investors who held a portfolio of all companies in the industry would be immune to this risk, because the loss on one company's stock would be offset by a gain on another's stock. (Of course, the competition might make the whole industry more vulnerable to the business cycle, but the issue here is the diversifiable risk of shifts in market share among firms.)

If the shares were priced especially low because of the risk of a shift in market shares, investors who could hold shares of the whole industry would snap them up. Their buying would drive up the stocks' prices until the premium rates of return for diversifiable risk were eliminated. Since all investors pay the same price, even those who are not diversified can expect no premium for bearing diversifiable risk.

Of course, substantial non–diversifiable risk remains, as the October Crash of 1987 demonstrates. Even an investor who held a portfolio of all traded stocks could not diversify against that type of risk. Sensitivity to such market–wide movements is what beta measures. That type of sensitivity, whether considered in a single- or multi-factor model, determines the risk premium in the cost of equity.

Q16. What does a particular value of beta signify?

A16. By definition, a stock with a beta equal to 1.0 has average non-diversifiable risk: it goes up or down by 10 percent on average when the market goes up or down by 10 percent. Stocks with betas above 1.0 exaggerate the swings in the market: stocks with betas of 2.0 tend to fall 20 percent when the market falls 10 percent, for example. Stocks with betas below 1.0 are less volatile than the market. A stock with a beta of 0.5 will tend to rise 5 percent when the market rises 10 percent.

Q17. How is beta measured?

A17. The usual approach to calculating beta is a statistical comparison of the sensitivity of a stock's (or a portfolio's) return to the market's return. Many investment services report betas, including Merrill Lynch's quarterly *Security Risk Evaluation* and the *Value Line Investment*

Survey. Betas are not always calculated the same way, and therefore must be used with a degree of caution, but the basic point that a high beta indicates a risky stock has long been widely accepted by both financial theorists and investment professionals.

Q18. Are there circumstances when the "usual approach" should not be used?

A18. There are at least two cases where the standard estimate of beta should be viewed skeptically.

First, companies in serious financial distress seem to "decouple" from their normal sensitivity to the stock market. The stock prices of financially distressed companies tend to change based more on individual news about their particular circumstances than upon overall market movements. Thus, a risky stock could have a low estimated beta if the company was in financial distress. Other circumstances that may cause a company's stock to decouple include an industry restructuring or major changes in a company's supply or output markets.

Second, similar circumstances seem to arise for companies "in play" during a merger or acquisition. Once again, the individual information about the progress of the proposed takeover is so much more important for that stock than day-to-day market fluctuations that, in practice, beta estimates for such companies seem to be too low.

Q19. How reliable is beta as a risk measure?

A19. Scholarly studies have long confirmed the importance of beta for a stock's required rate of return. It is widely regarded as the best single risk measure available. The merits of beta seemed to have been challenged by widely publicized work by Professors Eugene F. Fama and

Kenneth R. French.[20] However, despite the early press reports of their work as signifying that "beta is dead," it turns out that beta is still a potentially important explanatory factor (albeit one of several) in their work. Thus, beta remains alive and well as the best single measure of relative risk.

D. INTEREST RATE FORECAST

Q20. What interest rates do your procedures require?

A20. Modern capital market theories of risk and return use the short-term risk-free rate of return as the starting benchmark. My measures of the MRP incorporate this approach, since they represent the excess of the expected return on the market over the 30-day U.S. Treasury bill rate and over the long-term U.S. Government bond rate. Accordingly, implementation of my procedures requires use of a forecast of the 30-day Treasury bill rate and the long-term Government bond rate.

E. COST OF CAPITAL MODELS

Q21. How do you combine the above components into an estimate of the cost of capital?

A21. By far the most widely used approach to estimation of the cost of capital is the "Capital Asset Pricing Model," and I do calculate CAPM estimates. However, the CAPM is only one equity risk premium approach technique, and I also use another.

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[20] See for example, "The Capital Asset Pricing Model: Theory and Evidence", Eugene F. Fama and Kenneth R. French, University of Chicago Working Paper, June 2004.

Q22. Please start with the CAPM, by describing the model.

A22. As noted above, the modern models of capital market equilibrium express the cost of equity as the sum of a risk-free rate and a risk premium. The CAPM is the longest-standing and most widely used of these theories. The CAPM states that the cost of capital for investment I (*e.g.*, a particular common stock) is given by the following equation:

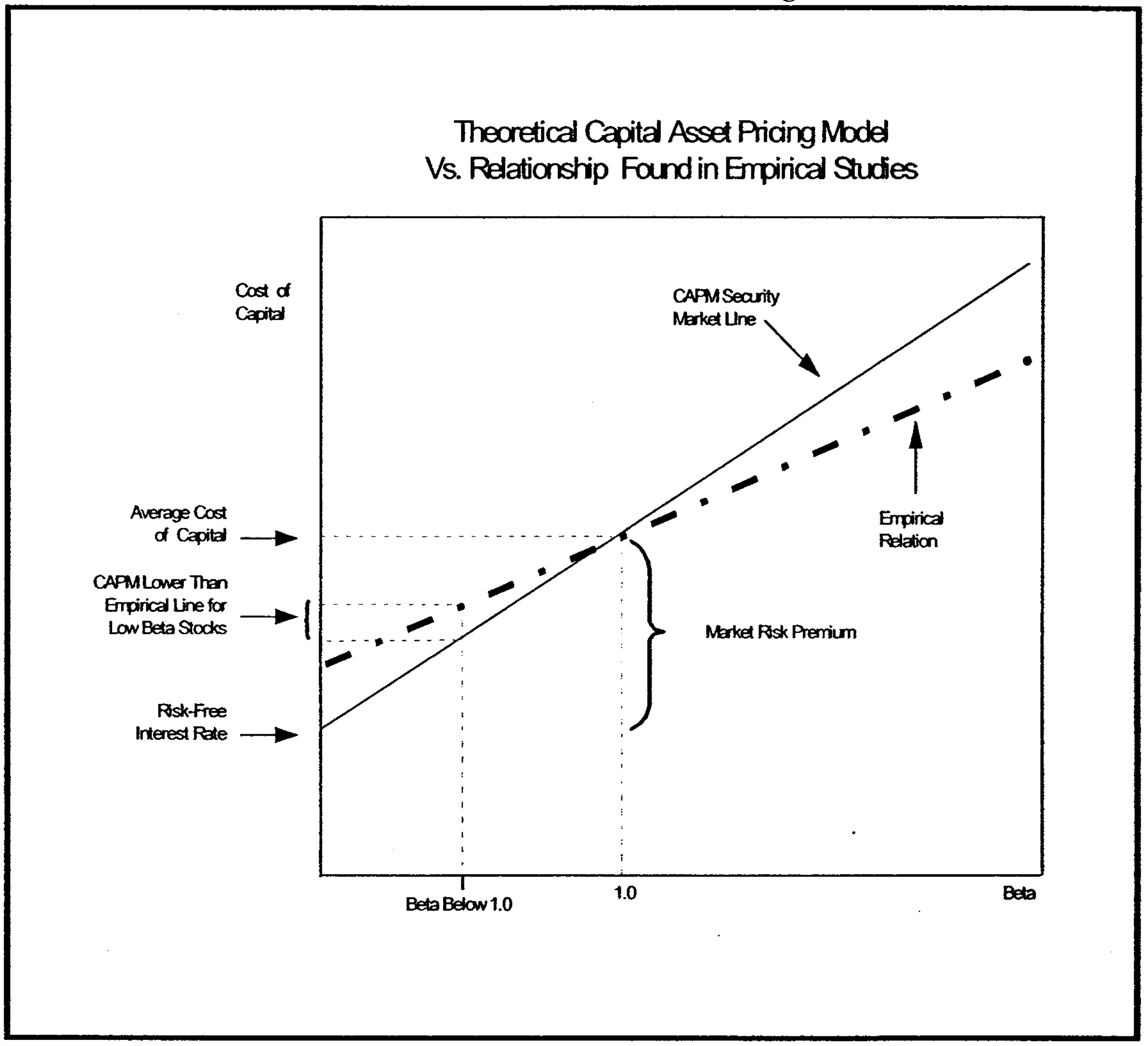
$$k_i = r_F + \beta_i \times \text{MRP} \qquad \textbf{(B-1)}$$

where k_i is the cost of capital for investment *I*; β_i is the beta risk measure for the investment *I*; and MRP is the market risk premium. The CAPM relies on the empirical fact that investors price risky securities to offer a higher expected rate of return than safe securities do. It says that the security market line starts at the risk-free interest rate (that is, that the return on a zero-risk security, the y-axis intercept in Figure 1 in the body of my testimony, equals the risk-free interest rate). It further says that the risk premium over the risk-free rate equals the product of beta and the risk premium on a value-weighted portfolio of all investments, which by definition has average risk.

Q23. What other equity risk premium approach model do you use?

A23. Empirical research has long shown that the CAPM tends to overstate the actual sensitivity of the cost of capital to beta: low-beta stocks tend to have higher risk premia than predicted by the CAPM and high-beta stocks tend to have lower risk premia than predicted. A number of variations on the original CAPM theory have been proposed to explain this finding. The difference between the CAPM and the type of relationship identified in the empirical studies is depicted in Figure B-1.

Figure B-1



T h e s e c o n d model makes use of these empirical findings. It estimates the cost of capital with the equation,

$$k_i = r_F + \alpha + \beta_i \times (\text{MRP} - \alpha) \qquad \textbf{(B-2)}$$

where α is the "alpha" of the risk-return line, a constant, and the other symbols are defined as above. I label this model the Empirical Capital Asset Pricing Model, or "ECAPM." For the short-term risk-free rate models, I set alpha equal to 1, 2, and 3 percent which are values somewhat lower than that estimated empirically. For low-beta stocks such as regulated utilities, the use of a lower value for alpha leads to a lower estimate of the cost of capital. For the long-term risk-free rate models, I set alpha equal to both 0.5 percent and 1.5 percent, but I rely more heavily on the 0.5 percent results. The use of a long-term risk-free rate incorporates some of the desired effect of using the ECAPM. That is, the long-term risk-free rate version of the Security Market Line has a higher intercept and a flatter slope than the short-term risk-free version which has been tested. Thus, it is likely that I do not need to make the same degree adjustment when I use the long-term risk-free rate. A summary of the empirical evidence on the magnitude of alpha is provided in Table No. MJV-B1.

II. EMPIRICAL EQUITY RISK PREMIUM RESULTS

Q24. How is this part of the appendix organized?

A24. This section presents the full details of my equity risk premium approach analyses, which are summarized in the body of my testimony. This section discusses the sample selection process, calculation of the market value capital structures, and the forecasts of the short-term and the long-term risk-free interest rates. Next, it addresses the beta estimates, and the estimates of the MRP I use in the models. Finally, it reports the CAPM and ECAPM results for the samples' costs of equity, and then describes the results of adjusting for differences between the samples' and Paradise Valley Water Company's ("Paradise Valley") capital structures.

A. PRELIMINARY MATTERS

1. WATER UTILITY SAMPLE

Q25. How do you select your water utility sample companies?

A25. The overall cost of capital for a part of a company depends on the risk of the business in which the *part* is engaged, *not* on the overall risk of the parent company on a consolidated basis. According to financial theory, the overall risk of a diversified company equals the market value weighted-average of the risks of its components.

Estimating the cost of capital for Paradise Valley's regulated assets is the subject of this proceeding. The ideal sample would be a number of companies that are publicly traded "pure plays" in the water production, storage, treatment, transmission and distribution line of business. "Pure play" is an investment term referring to companies with operations only in one line of business. Publicly traded firms, firms whose shares are freely traded on stock exchanges, are ideal because the best way to infer the cost of capital is to examine evidence from capital markets on companies in the given line of business.

To construct this sample, I started with the universe of companies classified as water utility companies in *Value Line*.[21] Normally, I would apply several selection criteria to eliminate companies with unique circumstances that may affect the cost of capital estimates. For example, I would normally eliminate companies with low annual revenues, no or low bond ratings, lack of IBES or Compustat data, and all companies with announced dividend cuts or that were involved in significant merger activity over the last five years (2000 to today). However, applying my standard procedures to the eight companies followed by *Value Line* would result in a sample of at most two companies. I therefore use all eight companies in my analysis. I report results for both the full sample and for a subsample without Southwest Water Company and York Water Co. because Southwest Water Company earns a relatively low (less than 40%) of its revenue from regulated water utility activities and because York Water Co. has numerous data problems. Companies in the subsample earned at least 86 percent of their revenue from regulated water utility activities in 2004.

Table No. MJV-2 reports operating revenue shares from different lines of business in 2004 for these companies. (Table No. MJV-1 provides an index to the other tables.)

Q26. Why do you usually eliminate companies currently involved in a merger from your samples?

A26. The stock prices of companies involved in mergers are often more affected by news relating to the merger than to movements in the stock market. In other words, the stock price "decouples" from its normal relationship to the stock market (the economy) which is the basis

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[21] Including both the Standard and the Small and Mid-Cap Editions of *Value Line Investment Survey and Value Line Investment Survey - Plus Edition.*.

upon which a company's relative risk is calculated. Instead the stock price of a merger candidate is more affected by the latest speculation on the terms and probability of the merger.

Q27. What are the water sample's data problems?

A27. First, of the eight companies followed by *Value Line*, three companies (Connecticut Water, Middlesex Water, and York Water) have 2004 revenues below $100 million. The stock of small companies frequently exhibit "thin trading" which means that their stock trades infrequently. During 2004, three companies (Connecticut Water, SJW Corp., and York Water) had an average trading volume of less than 10,000 shares per day. As a result, the measured beta is likely to be downward biased. Of the four companies with 2004 revenues above $100 million and an average trading volume in excess of 10,000 shares per day, one lacks a bond rating for the most recent five years, and I have not found a bond rating for several others for some years (see Workpaper #1 to Table No. MJV-10 for details).

Second, several companies lack long-term earnings forecasts. I do not include Connecticut Water Service Inc. and SJW Corp. in the sample when applying the forward-looking Discounted Cash Flow ("DCF") method because of a lack of recent earnings forecasts. However, I do include both Connecticut Water and SJW Corp. in the risk positioning method. Of the six companies included in the DCF method, two have only one analyst providing a long-term earnings forecast.

Third, only two companies have significant revenue, a bond rating and more than one long-term growth forecast and among those, one has only one long-term IBES earnings forecast.

Fourth, many companies have significant merger activity over the last five years. Philadelphia Suburban (renamed Aqua America) completed the acquisition of AquaSource for about $195 million in July 2003, and during 2004 Aqua America completed 29 acquisitions. Additionally, American Water Works acquired National Enterprises, Inc., Azurix, and the water and wastewater utility assets of Citizens Utilities. American Water Works, in turn, was acquired by the RWE AG on January 10, 2003. Domestic energy companies have also invested in the water utility business, although presently many of those investments have or will be sold. Allete has sold its assets in Florida and North Carolina; Indianapolis Water Company was sold by NISource; Suez Lyonnaise des Eaux purchased the remaining shares of United Water Resource that it did not already own; and Thames Water purchased E'Town Corporation. California Water Services purchased Ka'anpali Water Corporation in 2003 and Southwest Water Co. acquired a Texas utility consisting of 86 water systems and 11 wastewater systems in 2004.[22] York Water has recently acquired two small water utilities.[23]

These factors may all potentially affect the cost of equity estimates in not completely predictable ways. Because of the substantial data problems and lack of publicly traded water utilities, I am forced to rely on a sample with significant data problems or a sample with at most two companies (American States Water and California Water Services).[24]

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[22] Sources: *Value Line Investment Survey*, January 30, 2004 and January 28, 2005, *The Business Journal, http://ir.calwatergroup.com,* and company web sites.

[23] Press releases, March 1 and March 21, 2005.

[24] Several companies have multiple problems. For example, Connecticut Water has revenues below $100 million, exhibits thin trading and and lacks long-term earnings growth forecasts. Middlesex Water has revenues below $100 million, only one IBES forecast and no long-term *Value Line* earnings forecast. SJW Corp. exhibits thin trading, has no current IBES forecasts and lacks a bond rating. Southwest Water earned only 37% of its revenues from regulated activities and has no long-term *Value Line* forecast. York Water has revenues below $100 million, exhibits thin trading, has only one IBES forecast and no long-term value line forecast. In addition York Water has recently acquired two small local utilities.

2. GAS LOCAL DISTRIBUTION COMPANY SAMPLE

Q28. How do you select your gas local distribution company sample?

A28. To select this sample, I started with the universe of publicly traded gas distribution utilities covered by *Value Line*. This resulted in an initial group of 16 companies.[25] I then eliminated companies by applying additional selection criteria designed to eliminate companies with unique circumstances which may bias the cost of capital estimates. The final sample consists eight gas local distribution ("gas LDC") companies. Table No. MJV-13 reports operating revenue shares from regulated activities for these companies for the period 2000-2004.

Q29. What are the selection criteria you applied?

A29. I eliminated all companies whose regulated revenues are not greater than 50 percent of total revenues because one goal for this sample was for the sample companies to derive the majority of their revenues from regulated activities. I also eliminated all companies whose bond rating was less than Baa- as rated by Moody's and companies that had a large merger during the period January 2001 to March 2005. The screen for merger activity is any mention of merger activity in the analyst report section of *Value Line* or sizeable mergers found during a search of the companies' web pages.[26,27] To guard against measurement bias caused by "thin trading," I also restricted the sample to companies with total operating revenues greater than $300

[25] The 16 companies are from *Value Line Investment Survey's* Standard Edition.

[26] Company web pages were searched in December 2003 for merger and acquisition activities during the 2001-2003 period and in April 2005 for merger and acquisition activities during the period 2004 through March 2005.

[27] For purposes of sample selection, a sizeable merger is defined to be one which would exceed 25 percent of the total capitalization of the company at the time of the merger announcement.

million in 2004 and a market value in excess of $150 million as reported by *Value Line*.[28] Finally, I require that the companies have historical monthly return data available from Compustat for the relevant period.

Q30. What companies were eliminated from the gas LDC sample because their share of revenue from distribution activities is not above 50 percent?

A30. New Jersey Resources was eliminated from the sample because its revenue share from natural gas distribution is not above 50%. Additionally, the percentage of its income from marketing and other wholesale activities increased by 25 percent in 2004.[29]

Q31. Were any other companies eliminated?

A31. Yes. AGL Resources, Atmos Energy, Piedmont Natural Gas and Southern Union were eliminated for recent or current merger activities. Semco Energy was eliminated because of its non-investment grade bond rating from Moody's. Nicor Inc. was eliminated from the sample because of its restatement of earnings for 1999-2001, and because Nicor settled regulatory compliance issues with the Federal Energy Regulatory Commission ("FERC") in 2003.[30] UGI Corp. was eliminated because it primarily sells propane which is non-regulated.

Q32. Are there any issues with remaining companies in your sample?

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[28] As reported by *Value Line* on March 18, 2005.

[29] *Value Line Investment Survey*, Natural Gas (Distribution), March 18, 2005.

[30] Nicor announced on Oct. 29, 2002 that its earnings for 1999-2001 would be revised downwards by $15-35 million. March 4, 2003, Nicor released its restated earnings for 1999-2001 along with 2002 earnings.

A32. Perhaps. South Jersey Industries reported revenue from energy trading activities in its 2001 10-K. Given the turmoil of the energy trading markets, the companies' cost of capital estimates may be more volatile than those of more stable companies. Additionally, KeySpan and WGL Holdings have obtained on average less than 70 percent of their revenues from regulated activities during the past five years and Peoples Energy obtained less than 70 percent of its revenues from regulated activities in 2004.

Because of concerns with some companies in the sample, I report results for a subsample that consists only of those companies that have earned at least 70 percent of their revenue from regulated activities during the relevant period.[31]

Q33. Please compare the characteristics of the water utility sample and the gas LDC sample.

A33. Both samples earned a large percentage of their revenue from regulated activities and serve a mix of residential, industrial, and other customers. However, the gas LDC sample has fewer of the data and estimation issues identified above for the water sample. The following summarizes the water utility and the gas LDC samples' characteristics in terms of being "pure regulated utilities and low risk" companies. I summarize the characteristics for both the full sample and for the subsamples. The subsamples have a higher percent of their revenues from regulated utilities, and the water subsample is further restricted to companies with fewer data problems. Companies in the water utility subsample earned at least 86 percent of revenues from regulated activities in 2004 while companies in the gas LDC subsample earned at least 70 percent of revenue from regulated activities. (See Tables No. MJV-2 and No. MJV-13).

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[31] For the DCF analysis, companies in the subsample earned at least 70 percent of their revenue from regulated activities in 2004 and for the risk positioning analysis, companies in the subsample earned an average of at least 70 percent of their revenue from regulated activities during the past five years.

All companies in the water utility sample and the gas LDC sample are regulated by one or more states. Also, companies in both the water utility and the gas LDC sample have significant investments in water or gas networks and serve a mix of residential, industrial, commercial, and public customers, i.e., their customer mix is comparable.

To determine the risk characteristics of the gas LDC sample, I reviewed several key features of their regulatory environment. Most if not all companies have a fuel adjustment clause that allows them to pass (at least part of) increases in gas purchase costs onto their customers. Some gas LDC companies have tariffs that contain provisions that permit the recovery of (some) environmental remediation costs. Such provisions exist for, for example, KeySpan and South Jersey Industries.[32] All LDC companies discuss environmental clean-up requirements and five of the eight companies indicate in their 10-K reports that it might significantly and negatively affect their future performance. Note that most of the gas LDC's are subject to some retail competition (half of the companies in both the full sample and the subsample).[33] Regulatory requirements from federal and local authorities through, for example, the Clean Water Act of 1974 and EPA enforcement, will likely require the water industry to invest substantial amounts in infrastructure going forward.[34]

Q34. What do you conclude from the comparison of the water utility and the gas LDC samples?

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[32] KeySpan, 2004 10-K, p. 145 and South Jersey Industries, 2004 10-K, p. 6. South Jersey is included in the 'clean' subsample but KeySpan is not.

[33] Any company located in a state with a de-regulation rating of 1 or 2 per the U.S. Energy Information Administration. See Table No. MJV-13.

[34] According to *Value Line Investment Survey*, Water Utility Industry, January 28, 2005, updates to the infrastructure of water utilities are likely to grow into hundreds of billions of dollars over the next decade or two.

A34. The two samples differ primarily in that they operate in two different (regulated) industries, but they are very similar in terms of the percentage of revenues from regulated operations and the customers they serve. The gas LDC sample provides a reasonable comparison sample for the water utility industry but without the substantial data issues.

3. OTHER PRELIMINARY MATTERS

Q35. What capital structure information do you require?

A35. For reasons discussed in my testimony and explained in detail in *Section IV* of Dr. Kolbe's testimony explicit evaluation of the market-value capital structures of the sample companies versus the capital structure used for rate making is vital for a correct interpretation of the market evidence. This requires estimates of the market values of common and preferred equity and debt, and the current market costs of preferred equity and debt.

Q36. How do you calculate the market-value capital structures of the sample companies?

A36. I estimate the capital structure for each company by estimating the market values of common equity, preferred equity and debt from publicly available data. The calculations are in Panels A to H of Tables No. MJV-3 and MJV-14 for the water and gas LDC sample, respectively.

The market value of equity is straightforward: the price per share times the number of shares outstanding. The market value of debt is set equal to its book value because the market value of debt generally does not differ materially from its book value at this time. The market value of preferred equity is also set equal to its book value because preferred equity makes up a very small portion (less than 1 percent) of the market value capital structures of the companies in the two samples.

For purposes of assessing financial risk to common shareholders, I add an adjustment for short-term debt to the debt portion of the capital structure. This adjustment is used only for those companies whose short-term (current) liabilities (net of the current portion of long-term debt) exceed their short-term (current) assets. I add an amount equal to the minimum of the difference between short-term liabilities and short-term assets or the amount of short-term debt. The reason for this adjustment is to recognize that when current liabilities exceed current assets, a portion of the companies long-term assets are being financed, in effect, by short-term debt. The output of these schedules is the market debt-to-value and preferred equity-to-value ratios. Table No. MJV-3 and Table No. MJV-14 report such calculations using the values at year end for the years 2000 - 2004. The overall cost of capital calculation for the risk positioning estimates rely on the average of the market value capital structure computed for the years 2000 through 2004. The DCF capital structure uses stock prices as of April, 2005 and balance sheet information for year-end 2004.

Q37. How do you estimate the current market cost of debt?

A37. I use the current yields on indices of comparably rated utility bonds. The cost of debt for each company in the DCF analysis is the current yield reported by *Mergent Bond Record* for an index of bonds rated comparably by Moody's. For the risk positioning method, the cost is the current yield corresponding to the five-year average debt rating for each company. The debt ratings for the companies in both samples are obtained from *Moody's* (www.moodys.com and, for some water utilities from Standard and Poor's).[35] Calculation of the after-tax cost of debt uses the Company's estimated marginal income tax rate for 2005 of 39.529 percent.

[35] See Workpaper #1 to Table No. MJV-10 for details.

Q38. How do you estimate the current market cost of preferred equity?

A38. The cost of preferred equity is estimated similarly to the cost of debt. It is set equal to the yield on an index of comparably rated preferred equity. The preferred equity is rated by Moody's.[36]

B. RISK-FREE INTEREST RATE FORECAST

Q39. How do you obtain the forecasts of the risk-free interest rates over the period the utility rates set here are to be in effect?

A39. I understand that the period for which these rates will be in effect begins 13 months after the rate case filing which would be approximately June 2006. Therefore, the equity risk premium approach calculations require a forecast of short-term and long-term Government yields for that period.

I obtain these forecast rates from the website of the St. Louis Federal Reserve Bank. In particular, I use the yields from the "constant maturity series". This information is displayed in Table No. MJV-12, Panel A.

Q40. What values do you use for the short-term and long-term risk-free interest rates?

A40. I use a value of 3.0 percent for the short-term risk-free interest rate and a value of 5.0 percent for the long-term risk-free interest rate as the benchmark interest rates in the equity risk premium analyses for the reasons discussed in the testimony.

[36] If no preferred rating was found, the preferred rating is assumed to be equal to the company's bond rating.

C. BETAS AND THE MARKET RISK PREMIUM

1. BETA ESTIMATION PROCEDURES

Q41. How do you calculate beta?

A41. My standard approach is to calculate beta by statistical regression of the excess (positive or negative) of the return on the stock over the risk-free rate against the excess of the return on the S&P 500 index over the risk-free rate for the most recent 60-month period for which data exist.

Q42. Did you use your standard approach to calculate betas for this proceeding?

A42. No. Ordinarily, I estimate betas based upon the most recent 60 months of data for the sample companies, but the turmoil and unusual events in the stock market makes the most recent 60 month period unsuitable to estimate the sample companies betas. These events have caused the returns of the companies in the two samples to "decouple" from their normal relationship to the returns on the market index. I believe that the risk of the sample companies has increased given the changes in the natural gas market and in the water industry, but betas estimated over the most recent 60 month period have fallen dramatically for both samples from estimates based upon data from only a few years earlier. Several of the sample companies' estimated betas were very close to zero and some were even negative for the most recent 60 month period. A zero beta implies a risk-free asset, but I don't believe that these sample companies are risk-free. These results caused me to question of the validity of my beta estimates for the samples.

Q43. In light of decoupling discussed above, how do you estimate the betas for your sample companies?

A43. I use betas estimated by *Value Line*. Because *Value Line* reports adjusted betas, I test for interest rate sensitivity in the returns of the sample companies. I use adjusted betas to compensate for interest rate sensitivity for companies regulated on the basis of original cost rate base, because unadjusted betas underestimate the cost of capital for interest sensitive stocks. However, in this case, the sample companies do not exhibit statistically significant sensitivity to interest rate changes in either sample. I, therefore, reverse the adjustment procedure to provide unadjusted beta values.

Q44. Please explain how you test for interest rate sensitivity.

A44. Under traditional regulation, utilities are more sensitive to interest rate changes than are unregulated companies because utilities are regulated with nominal rates of return on historical-cost rate bases. Shareholders of companies regulated on a book-value rate base receive compensation for inflation in a different way from most companies' shareholders, through an inflation premium in the rate of return rather than through appreciation of asset value. Bondholders get inflation compensation in the same way, through an inflation premium in the interest rate. This similarity makes regulated company returns especially sensitive to fluctuations in the bond market. This in turn affects the estimation of such a company's beta, the stock market measure of risk. Betas measured in the conventional way do not capture the regulated firms' extra sensitivity to interest rates.[37] To measure interest rate sensitivity, I

[37] For details on this, see Charles River Associates, *Choice of Discount Rates in Utility Planning: A Critique of Conventional Betas as Risk Indicators for Electric Utilities*, prepared for the Electric Power Research Institute, (continued...)

estimate a two factor model where the second factor is a pure bond residual. The pure bond residual is determined as the difference between the realized bond yield and the yield predicted by a regression of bond yields on the stock market. If the regression coefficient on the pure bond residual in the two-factor model is statistically significant, the firm exhibits interest rate sensitivity. Neither the water sample nor the gas LDC sample companies currently exhibit statistically significant interest rate sensitivity on average. It is for this reason that I use unadjusted betas in my analysis.

Q45. Please review the Merrill Lynch beta adjustment procedure and the reason for using it.

A45. Merrill Lynch reports two types of beta, one calculated essentially as just described and one adjusted to compensate for sampling errors in directly estimated betas. The Merrill Lynch adjustment moves betas one-third of the way toward a value of one, the average stock beta. The adjustment is designed as a correction for the tendency of companies with low estimated betas to have negative sampling errors and for the tendency of companies with high estimated betas to have positive sampling errors.

Many practitioners routinely use Merrill Lynch adjusted betas to adjust for sampling error, but that is not the reason I use adjusted betas. As noted above, I normally use adjusted betas to compensate for the interest sensitivity of companies regulated on the basis of original cost rate base. The use of unadjusted betas is appropriate for estimating the cost of capital for industries other than utilities regulated on the basis of original cost rate base or for companies

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[37] (...continued)
February, 1984. A. Lawrence. Kolbe was a principal investigator on this study, along with James A. Read, Jr.

that do not demonstrate interest rate sensitivity. Because neither sample currently exhibits statistically significant interest rate sensitivity at this time, I use unadjusted betas.

Q46. What beta values do you use in your analysis?

A46. After reversing the adjustment process discussed above, the current estimated *Value Line* betas range from 0.30 to 0.60 for the water sample and from the 0.30 to 0.67 for the gas LDC sample (See Workpaper #1 to Tables No. MJV-9 and No. MJV-20). For both samples the average beta value is very close to the average value for the period prior to the recent decline in estimated betas using 60 months as the estimation period. The fact that *Value Line*'s beta estimates have remained relatively stable is evidence that *Value Line* does not believe that the risk of the sample companies has suddenly decreased.[38]

Q47. Do you have any additional support for the betas that you use in your analysis?

A47. Yes. Additional evidence on the current value of the betas is provided by estimates based on weekly return data instead of monthly return data. Using the most recent 52 weeks of data avoids much of the period of stock market turmoil that significantly affects the 60-month beta estimates. I have calculated 52-week beta estimates for the water and gas LDC sample companies. The average reported as of April 13, 2005 is 1.01 for the water sample, which is significantly higher than the unadjusted beta estimates of .46 to .52 I rely on for the water sample. (Workpaper #1 to Table No. MJV-9) For the gas LDC sample, the 52-week sample

[38] During the past year, *Value Line* has increased its beta estimates for both the water and gas LDC samples by an average of approximately 0.05 (See Workpaper #1 to Tables No. MJV-9 and MJV-20).

average beta is 1.00, also significantly higher than the 0.53 to 0.58 average of the beta estimates I use in my analysis. (Workpaper #1 to Table No. MJV-20).

Although I do not use the beta estimates based on 52 weeks of data, the estimates are evidence that the risk of the sample companies is higher than is reflected in betas I use in the analyses.

2. MARKET RISK PREMIUM ESTIMATION

Q48. Given all of the evidence, what MRP do you use in your analysis?

A48. It is clear that market return information is volatile and difficult to interpret, but based on the collective evidence, the MRP I use for the short-term risk-free rate is 8 percent and for the long-term risk-free rate is 6.5 percent.

D. COST OF CAPITAL ESTIMATES

Q49. Based on these data, what are the values you calculate for the overall cost of capital and the corresponding cost of equity for the water utility sample?

A49. Panels A and B of Table No. MJV-9 present the cost of equity results using the equity risk positioning method at the sample companies' market value capital structures. The table contains two panels, Panel A for the long-term risk-free rate and Panel B for the short-term risk-free rate.

Q50. What does the water utility sample market data imply about cost of equity at Paradise Valley's 36.7 percent equity ratio?

A50. The return on equity and the overall cost of capital for the various equity risk positioning methods are reported in Table No. MJV-10, Panels A to G. Panels A through C utilize the long-term risk-free rate while Panels D through G use the short-term risk free rate. Panel A reports the CAPM results using the long-term risk-free rate, while Panels B and C report the ECAPM cost of equity results for the ECAPM parameters of 0.5 and 1.5 percent, respectively. Panel D reports the CAPM estimates using the short-term risk free rate. Panels E, F and G report ECAPM results using ECAPM parameters of 1, 2 and 3 respectively. Focusing on the middle version of the ECAPM, Panel B of Table No. MJV-10 (ECAPM with a = 0.5%) shows the results using the long-term risk-free rate version of the model. For this table, the costs of equity for the water sample range from 7.3 to 9.1 percent for capital structures that average 67 percent equity. The sample average ATWACC is 6.6 percent for the full sample and 6.7 percent for the subsample.

In each panel, column eight reports the overall cost of capital for each company. The last two rows of each panel report the sample averages. The first is for all companies in the water sample (average [a]), and the second is for the subsample of companies with significant revenue from regulated water activities and fewer data problems (average [b]). The sample average ATWACCs from each panel of Table No. MJV-10 are reproduced in column one of Table No. MJV-11 which reports the cost of equity estimates for each of the risk positioning estimates that is consistent with the sample information and the capital structure of Paradise Valley. Panel A of Table No. MJV-11 reports the results for all sample companies. Panel B of the table summarizes the results for the subsample of companies that have a large percentage of revenues from regulated activities and fewer data problems. The sample average

ATWACCs and corresponding costs of equity at a 36.7 percent equity ratio are also displayed in Table 1 of my testimony.

Q51. What cost of equity values do you calculate for the gas LDC sample?

A51. The cost of equity estimates for the gas LDC sample are displayed on Panels A and B of Table No. MJV-20. Panel A uses the long-term risk-free rate, and Panel B uses the short-term risk-free rate.

Q52. What does the gas LDC sample market data imply about the cost of equity at Paradise Valley's 36.7 percent equity ratio?

A52. The cost of equity and the overall cost of capital for the various equity risk positioning methods are reported in Table No. MJV-21 for the gas LDC sample. Panels A through C utilize the long-term risk-free rate. Panel A again reports the CAPM cost of equity results while Panels B and C report the ECAPM cost of equity results for the 0.5 and 1.5 percent adjustment factors, respectively. Panels D through G to Table MJV-21 utilize the short-term risk-free rate. Panel D report the CAPM cost of equity results, while Panels E, F and G report the ECAPM overall cost of capital results using 1, 2 and 3 percent adjustment factors. In each panel, column eight reports the overall cost of capital for each company. The last two lines of each panel report the sample averages for the full sample and the subsample of companies with an average of more than 70 percent of revenue for the last five years from regulated activities.

Panel B of Table No. MJV-21 shows the estimates using the middle version of the ECAPM (a = 0.5%) for the companies in the gas LDC sample. Using the long -term risk-free rate, the model results in costs of equity of 7.3 to 9.5 percent for capital structures that average about 57 percent equity. The full sample average ATWACC for both samples is 6.6 percent, but the sample average cost of equity is higher for the gas LDC which is consistent with the increased financial leverage in the LDC sample (57% equity) compared to the water sample (66 to 67% equity). The result is that the cost of equity at the Paradise Valley's 36.7% equity thickness is comparable for both samples using all companies.[39] The results for the water subsample are slightly higher than for the full sample which suggests that the estimates for the full sample are slightly downward biased. The gas LDC subsample's ATWACC results are 10 to 20 basis points lower than the full sample.

The sample average ATWACC from each panel of Table No. MJV-21 is reproduced in column one of Table No. MJV-22 which reports the cost of equity estimates for each of the risk positioning estimates. Panel A reports the results for all sample companies. As with the water sample, Panel B reports the averages using only those companies that have a large percentage of revenue from regulated activities. The sample average ATWACCs and corresponding costs of equity at a 36.7 percent equity ratio are displayed in Table 3 of my testimony.

I discuss the implications of the equity risk positioning results in the main body of my testimony.

[39] The difference between the estimated cost of equity of 12.2 percent for the full water sample compared to 12.0 percent for the full gas LDC sample is due to rounding. The ATWACC of the full water sample is 6.620 while the ATWACC of the gas LDC sample is 6.563 percent.

Table No. MJV-B1

Empirical Evidence on the Alpha Factor in ECAPM

Author	Range of alpha	Period relied upon
Fischer (1993)	−3.6% to 3.6%	1931-1991
Fischer, Jensen and Scholes (1972)	-9.61% to 12.24%	1931-1965
Fama and McBeth (1972)	4.08% to 9.36%	1935-1968
Fama and French (1992)	10.08% to 13.56%	1941-1990
Litzenberger and Ramaswamy (1979)	5.32% to 8.17%	
Litzenberger, Ramaswamy and Sosin (1980)	1.63% to 5.04%	1926-1978
Pettengill, Sundaram and Mathur (1995)	4.6%	

Sources:

Black, Fischer, "Beta and Return," *The Journal of Portfolio Management*, Fall 1993, 8-18.

Black, Fischer, Michael C. Jensen and Myron Scholes, "The Capital Asset Pricing Model: Some Empirical Tests, from Studies in the theory of Capital Markets," in Jensen, M. (ed.) *Studies in the Theory of Capital Markets*, Praeger, New York, 1972, 79-121.

Fama, Eugene F. and James D. MacBeth, "Risk, Returns and Equilibrium: Empirical Tests," *Journal of Political Economy*, September 1972, pp. 607-636.

Fama, Eugene F. and Kenneth R. French, "The Cross-Section of Expected Stock Returns," *Journal of Finance*, Vol. 47, June 1992, pp. 427-465.

Litzenberger, Robert H. and Krishna Ramaswamy, "The Effect of Personal Taxes and Dividends on Capital Asset Prices, Theory and Empirical Evidence," *Journal of Financial Economics*, June 1979, pp. 163-195.

Litzenberger, Robert H. and Krishna Ramaswamy and Howard Sosin, "On the CAPM Approach to Estimation of a Public Utility's Cost of Equity Capital," *The Journal of Finance*, Vol. 35, No. 2, May 1980, pp. 369-387.

Pettengill, Glenn N., Sridhar Sundaram and Ike Mathur, "The Conditional Relation between Beta and Returns," *Journal of Financial and Quantitative Analysis*, Vol. 30, No. 1, March 1995, pp. 101-116.

Appendix C: DISCOUNTED CASH FLOW METHODOLOGY: DETAILED PRINCIPLES AND RESULTS

TABLE OF CONTENTS

Q1. What is the purpose of this appendix?

A1. This appendix reviews the principles behind the discounted cash flow or "DCF" methodology and the details of the cost of capital estimates obtained from this methodology. This appendix intentionally repeats portions of my direct testimony, because I want the reader to have access here to a full discussion of the issues addressed, rather than having to continually turn back to the corresponding section of the testimony.

I. DISCOUNTED CASH FLOW METHODOLOGY PRINCIPLES

Q2. How is this section of the appendix organized?

A2. The first part discusses the general principles that underlie the DCF approach. The second portion describes the strengths and weaknesses of the DCF model and why it is generally less reliable for estimating the cost of capital for the sample companies at the present time than the risk positioning method discussed in Appendix B.

A. SIMPLE AND MULTI-STAGE DISCOUNTED CASH FLOW MODELS

Q3. Please summarize the DCF model.

A3. The DCF model takes the first approach to cost of capital estimation discussed with Figure 1 in Section II-A of my testimony. That is, it attempts to measure the cost of equity in one step. The method assumes that the market price of a stock is equal to the present value of the dividends that its owners expect to receive. The method also assumes that this present value can be calculated by the standard formula for the present value of a cash flow stream:

$$P = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \ldots + \frac{D_T}{(1+k)^T} \qquad \text{(C-1)}$$

where "P" is the market price of the stock; "D_i" is the dividend cash flow expected at the end of period i; "k" is the cost of capital; and "T" is the last period in which a dividend cash flow is to be received. The formula just says that the stock price is equal to the sum of the expected future dividends, each discounted for the time and risk between now and the time the dividend is expected to be received.

Most DCF applications go even further, and make very strong (*i.e.*, unrealistic) assumptions that yield a simplification of the standard formula, which then can be rearranged to estimate the cost of capital. Specifically, if investors expect a dividend stream that will grow forever at a steady rate, the market price of the stock will be given by a very simple formula,

$$P = \frac{D_1}{(k-g)} \qquad \text{(C-2)}$$

where "D_1" is the dividend expected at the end of the first period, "g" is the perpetual growth rate, and "P" and "k" are the market price and the cost of capital, as before. Equation C-2 is a simplified version of Equation C-1 that can be solved to yield the well known "DCF formula" for the cost of capital:

$$k = \frac{D_1}{P} + g = \frac{D_0 x (1+g)}{P} + g \qquad \text{(C-3)}$$

where "D_0" is the current dividend, which investors expect to increase at rate g by the end of the next period, and the other symbols are defined as before. Equation C-3 says that if Equation C-2 holds, the cost of capital equals the expected dividend yield plus the (perpetual) expected future growth rate of dividends. I refer to this as the simple DCF model.

Q4. Are there other versions of the DCF models besides the "simple" one?

A4. Yes. If Equation C-2 does not hold, sometimes other variations of the general present value formula, Equation C-1, can be used to solve for k in ways that differ from Equation C-3. For example, if there is reason to believe that investors do *not* expect a steady growth rate forever, but rather have different growth rate forecasts in the near term (e.g., over the next five or ten years), these forecasts can be used to specify the early dividends in Equation C-1. Once the near-term dividends are specified, Equation C-2 can be used to specify the share price value at the end of the near-term (e.g., at the end of five or ten years), and the resulting cash flow stream can be solved for the cost of capital using Equation C-1.

More formally, the "multi-stage" DCF approach solves the following equation for k:

$$P = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \ldots + \frac{D_T + P_{TERM}}{(1+k)^T} \quad . \qquad \text{(C-4)}$$

The terminal price, P_{TERM} is estimated as

$$P_{TERM} = \frac{D_{T+1}}{(k - g_{LR})} \qquad \text{(C-5)}$$

where T is the last of the periods in which a near term dividend forecast is made and g_{LR} is the long-run growth rate. Thus, Equation C-4 defers adoption of the very strong perpetual growth assumptions that underlie Equation C-2 — and hence the simple DCF formula, Equation C-3 — for as long as possible, and instead relies on near term knowledge to improve the estimate of k. I examine both simple and multi-stage DCF results below.

Q5. What are the merits of the DCF model?

A5. The DCF approach is conceptually sound if its assumptions are met but can run into difficulty in practice because those assumptions are so strong, and hence so unlikely to correspond to reality. Two conditions are well-known to be necessary for the DCF approach to yield a reliable estimate of the cost of capital: the variant of the present value formula, Equation C-1, that is used must actually match the variations in investor expectations for the dividend growth path; and the growth rate(s) used in that formula must match current investor expectations. Less frequently noted conditions may also create problems.

The DCF model assumes that investors expect the cost of capital to be the same in all future years. Investors may not expect the cost of capital to be the same, which can bias the DCF estimate of the cost of capital in either direction.

The DCF model only works for companies for which the standard present value formula works. The standard formula does *not* work for options (*e.g.*, puts and calls on common stocks), and so it will not work for companies whose stocks behave as options do. Option-pricing effects will be important for companies in financial distress, for example, which implies the DCF model will *understate* their cost of capital, all else equal.

In recent years even the most basic DCF assumption, that the market price of a stock in the absence of growth options is given by the standard present value formula (*i.e.*, by

Equation C-1 above), has been called into question by a literature on market volatility as well as the issue of the meaning of the market to book ratio discussed in Dr. Kolbe's testimony. In any case, it is still too early to throw out the standard formula, if for no other reasons than that the evidence is still controversial and no one has offered a good replacement. But the evidence suggests that it must be viewed with more caution than financial analysts have traditionally applied. Simple models of stock prices may not be consistent with the available evidence on stock market volatility.

Q6. Do you agree that estimating the right growth rate is the most difficult part for the implementation of the DCF approach?

A6. Yes. Finding the right growth rate(s) is indeed the usual "hard part" of a DCF application. The original approach to estimation of *g* relied on average historical growth rates in observable variables, such as dividends or earnings, or on the "sustainable growth" approach, which estimates *g* as the average book rate of return times the fraction of earnings retained within the firm. But it is highly unlikely that historical averages over periods with widely varying rates of inflation, interest rates and costs of capital, such as in the relatively recent past, will equal current growth rate expectations. Moreover, the constant growth rate DCF model *requires* that dividends and earnings grow at the same rate. It is inconsistent for dividends to grow at a rate that differs from the growth in earnings because it would mean that dividends are becoming an ever increasing or decreasing percentage of earnings.

Most cost of capital experts rely on earnings growth rates, not dividend growth rates, for several reasons. First, although the model is derived from dividend growth rates, the more fundamental parameter is earnings growth because dividends are paid from earnings.

Second, analyst forecasts of dividend growth rates are generally not available, but earnings growth forecasts are. Third, a better approach than relying on historical information is to use the growth rates currently expected by investment analysts, if an adequate sample of such rates is available. Analysts' forecasts are superior to time series forecasts based upon single variable historical data as has been documented and confirmed extensively in academic research.[1]

If this approach is feasible and if the person estimating the cost of capital is able to select the appropriate version of the DCF formula, the DCF method should yield a reasonable estimate of the cost of capital for companies not in financial distress and without material option-pricing effects (always subject to recent concerns about the applicability of the basic present value formula to stock prices). However, for the DCF approach to work, the basic stable-growth assumption must become reasonable and the underlying stable-growth rate must become determinable *within the period for which forecasts are available.*

Q7. What is the so called "optimism bias" in the earnings growth rate forecasts of security analysts and what is its effect on the DCF analysis?

A7. Optimism bias is related to the observed tendency for analysts to forecast earnings growth rates that are higher than are actually achieved. This tendency to over estimate growth rates is perhaps related to incentives faced by analysts that provide rewards not strictly based

[1] Lawrence D. Brown and Michael S. Rozeff, 1978, "The Superiority of Analysts Forecasts as Measures of Expectations: Evidence from Earnings," *Journal of Finance*, Vol. XXXIII, No. 1, pp. 1-16. J. Cragg and B.G. Malkiel, 1982, *Expectations and the Structure of Share Prices*, National Bureau of Economic Research, University of Chicago Press. R.S. Harris, 1986, "Using Analysts' Growth Forecasts to Estimate Shareholder Required Rates of Return," *Financial Management*, Spring 1986, pp. 58-67. J. H. Vander Weide and W. T. Carleton, 1988, "Investor Growth Expectations: Analysts vs. History," *Journal of Portfolio Management*, Spring, pp. 78-82. T. Lys and S. Sohn, 1990, "The Association Between Revisions of Financial Analysts Earnings Forecasts and Security Price Changes," *Journal of Accounting and Economics*, vol 13, pp. 341-363.

upon the accuracy of the forecasts. To the extent optimism bias is present in the analysts' earnings forecasts, the cost of capital estimates from the DCF model would be too high.

Q8. Does optimism bias mean that the DCF estimates based upon analysts' earnings forecasts are completely unreliable?

A8. No. The effect of optimism bias is least likely to affect DCF estimates for large, rate regulated companies in stable segments of an industry. Furthermore, the magnitude of the optimism bias (if any) for regulated companies is not clear. In a recent paper Chan, Karceski, and Lakonishok (2000)[2] sort companies on the basis of the size of the IBES forecasts to test the level of optimism bias. Utilities constitute 25 percent of the companies in lowest quintile, and by one measure the level of optimism bias is 4 percent. However, the 4 percent figure does not represent the complete characterization of the results in the paper. Table IX of the paper shows that the median IBES forecast for the first (lowest) quintile averages 6.0 percent. The realized "Income before Extraordinary Items" is 2.0 percent (implying a four percent upward bias in IBES forecasts), but the "Portfolio Income before Extraordinary Items" is 8.0 percent (implying a two percent downward bias in IBES forecasts).

The difference between the "Income before Extraordinary Items" and "Portfolio Income before Extraordinary Items" is whether individual firms or a portfolio are used in estimating the realized returns. The first is a simple average of all firms in the quintile while the second is a market value weighted-average. Although both measures of bias have

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[2] L. K.C. Chan, J. Karceski, and J. Lakonishok, 2003, "The Level and Persistence of Growth Rates," *Journal of Finance* 58(2):643-684.

their own drawbacks according to the authors,[3] the Portfolio Income measure gives more weight to the larger firms in the quintile such as regulated utilities. In addition, the paper demonstrates that "analysts' forecasts as well as investors' valuations reflect a wide-spread belief in the investment community that many firms can achieve streaks of high growth in earnings."[4] Therefore, it is not clear how severe the problem of optimism bias may be for regulated utilities or even whether there is a problem at all.

Finally, the two-stage DCF model also adjusts for any over optimistic (or pessimistic) growth rate forecasts by substituting the long-term GDP growth rate for the 5-year growth rate forecasts of the analysts in the years after year 5.

Q9. Please describe the two-stage DCF model you use.

A9. The two-stage model I use is presented in equation C-4 above and assumes that the long-term perpetual growth rate for all companies in the two samples is the forecast long-term growth rate of the GDP.[5] This model allows growth rates to differ for each company for each year over the next ten years before settling down to a single long-term growth rate. The growth rate for the first five years is the growth rate for years one through five as provided in analysts' reports. After year five, the growth rate is assumed to converge linearly to the GDP growth rates. In other words, the growth rate in year 6 is adjusted by 1/5th of the difference between each company's 5-year growth rate forecast and the GDP

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[3] Chan, Karceski, and Lakonishok, *op. cit.*, p. 675.

[4] Chan, Karceski, and Lakonishok, *op. cit.*, p. 663.

[5] See Blue Chip Economic Indicators, March 10, 2005.

forecast. The growth rate in year 7 is adjusted by an additional 1/5th so that the earning growth rate pattern converges on the long-term GDP growth rate forecast.

Q10. Why do you assume that the long-term growth rate of the sample companies will converge to the long-term growth rate of GDP?

A10. Recall that the DCF model assumes that dividends grow at a constant rate literally forever. If the growth rate of earnings (and therefore, dividends) were greater than (less than) the long-term growth rate of the economy, mathematically it would mean that the company (and the industry) would become an ever increasing (or decreasing) proportion of the economy. Therefore, the most logical assumption is that the company's earnings grow at the same rate as the economy on average over the long run.

Q11. How well are the conditions needed for DCF reliability met at present?

A11. The requisite conditions for the sample companies are not fully met at this time. Of particular concern for this proceeding is the uncertainty about what investors truly expect the long-run outlook for the sample companies to be. The longest time period available for growth rate forecasts of which I am aware is five years. The long-run growth rate (*i.e.*, the growth rate after an industry settles into a steady state) drives the actual results one gets with the DCF model. Unfortunately, this implies that unless the company or industry in question is stable, so there is little doubt as to the growth rate investors expect, DCF results in practice can end up being driven by the subjective judgment of the analyst who performs the work.

Uncertainty in an industry implies that a commission may often be faced with a wide range of DCF numbers, none of which can be well grounded in objective data on true long-run growth expectations, *because no such objective data now exist.* DCF for firms or industries in flux is *inherently* subjective with regard to a parameter (the long-run growth rate) that drives the answer one gets.

In short, the unavoidable questions about the DCF model's strong assumptions cause me to view the DCF method as *inherently* less reliable than risk positioning approach described above. However, because the DCF method has been widely used in the past and in other forums when the industry's economic conditions were different from today's, I submit DCF evidence in this case. DCF estimates also serve as a check on the values provided by the risk positioning approach methods.

B. CONCLUSIONS ABOUT DCF

Q12. Please sum up the implications of this part of the appendix.

A12. The unavoidable questions about the DCF model's strong assumptions — whether the basic present value formula works for stocks, whether option pricing effects are important for the company, whether the right variant of the basic formula has been found, and whether the true growth rate expectations have been identified — cause me to view the DCF method as *inherently* less reliable than equity risk premium approach, the other approach I use.

II. EMPIRICAL DCF RESULTS

Q13. How is this part of the appendix organized?

A13. This section presents the details of my DCF analyses, which are summarized in my direct testimony. The first part describes some preliminary matters, such as sample selection, calculation of sample capital structures, and so on. Then it turns to the details of the DCF estimates themselves.

In particular, implementation of the simple DCF models described above requires an estimate of the current price, the dividend, and near-term and long-run growth rate forecasts. The simple DCF model relies only on a single growth rate forecast, while the multi-stage DCF model employs both near-term and long-run growth rate forecasts. The remaining parts of this section describe each of these inputs in turn.

A. PRELIMINARY MATTERS

Q14. In the Appendix B discussion of "preliminary matters," you discuss sample selection and the capital structure/cost of capital data you need to complete your risk premium analyses. What, if anything, is different when you use the DCF method?

A14. First, the sample companies to which the DCF approach is applied differ slightly for the water utility sample due to the availability of earnings forecasts. Note also that the timing of the market value capital structure calculations is different in the DCF method and in the equity risk premium method. The equity risk premium method relies on the average capital structure over the past five years while the DCF approach uses only current data, so the relevant market value capital structure measure is the most recent that can be calculated. This capital structure is reported in columns 1-3 of Table No. MJV-4 for the water utility sample and Table No. MJV-15 for the gas LDC sample.

B. GROWTH RATES

Q15. What growth rates do you use?

A15. For reasons discussed above, historical growth rates today are useless as forecasts of current investor expectations for the water industry or the gas LDC sample. I therefore use rates forecasted by security analysts.

The ideal in a DCF application would be a detailed forecast of future dividends, year by year well into the future, based on a large sample of investment analysts' expectations. I know of no source of such data. Dividends are ultimately paid from earnings, however, and earnings forecasts are available for a few years. Investors do not expect dividends to grow in lockstep with earnings, but for companies for which the DCF approach can be used reliably (*i.e.*, for relatively stable companies whose prices do not include the option-like values described previously), they do expect dividends to track earnings over the long-run. Thus, use of earnings growth rates as a proxy for expectations of dividend growth rates is a common practice.

Accordingly, the first step in my DCF analysis is to examine a sample of investment analysts' forecasted earnings growth rates from the Institutional Brokers Estimate System ("IBES") and from *Value Line* for both samples. Neither IBES nor *Value Line* provide analysts' forecast for all companies in the water utility sample. IBES provides a (recent) long-term growth forecast for six of the eight companies in the water utility sample. IBES does not provide recent earnings growth rates forecasts for Connecticut Water Services or SJW Corp. The consensus forecast from IBES is based on one analyst's estimate for three companies (American States Water, Middlesex Water, and York Water) and on four analyst's estimates for three companies (California Water Services, Aqua America, and Southwest Water). *Value Line* provides earnings forecasts for only three of the six companies with long-term IBES forecasts.[6] Both IBES and *Value Line* provide long-term growth rates for all companies in the gas LDC sample. IBES projected earnings growth rates for the companies in the water utility sample and the gas LDC sample are in Panel A of Workpaper #3 to Table No. MJV-5 for the water utility sample and Panel A of Workpaper #3 to Table No. MJV-16 for the Gas LDC sample. The estimated growth rates for fiscal years 2005, 2006, and 2007, respectively, are in columns 1, 2 and 3. The sixth column reports the IBES mean five-year annual earnings growth rate. Columns four and five contain the annual growth rate for the unspecified part of the five years following 2007 (*i.e.*, for 2008 and 2009) that is implied by the other four columns of growth rates. That is, if one knows the growth rates for year 1, 2 and 3, and for years 1 through 5 inclusive, one can derive what the average growth rate must be for years 4 and 5. The last column in the workpapers reports the number of investment analysts who contributed a five-year growth forecast.

As mentioned above, *Value Line* does not provide earnings growth forecasts for all companies in the water sample. In addition, at the present time, *Value Line's* time horizon for the water and gas LDC sample differ. For the water sample, *Value Line* provides

[6] See Workpaper #2 to Table No. MJV-5 for details.

earnings per share forecasts for fiscal year end 2005 and 2006 and for a 2007 through 2009 horizon. For the gas LDC sample, *Value Line* provides earnings per share forecasts for fiscal year end 2005 and 2006 and with a 2008 through 2010 horizon. The water sample forecasts represent an average of about four years while the gas LDC forecasts represent an average of about four and 3/4 years. Panel B of Workpaper #3 to Tables No. MJV-5 and MJV-16 performs growth rate calculations for 2006 through 2009 based upon *Value Line*'s earning estimates. The calculations are similar to that of Panel A.[7]

The growth rate estimates for IBES and *Value Line* are combined in Panel C of Workpaper #3 to Table No. MJV-5 for the water sample and Table No. MJV-16 for the gas LDC sample by weighting the IBES annual forecasts by the number of analysts making that forecast and treating the *Value Line* forecast as one analyst's forecast.[8]

In the simple DCF, I use the five-year average annual growth rate as the perpetual growth rate.[9] In the multistage DCF model, the growth rates for fiscal years 2005-2009 are employed to permit variation in growth rates in the near-term[10] while I rely on the long-term GDP growth as an estimate of the perpetual earnings growth rate for the two samples.[11]

Q16. Do these growth rates correspond to the ideal you mentioned above?

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[7] The 2004 Earnings per Share (EPS) for the companies reported in Workpaper #1 to Tables No. MJV-5 and Table No. MJV-16 are provided by IBES while the EPS reported in Workpaper #2 to Table No. MJV-5 and Table No. MJV-16 are provided by *Value Line.*

[8] I treat the *Value Line* forecasts as though they overlap exactly with the forecasts from IBES. These growth rates underlie my simple and multi-stage DCF analyses.

[9] This growth rate is in column 6 in Table No. MJV-5 for the water sample and in Table No. MJV-16 for the gas LDC sample.

[10] The growth rates for fiscal years 2005-2009 are shown in Workpaper #3 to Table No. MJV-5 and to Table No. MJV-16, columns 1-5.

[11] I use the long-term GDP growth rate estimate from Blue Chip Economic Indicators, March 10, 2005.

A16. No. While forecasted growth rates are the quantity required in principle, the forecasts need to go far enough out into the future so that it is reasonable to believe that investors expect a stable growth path afterwards. As can be seen in Panel C of Workpaper #3 to Table No. MJV-5 for the water sample and to Panel C of Workpaper #3 to Table No. MJV-16 for the gas LDC sample, the growth rate estimates do not support the view that investors are expecting growth rates equal to the single perpetual growth rate assumed in the simple DCF model. The growth rate forecasts vary substantially in the short-term, and the five-year growth rate forecasts are also quite different from company to company. However, the five-year growth rate forecasts for the gas LDC sample vary much less from company to company than do the five-year growth rate forecasts for the water companies. Similarly, the short-term growth forecast for companies in the gas LDC sample vary much less than do the forecasts for the short-term growth forecast for the water sample companies. There are also generally fewer analysts forecasting earnings for the companies in the water sample.[12]

It is clear that much longer detailed growth rate forecasts than currently available from IBES and *Value Line* would be needed to implement the DCF model in a completely reliable way for these two samples at this time; however, the general stability of the 5-year growth rate forecasts for the gas LDC sample indicates a higher degree of reliability than for the water sample at this time. I submit DCF evidence in this case for both the water utility sample and the gas LDC sample as a check on the equity risk premium approach estimates.

[12] For two of the six water utility companies utilized in the DCF analysis, only one analyst provided a long-term growth forecast and one company has only two analysts forecasts (see Workpaper #3 to Table No. MJV-5, Panel C). In contrast, all companies in the gas LDC sample have long-term growth forecasts from at least three analysts (see Workpaper #3 to Table No. MJV-16, Panel C).

C. DIVIDEND AND PRICE INPUTS

Q17. What values do you use for dividends and stock prices?

A17. Dividend payments are for the 1st quarter of 2005 as reported by Compustat. This dividend is grown at the estimated growth rate and divided by the price described below to estimate the dividend yield for the simple and multi-stage DCF models.

Stock prices are the average of the closing stock prices for the 15 trading days (approximately three weeks) ending April 1, 2005 for all sample companies except Aqua America Inc., which ends April 8, 2005. This time period coincides with the just prior to the release dates of the IBES growth forecasts so that the information on growth rates and stock prices are contemporaneous.[13] I do not use a longer period to measure the price because that would be inconsistent with the principles that underlie the DCF formula. The DCF approach assumes the stock price is the present value of future expected dividends. Stock prices six months or a year ago reflect expectations at that time, which are different from those that underlie the current IBES and *Value Line* forecasts. At the same time, use of an average over a brief period as opposed to a single day helps guard against a company's price on a particular day price being unduly influenced by mistaken information, differences in trading frequency, and the like.

The closing stock price is used because it is at least as good as any other measure of the day's outcome, and may be better for DCF purposes. In particular, if there were any

[13] IBES growth rate forecasts were released on April 1, 2005 for all companies in both samples except for Aqua America whose IBES growth rate forecast was released on April 8, 2005.

single price during the day that would affect investors' decisions to buy or sell a stock, I would suspect that it would be each day's closing price, not the high or low during the day. The daily price changes reported in the financial pages, for example, are from close to close, not from high to high or from low to low.

D. COMPANY-SPECIFIC DCF COST OF CAPITAL ESTIMATES

Q18. What cost of equity estimates do these data yield?

A18. The cost of equity results for the simple and multi-stage DCF models are shown in Table No. MJV-6 for the water utility sample and in Table No. MJV-17 for the gas LDC sample. Panel A reports the results for the simple DCF method and Panel B reports the results for the multi-stage DCF method using the long-term GDP growth rate as the perpetual growth rate.

Q19. What information is provided in Table No. MJV-7 and Table No. MJV-18?

A19. In these tables, the capital structure, cost of equity estimates, and cost of debt estimates are combined to obtain the overall cost of capital for each sample company. The results are presented in Table No. MJV-7 for the water utility sample and in Table No. MJV-18 for the gas LDC sample. Panel A relies on the simple DCF cost of equity results, and Panel B relies on the multi-stage DCF cost of equity results.

For both samples, I also report the average for the subsample of companies that have a large percentage of revenue from regulated activities.[14]

Q20. What do the values in Table No. MJV-7 and Table No. MJV- 18 imply about the cost of equity for the sample companies at Paradise Valley's 36.7 percent equity ratio?

A20. The overall after-tax weighted-average cost of capital from these tables for both DCF methods and for the subsamples are reported in column one of Table No. MJV-8 and Table No. MJV-19. Column 6 of the tables reports the cost of equity consistent with the Paradise Valley's 36.7 percent equity thicknesses and the samples' average weighted-average cost of capital. The sample average ATWACCs and corresponding costs of equity at a 36.7 percent equity ratio are also displayed in Table 2 and Table 4 of my direct testimony.

The implications of these numbers are discussed in my direct testimony, along with the findings of the equity risk premium approach.

[14] The 2004 revenues from regulated businesses is above 80 percent for the water utility sample and above 70 percent for the gas LDC sample. (See Table No. MJV-2 and Table No. MJV-13.) Also, the water subsample excludes York Water which has numerous data problems.

Table No. MJV-1

Index to Tables for the Testimony of Michael J. Vilbert

Table No. MJV-2

2004 Water Utility Sample

Percentage of Revenue from Regulated Activity

Company	State [1]	2004 [2]
American States Water Co	CA	99%
California Water Service Gp	CA	95%
Connecticut Water Svc Inc	CT	91%
Middlesex Water Co	NJ	86%
Aqua America Inc	PA	97%
SJW Corp	CA	95%
Southwest Water Co	CA	37%
York Water Co	PA	92%

Sources and Notes:
[1]: Compustat as of April, 2005.
[2]: Workpaper #1 to Table No. MJV-2; Panels A - H.

Workpaper #1 to Table No. MJV-2

2004 Water Utility Sample: Breakdown of Revenues

Panel A: American States Water Co ($MM)

	% total 2004	2004
Operating Revenues		
Water		
SCW Water *	85%	194.091
SCW Electric *	11%	25.594
CCWC Water *	3%	6.544
Other (Includes FBWS)	1%	1.776
Total Operating Revenues		228.005
Estimated % Regulated Revenues (includes *)		**99%**

Sources and Notes:
American States Water Co's 2004 10-K, Note 14 - Business Segments.
FBWS, found in the "other" revenue segment, is assumed to not be a regulated entity.

Workpaper #1 to Table No. MJV-2

2004 Water Utility Sample: Breakdown of Revenues

Panel B: California Water Service Gp ($MM)

	% total 2004	2004
Operating Revenues		
Residential	70%	221.323
Business	18%	55.803
Industrial	4%	13.592
Public Authorities	5%	15.118
Other	3%	9.731
Total Operating Revenues		315.567
Estimated % Regulated Revenues		**95%**

Sources and Notes:
California Water Service Gp's 2004 10-K, Ten-Year Financial Review.
On page 6 of the 10-K, there is a note saying that 5% of net income is from non-regulated activities. This is assumed true for operating revenues as well.

Workpaper #1 to Table No. MJV-2

2004 Water Utility Sample: Breakdown of Revenues

Panel C: Connecticut Water Svc Inc ($MM)

	% total 2004	2004
Operating Revenues		
Water Activities*	91%	48.493
Real Estate Transactions	0%	-0.012
Services and Rentals	9%	4.818
Total Operating Revenues		53.299
Estimated % Regulated Revenues (includes *)		**91%**

Sources and Notes:
Connecticut Water Svc Inc's 2004 10-K, Note 14 - Segment Reporting.

Workpaper #1 to Table No. MJV-2

2004 Water Utility Sample: Breakdown of Revenues

Panel D: Middlesex Water Co ($MM)

	% total 2004	2004
Operating Revenues		
Regulated *	86%	60.745
Non-Regulated	15%	10.366
Inter-segment Elimination		(0.120)
Total Operating Revenues		70.991
Estimated % Regulated Revenues (includes *)		**86%**

Sources and Notes:
Middlesex Water Co's 2004 10-K, Note 8 - Business Segment Data.

Workpaper #1 to Table No. MJV-2

2004 Water Utility Sample: Breakdown of Revenues

Panel E: Aqua America Inc ($MM)

	% total 2004	2004
Operating Revenues		
Residential Water *	60%	264.910
Commercial Water *	15%	65.605
Fire Protection*	5%	20.771
Industrial Water *	4%	17.377
Other Water *	5%	23.822
Wastewater *	8%	35.931
Water and Wastewater Operating Contracts and Other	3%	13.623
Total Operating Revenues		442.039
Estimated % Regulated Revenues (includes *)		**97%**

Sources and Notes:

Aqua America Inc's 2004 10-K, Operating Revenues on pages 5 and 6.

On page 6, there is a note saying that "...[W]e had other non-regulated revenues that were primarily associated with operating...and data processing service fees of $13,623 in 2004. This is assumed to be the segment called "Water and Wastewater Operating Contracts and Other".

Workpaper #1 to Table No. MJV-2

2004 Water Utility Sample: Breakdown of Revenues

Panel F: SJW Corp ($MM)

	% total 2004	2004
Operating Revenues		
Regulated *	95%	157.951
Non Regulated	5%	8.960
Total Operating Revenues		166.911
Estimated % Regulated Revenues (includes *)		**95%**

Sources and Notes:
SJW Corp's 2004 10-K, Note 15 - Non-regulated Businesses.

Workpaper #1 to Table No. MJV-2

2004 Water Utility Sample: Breakdown of Revenues

Panel G: Southwest Water Co ($MM)

	% total 2004	2004
Operating Revenues		
Services Group	63%	118.532
Utility Group *	37%	69.420
Total Operating Revenues		187.952
Estimated % Regulated Revenues (includes *)		**37%**

Sources and Notes:

Southwest Water Co 2004 10-K, Note 12 - Segment Information.

On page 74, there is a note saying that "The Services Group operates and manages water and wastewater treatment facilities owned by cities, public agencies, municipal utility districts, private entities and investor-owned utilities...while subject to certain environmental standards, is not regulated..."

Workpaper #1 to Table No. MJV-2

2004 Water Utility Sample: Breakdown of Revenues

Panel H: York Water Co ($MM)

	% total 2004	2004
Operating Revenues		
Residential *	61%	13.789
Commercial and Industrial *	31%	6.893
Other	8%	1.822
Total Operating Revenues		22.504
Estimated % Regulated Revenues (includes *)		**92%**

Sources and Notes:
York Water Co 2004 10-K.
It is assumed that Other is not regulated.

Table No. MJV-3

Market Value of the 2004 Water Utility Sample

Panel A: American States Water Co

($MM)

	DCF Capital Structure	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Year End, 2000	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$251	$251	$212	$213	$200	$193	[a]
Shares Outstanding (in millions) - Common	17	17	15	15	15	15	[b]
Price per Share - Common	$25.60	$25.87	$25.11	$23.38	$24.32	$24.00	[c]
Market Value of Common Equity	$429	$433	$382	$355	$368	$363	[d] = [b] x [c].
Market to Book Value of Common Equity	1.71	1.72	1.80	1.66	1.84	1.88	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$0	$0	$0	$0	$2	$2	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$2	$2	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$53	$53	$58	$52	$88	$52	[h]
Current Liabilities	$86	$86	$96	$80	$64	$80	[i]
Current Portion of Long-Term Debt	$1	$1	$1	$13	$1	$1	[j]
Net Working Capital	($32)	($32)	($37)	($14)	$25	($27)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$45	$45	$56	$35	$20	$45	[l]
Adjusted Short-Term Debt	$32	$32	$37	$14	$0	$27	[m] = See Sources and Notes.
Long-Term Debt	$310	$310	$307	$301	$315	$176	[n]
Book Value of Long-Term Debt	$311	$311	$308	$315	$316	$177	[o] = [n] + [j].
Market Value of Long-Term Debt	$311	$311	$308	$315	$316	$177	[p] = [o].
Market Value of Debt	$344	$344	$344	$329	$316	$204	[q] = [p] + [m].
MARKET VALUE OF FIRM	$772	$777	$726	$684	$686	$569	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	55.52%	55.78%	52.58%	51.90%	53.64%	63.78%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	-	-	-	-	0.27%	0.34%	[t] = [g] / [r].
Debt - Market Value Ratio	44.48%	44.22%	47.42%	48.10%	46.08%	35.89%	[u] = [q] / [r].

Sources and Notes:

Compustat as of April 2005.

The DCF Capital structure is calculated using Year End 2004 balance sheet information and a 15-trading day average price ending on 4/1/2005.

Prices are reported in Workpaper #1 to Table No. MJV-6.

[m] =

(1): 0 if [k] > 0.

(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].

(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-3

Market Value of the 2004 Water Utility Sample

Panel B: California Water Service Gp

($MM)

	DCF Capital Structure	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Year End, 2000	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$288	$288	$245	$199	$197	$199	[a]
Shares Outstanding (in millions) - Common	18	18	17	15	15	15	[b]
Price per Share - Common	$33.83	$37.18	$27.76	$23.96	$25.77	$26.71	[c]
Market Value of Common Equity	$621	$683	$470	$364	$391	$405	[d] = [b] x [c].
Market to Book Value of Common Equity	2.16	2.37	1.92	1.83	1.99	2.03	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$3	$3	$3	$3	$3	$3	[f]
Market Value of Preferred Equity	$3	$3	$3	$3	$3	$3	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$70	$70	$44	$43	$40	$41	[h]
Current Liabilities	$57	$57	$64	$92	$79	$64	[i]
Current Portion of Long-Term Debt	$1	$1	$1	$1	$5	$3	[j]
Net Working Capital	$14	$14	($19)	($48)	($33)	($20)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$0	$0	$6	$36	$22	$15	[l]
Adjusted Short-Term Debt	$0	$0	$6	$36	$22	$15	[m] = See Sources and Notes.
Long-Term Debt	$275	$275	$272	$250	$203	$187	[n]
Book Value of Long-Term Debt	$276	$276	$273	$251	$208	$190	[o] = [n] + [j].
Market Value of Long-Term Debt	$276	$276	$273	$251	$208	$190	[p] = [o].
Market Value of Debt	$276	$276	$280	$288	$230	$205	[q] = [p] + [m].
MARKET VALUE OF FIRM	$901	$962	$753	$655	$625	$613	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	68.98%	70.97%	62.41%	55.54%	62.63%	66.04%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	0.39%	0.36%	0.46%	0.53%	0.56%	0.57%	[t] = [g] / [r].
Debt - Market Value Ratio	30.63%	28.67%	37.13%	43.93%	36.81%	33.39%	[u] = [q] / [r].

Sources and Notes:
Compustat as of April 2005.
The DCF Capital structure is calculated using Year End 2004 balance sheet information and a 15-trading day average price ending on 4/1/2005.
Prices are reported in Workpaper #1 to Table No. MJV-6.
[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-3

Market Value of the 2004 Water Utility Sample

Panel C: Connecticut Water Svc Inc

($MM)

	DCF Capital Structure	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Year End, 2000	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$88	$88	$83	$80	$71	$65	[a]
Shares Outstanding (in millions) - Common	8	8	8	8	8	7	[b]
Price per Share - Common	$25.13	$26.47	$27.71	$25.85	$29.79	$19.76	[c]
Market Value of Common Equity	$202	$213	$221	$205	$228	$144	[d] = [b] x [c].
Market to Book Value of Common Equity	2.30	2.42	2.65	2.57	3.22	2.22	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$1	$1	$1	$1	$1	$1	[f]
Market Value of Preferred Equity	$1	$1	$1	$1	$1	$1	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$15	$15	$11	$10	$9	$9	[h]
Current Liabilities	$16	$16	$15	$15	$13	$9	[i]
Current Portion of Long-Term Debt	$0	$0	$0	$0	$2	$0	[j]
Net Working Capital	($0)	($0)	($4)	($5)	($1)	$0	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$6	$6	$10	$7	$2	$1	[l]
Adjusted Short-Term Debt	$0	$0	$4	$5	$1	$0	[m] = See Sources and Notes.
Long-Term Debt	$66	$66	$65	$65	$64	$65	[n]
Book Value of Long-Term Debt	$67	$67	$65	$65	$66	$65	[o] = [n] + [j].
Market Value of Long-Term Debt	$67	$67	$65	$65	$66	$65	[p] = [o].
Market Value of Debt	$67	$67	$69	$70	$67	$65	[q] = [p] + [m].
MARKET VALUE OF FIRM	$270	$281	$290	$276	$296	$209	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	74.82%	75.79%	76.06%	74.38%	77.01%	68.67%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	0.31%	0.30%	0.29%	0.31%	0.29%	0.37%	[t] = [g] / [r].
Debt - Market Value Ratio	24.86%	23.91%	23.65%	25.31%	22.71%	30.97%	[u] = [q] / [r].

Sources and Notes:

Compustat as of April 2005.

The DCF Capital structure is calculated using Year End 2004 balance sheet information and a 15-trading day average price ending on 4/1/2005.

Price per share for the DCF Capital Structure calculation is an average of prices starting from 4/1/2005 going back 15 business days rather than 12/14/01, as is indicated in the I/B/E/S sheets.

[m] =

(1): 0 if [k] > 0.

(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].

(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-3

Market Value of the 2004 Water Utility Sample

Panel D: Middlesex Water Co

($MM)

	DCF Capital Structure	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Year End, 2000	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$95	$95	$80	$77	$72	$71	[a]
Shares Outstanding (in millions) - Common	11	11	11	10	10	10	[b]
Price per Share - Common	$17.98	$19.27	$20.54	$16.02	$17.01	$16.70	[c]
Market Value of Common Equity	$204	$219	$217	$166	$173	$169	[d] = [b] x [c].
Market to Book Value of Common Equity	2.15	2.30	2.73	2.17	2.39	2.39	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$4	$4	$4	$4	$4	$4	[f]
Market Value of Preferred Equity	$4	$4	$4	$4	$4	$4	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$16	$16	$14	$20	$25	$15	[h]
Current Liabilities	$28	$28	$28	$30	$26	$18	[i]
Current Portion of Long-Term Debt	$1	$1	$1	$1	$0	$0	[j]
Net Working Capital	($11)	($11)	($12)	($9)	($1)	($3)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$11	$11	$13	$18	$13	$6	[l]
Adjusted Short-Term Debt	$11	$11	$12	$9	$1	$3	[m] = See Sources and Notes.
Long-Term Debt	$115	$115	$97	$87	$88	$82	[n]
Book Value of Long-Term Debt	$116	$116	$98	$88	$88	$82	[o] = [n] + [j].
Market Value of Long-Term Debt	$116	$116	$98	$88	$88	$82	[p] = [o].
Market Value of Debt	$127	$127	$111	$97	$89	$85	[q] = [p] + [m].
MARKET VALUE OF FIRM	$335	$350	$332	$267	$266	$258	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	60.90%	62.53%	65.41%	62.20%	65.02%	65.48%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	1.21%	1.16%	1.22%	1.52%	1.53%	1.58%	[t] = [g] / [r].
Debt - Market Value Ratio	37.89%	36.31%	33.36%	36.28%	33.45%	32.94%	[u] = [q] / [r].

Sources and Notes:
Compustat as of April 2005.
The DCF Capital structure is calculated using Year End 2004 balance sheet information and a 15-trading day average price ending on 4/1/2005.
Prices are reported in Workpaper #1 to Table No. MJV-6.
[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-3

Market Value of the 2004 Water Utility Sample

Panel E: Aqua America Inc

($MM)

	DCF Capital Structure	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Year End, 2000	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$747	$747	$658	$493	$472	$428	[a]
Shares Outstanding (in millions) - Common	95	95	93	85	85	84	[b]
Price per Share ($) - Common	$24.50	$24.18	$22.08	$16.47	$18.59	$15.07	[c]
Market Value of Common Equity	$2,337	$2,306	$2,045	$1,398	$1,589	$1,264	[d] = [b] x [c].
Market to Book Value of Common Equity	3.13	3.09	3.11	2.84	3.37	2.96	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$0	$0	$0	$0	$1	$2	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$1	$2	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$90	$90	$84	$71	$70	$71	[h]
Current Liabilities	$217	$217	$232	$227	$203	$173	[i]
Current Portion of Long-Term Debt	$50	$50	$39	$34	$15	$16	[j]
Net Working Capital	($77)	($77)	($109)	($121)	($118)	($87)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$85	$85	$96	$115	$110	$89	[l]
Adjusted Short-Term Debt	$77	$77	$96	$115	$110	$87	[m] = See Sources and Notes.
Long-Term Debt	$784	$784	$697	$583	$517	$469	[n]
Book Value of Long-Term Debt	$835	$835	$736	$617	$531	$485	[o] = [n] + [j].
Market Value of Long-Term Debt	$835	$835	$736	$617	$531	$485	[p] = [o].
Market Value of Debt	$912	$912	$833	$732	$641	$571	[q] = [p] + [m].
MARKET VALUE OF FIRM							
	$3,248	$3,218	$2,877	$2,130	$2,232	$1,837	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	71.93%	71.67%	71.06%	65.62%	71.22%	68.81%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	-	-	-	0.01%	0.05%	0.10%	[t] = [g] / [r].
Debt - Market Value Ratio	28.07%	28.33%	28.94%	34.37%	28.73%	31.10%	[u] = [q] / [r].

Sources and Notes:

Compustat as of April 2005.

The DCF Capital structure is calculated using Year End 2004 balance sheet information and a 15-trading day average price ending on 4/8/2005.

Prices are reported in Workpaper #1 to Table No. MJV-6.

[m] =

(1): 0 if [k] > 0.

(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].

Table No. MJV-3

Market Value of the 2004 Water Utility Sample

Panel F: SJW Corp

($MM)

	DCF Capital Structure	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Year End, 2000	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$185	$185	$166	$153	$149	$144	[a]
Shares Outstanding (in millions) - Common	9	9	9	9	9	9	[b]
Price per Share ($) - Common	$36.48	$36.87	$29.51	$26.30	$28.41	$33.80	[c]
Market Value of Common Equity	$333	336.84	269.57	240.24	259.49	308.76	[d] = [b] x [c].
Market to Book Value of Common Equity	1.80	1.82	1.62	1.57	1.74	2.14	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$28	$28	$27	$19	$20	$15	[h]
Current Liabilities	$15	$15	$15	$24	$24	$27	[i]
Current Portion of Long-Term Debt	$0	$0	$0	$0	$0	$0	[j]
Net Working Capital	$13	$13	$12	($5)	($4)	($11)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$0	$0	$0	$11	$12	$11	[l]
Adjusted Short-Term Debt	$0	$0	$0	$5	$4	$11	[m] = See Sources and Notes.
Long-Term Debt	$144	$144	$140	$110	$110	$90	[n]
Book Value of Long-Term Debt	$144	$144	$140	$110	$110	$90	[o] = [n] + [j].
Market Value of Long-Term Debt	$144	$144	$140	$110	$110	$90	[p] = [o].
Market Value of Debt	$144	$144	$140	$115	$114	$101	[q] = [p] + [m].
MARKET VALUE OF FIRM							
	$477	$481	$409	$355	$373	$410	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	69.85%	70.07%	65.85%	67.65%	69.53%	75.31%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	[t] = [g] / [r].
Debt - Market Value Ratio	30.15%	29.93%	34.15%	32.35%	30.47%	24.69%	[u] = [q] / [r].

Sources and Notes:

Compustat as of April 2005.

The DCF Capital structure is calculated using Year End 2004 balance sheet information and a 15-trading day average price ending on 4/1/2005.

Price per share for the DCF Capital Structure calculation is an average of prices starting from 4/1/2005 going back 15 business days rather than 4/11/03, as is indicated in the I/B/E/S sheets.

[m] =

(1): 0 if [k] > 0.

(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].

(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-3

Market Value of the 2004 Water Utility Sample

Panel G: Southwest Water Co

($MM)

	DCF Capital Structure	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Year End, 2000	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$126	$126	$79	$61	$54	$48	[a]
Shares Outstanding (in millions) - Common	19	19	15	13	13	13	[b]
Price per Share ($) - Common	$10.97	$12.98	$11.44	$9.47	$9.66	$7.68	[c]
Market Value of Common Equity	$213	$252	$176	$123	$130	$101	[d] = [b] x [c].
Market to Book Value of Common Equity	1.69	2.00	2.23	2.01	2.40	2.10	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$0	$0	$1	$1	$1	$1	[f]
Market Value of Preferred Equity	$0	$0	$1	$1	$1	$1	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$45	$45	$35	$30	$31	$27	[h]
Current Liabilities	$36	$36	$31	$32	$26	$26	[i]
Current Portion of Long-Term Debt	$3	$3	$3	$2	$5	$5	[j]
Net Working Capital	$13	$13	$7	$0	$10	$6	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$0	$0	$0	$0	$0	$0	[l]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	[m] = See Sources and Notes.
Long-Term Debt	$116	$116	$73	$81	$65	$46	[n]
Book Value of Long-Term Debt	$119	$119	$76	$83	$70	$52	[o] = [n] + [j].
Market Value of Long-Term Debt	$119	$119	$76	$83	$70	$52	[p] = [o].
Market Value of Debt	$119	$119	$76	$83	$70	$52	[q] = [p] + [m].
MARKET VALUE OF FIRM							
	$332	$371	$252	$207	$201	$153	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	64.00%	67.79%	69.78%	59.61%	64.96%	66.05%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	0.14%	0.12%	0.20%	0.25%	0.26%	0.34%	[t] = [g] / [r].
Debt - Market Value Ratio	35.86%	32.09%	30.02%	40.14%	34.79%	33.62%	[u] = [q] / [r].

Sources and Notes:
Compustat as of April 2005.
The DCF Capital structure is calculated using Year End 2004 balance sheet information and a 15-trading day average price ending on 4/1/2005.
Prices are reported in Workpaper #1 to Table No. MJV-6.
[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-3

Market Value of the 2004 Water Utility Sample

Panel H: York Water Co

($MM)

	DCF Capital Structure	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Year End, 2000	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$48	$48	$39	$37	$36	$32	[a]
Shares Outstanding (in millions) - Common	7	7	6	6	6	6	[b]
Price per Share ($) - Common	$19.16	$19.60	$18.21	$15.39	$14.89	$8.63	[c]
Market Value of Common Equity	$132	$135	$117	$98	$94	$52	[d] = [b] x [c].
Market to Book Value of Common Equity	2.75	2.81	2.99	2.63	2.62	1.60	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$5	$5	$4	$4	$4	$4	[h]
Current Liabilities	$21	$21	$14	$5	$5	$6	[i]
Current Portion of Long-Term Debt	$16	$16	$3	$0	$0	$0	[j]
Net Working Capital	$0	$0	($7)	($2)	($1)	($2)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$0	$0	$7	$3	$2	$3	[l]
Adjusted Short-Term Debt	$0	$0	$7	$2	$1	$2	[m] = See Sources and Notes.
Long-Term Debt	$36	$36	$30	$33	$33	$33	[n]
Book Value of Long-Term Debt	$52	$52	$33	$33	$33	$33	[o] = [n] + [j].
Market Value of Long-Term Debt	$52	$52	$33	$33	$33	$33	[p] = [o].
Market Value of Debt	$52	$52	$40	$34	$34	$35	[q] = [p] + [m].
MARKET VALUE OF FIRM	$184	$187	$157	$132	$128	$87	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	71.77%	72.22%	74.60%	73.98%	73.61%	59.77%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	[t] = [g] / [r].
Debt - Market Value Ratio	28.23%	27.78%	25.40%	26.02%	26.39%	40.23%	[u] = [q] / [r].

Sources and Notes:
Compustat as of April 2005.
The DCF Capital structure is calculated using Year End 2004 balance sheet information and a 15-trading day average price ending on 4/1/2005.
Prices are reported in Workpaper #1 to Table No. MJV-6.
[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-4

2004 Water Utility Sample

Capital Structure Summary

Company	DCF Capital Structure			5-Year Average Capital Structure		
	Common Equity - Value Ratio [1]	Preferred Equity - Value Ratio [2]	Debt - Value Ratio [3]	Common Equity - Value Ratio [4]	Preferred Equity - Value Ratio [5]	Debt - Value Ratio [6]
American States Water Co	0.56	-	0.44	0.56	0.00	0.44
California Water Service Gp	0.69	0.00	0.31	0.64	0.00	0.36
Connecticut Water Svc Inc	0.75	0.00	0.25	0.74	0.00	0.25
Middlesex Water Co	0.61	0.01	0.38	0.64	0.01	0.34
Aqua America Inc	0.72	-	0.28	0.70	0.00	0.30
SJW Corp	0.70	-	0.30	0.70	-	0.30
Southwest Water Co	0.64	0.00	0.36	0.66	0.00	0.34
York Water Co	0.72	-	0.28	0.71	-	0.29

Sources and Notes:

[1], [4]: Workpaper #1 to Table No. MJV-4.

[2], [5]: Workpaper #2 to Table No. MJV-4.

[3], [6]: Workpaper #3 to Table No. MJV-4.

Values in this table may not add up to one because of rounding.

Workpaper #1 to Table No. MJV-4

2004 Water Utility Sample

Calculation of the Average Common Equity - Market Value Ratio from 2000 to 2004

Company	DCF Capital Structure [1]	2004 [2]	2003 [3]	2002 [4]	2001 [5]	2000 [6]	5-Year Average [7]
American States Water Co	0.56	0.56	0.53	0.52	0.54	0.64	0.56
California Water Service Gp	0.69	0.71	0.62	0.56	0.63	0.66	0.64
Connecticut Water Svc Inc	0.75	0.76	0.76	0.74	0.77	0.69	0.74
Middlesex Water Co	0.61	0.63	0.65	0.62	0.65	0.65	0.64
Aqua America Inc	0.72	0.72	0.71	0.66	0.71	0.69	0.70
SJW Corp	0.70	0.70	0.66	0.68	0.70	0.75	0.70
Southwest Water Co	0.64	0.68	0.70	0.60	0.65	0.66	0.66
York Water Co	0.72	0.72	0.75	0.74	0.74	0.60	0.71

Sources and Notes:

[1] - [6]: Table No. MJV-3; Panels A - H, [s].

[7]: { [2] + [3] + [4] + [5] + [6] } / 5.

Workpaper #2 to Table No. MJV-4

2004 Water Utility Sample

Calculation of the Average Preferred Equity - Market Value Ratio from 2000 to 2004

Company	DCF Capital Structure [1]	2004 [2]	2003 [3]	2002 [4]	2001 [5]	2000 [6]	5-Year Average [7]
American States Water Co	-	-	-	-	0.00	0.00	0.00
California Water Service Gp	0.00	0.00	0.00	0.01	0.01	0.01	0.00
Connecticut Water Svc Inc	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Middlesex Water Co	0.01	0.01	0.01	0.02	0.02	0.02	0.01
Aqua America Inc	-	-	-	0.00	0.00	0.00	0.00
SJW Corp	-	-	-	-	-	-	-
Southwest Water Co	0.00	0.00	0.00	0.00	0.00	0.00	0.00
York Water Co	-	-	-	-	-	-	-

Sources and Notes:
[1] - [6]: Table No. MJV-3; Panels A - H, [t].
[7]: { [2] + [3] + [4] + [5] + [6] } / 5.
Values reported as 0.00 have an insignificant amount of preferred equity.

Workpaper #3 to Table No. MJV-4

2004 Water Utility Sample

Calculation of the Average Debt - Market Value Ratio from 2000 to 2004

Company	DCF Capital Structure [1]	2004 [2]	2003 [3]	2002 [4]	2001 [5]	2000 [6]	5-Year Average [7]
American States Water Co	0.44	0.44	0.47	0.48	0.46	0.36	0.44
California Water Service Gp	0.31	0.29	0.37	0.44	0.37	0.33	0.36
Connecticut Water Svc Inc	0.25	0.24	0.24	0.25	0.23	0.31	0.25
Middlesex Water Co	0.38	0.36	0.33	0.36	0.33	0.33	0.34
Aqua America Inc	0.28	0.28	0.29	0.34	0.29	0.31	0.30
SJW Corp	0.30	0.30	0.34	0.32	0.30	0.25	0.30
Southwest Water Co	0.36	0.32	0.30	0.40	0.35	0.34	0.34
York Water Co	0.28	0.28	0.25	0.26	0.26	0.40	0.29

Sources and Notes:
[1] - [6]: Table No. MJV-3; Panels A - H, [u].
[7]: { [2] + [3] + [4] + [5] + [6] } / 5.

Table No. MJV-5

2004 Water Utility Sample

Combined I/B/E/S and Value Line Estimated Growth Rates

Company	I/B/E/S Growth Rate Long-Term [1]	I/B/E/S Number of Long-Term Growth Rate Estimates [2]	Value Line Growth Rate Long-Term [3]	Combined I/B/E/S and Value Line Growth Rate [4]
American States Water Co	3.0%	1	11.3%	7.2%
California Water Service Gp	6.5%	4	5.6%	6.3%
Middlesex Water Co	6.0%	1	n/a	6.0%
Aqua America Inc	10.5%	4	8.1%	10.0%
Southwest Water Co	7.5%	4	n/a	7.5%
York Water Co	7.0%	1	n/a	7.0%

Sources and Notes:

[1] - [2]: Workpaper #1 to Table No. MJV-5.

[3]: Workpaper #3 to Table No. MJV-5; Panel B, [5].

[4]: (([1] x [2]) + [3]) / ([2] + 1).

If [3] is not available, the I/B/E/S Long-Term Growth Rate is used.

Connecticut Water Svs Inc and SJW Corp have no recent I/B/E/S long-term and interim growth rate estimates respectively and are excluded from the DCF analysis.

Workpaper #1 to Table No. MJV-5

2004 Water Utility Sample

I/B/E/S Earnings Per Share Data

Company	EPS Fiscal Year-End 2004 Observed [1]	EPS Fiscal Year-End 2005 Estimate [2]	EPS Fiscal Year-End 2006 Estimate [3]	Growth Rate Long-Term [4]	Number of Long-Term Growth Rate Estimates [5]
American States Water Co	$1.06	$1.35	n/a	3.0%	1
California Water Service Gp	$1.46	$1.59	$1.73	6.5%	4
Middlesex Water Co	$0.61	$0.66	$0.79	6.0%	1
Aqua America Inc	$0.86	$0.96	$1.05	10.5%	4
Southwest Water Co	$0.25	$0.40	n/a	7.5%	4
York Water Co	$0.80	$0.79	n/a	7.0%	1

Sources and Notes:

[1] - [5]: I/B/E/S as of April 1, 2005 for all companies except Aqua America Inc, which is from I/B/E/S as of April 8, 2005. Connecticut Water Svs Inc and SJW Corp have no recent I/B/E/S long-term and interim growth rate estimates respectively and are excluded from the DCF analysis.

Workpaper #2 to Table No. MJV-5

2004 Water Utility Sample

Value Line Earnings Per Share Data

Company	EPS Fiscal Year 2004 Estimate [1]	EPS Fiscal Year 2005 Estimate [2]	EPS 2005 - 2006 Estimate [3]	Combined EPS Fiscal Year 2005 Estimate [4]	Combined EPS Fiscal Year 2006 Estimate [5]	EPS 2007 - 2009 Estimate [6]
American States Water Co	$1.16	$1.45	n/a	$1.45	n/a	$2.00
California Water Service Gp	$1.58	$1.70	n/a	$1.70	n/a	$2.00
Middlesex Water Co	$0.69	n/a	$0.80	$0.74	$0.80	n/a
Aqua America Inc	$0.85	$0.95	n/a	$0.95	n/a	$1.20
Southwest Water Co	$0.45	n/a	$0.51	$0.48	$0.51	n/a
York Water Co	$0.75	n/a	$0.79	$0.77	$0.79	n/a

Sources and Notes:
[1] - [2] and [6]: Value Line Investment Survey; January 28, 2005.
[3]: Value Line Small and MidCap Edition; January 28, 2005.
[4]: If [3] is not available, then [2]. If [3] is available, then [1] x ([3] / [1]) ^(1/2).
[5]: [4] x ([3] / [1]) ^(1/2).

Workpaper #3 to Table No. MJV-5

Estimated Growth Rates of the 2004 Water Utility Sample

Panel A: Using I/B/E/S Forecasts

Company	Growth Rate: FY 04 - 05 [1]	Growth Rate: FY 05 - 06 [2]	Growth Rate: FY 06 - 07 [3]	Growth Rate: FY 07 - 08 [4]	Growth Rate: FY 08 - 09 [5]	Growth Rate Long-Term [6]	Number of Long-Term Growth Rate Estimates [7]
American States Water Co	27.4%	-2.3%	-2.3%	-2.3%	-2.3%	3.0%	1
California Water Service Gp	8.9%	8.8%	5.0%	5.0%	5.0%	6.5%	4
Middlesex Water Co	8.2%	19.7%	1.1%	1.1%	1.1%	6.0%	1
Aqua America Inc	11.6%	9.4%	10.5%	10.5%	10.5%	10.5%	4
Southwest Water Co	60.0%	-2.7%	-2.7%	-2.7%	-2.7%	7.5%	4
York Water Co	-1.3%	9.2%	9.2%	9.2%	9.2%	7.0%	1

Sources and Notes:

[1]: From Workpaper #1 to Table No. MJV-5: ([2] - [1]) / [1].

[2]: From Workpaper #1 to Table No. MJV-5: ([3] - [2]) / [2].

[3]: From Workpaper #1 to Table No. MJV-5:

If [3] is n/a then {([1] x ((1 + [4]) ^ 5) / [2]) ^ (1/4)} - 1; otherwise, {([1] x ((1 + [4]) ^ 5) / [3]) ^ (1/3)} - 1.

[4]: [3].

[5]: [3].

[6] and [7]: Workpaper #1 to Table No. MJV-5, [4] and [5].

Workpaper #3 to Table No. MJV-5

Estimated Growth Rates of the 2004 Water Utility Sample

Panel B: Using Value Line Forecasts

Company	Growth Rate: FY 04 - 05 [1]	Growth Rate: FY 05 - 06 [2]	Growth Rate: FY 06 - 07 [3]	Growth Rate: FY 07 - 08 [4]	Growth Rate: FY 08 - 09 [5]	Growth Rate Long-Term [6]
American States Water Co	25.0%	11.3%	11.3%	11.3%	11.3%	11.3%
California Water Service Gp	7.6%	5.6%	5.6%	5.6%	5.6%	5.6%
Middlesex Water Co	7.7%	7.7%	n/a	n/a	n/a	n/a
Aqua America Inc	11.8%	8.1%	8.1%	8.1%	8.1%	8.1%
Southwest Water Co	6.5%	6.5%	n/a	n/a	n/a	n/a
York Water Co	2.6%	2.6%	n/a	n/a	n/a	n/a

Sources and Notes:
[1]: From Workpaper #2 to Table No. MJV-5: ([4] - [1]) / [1].
[2]: From Workpaper #2 to Table No. MJV-5:
If [6] is n/a then ([5] - [4]) / [4]; otherwise, {([6] / [2])^(1/3)} - 1.
[3] - [6]: [2].

Workpaper #3 to Table No. MJV-5

Estimated Growth Rates of the 2004 Water Utility Sample

Panel C: Combined I/B/E/S and Value Line Forecasts

Company	Combined Growth Rate: FY 04 - 05 [1]	Combined Growth Rate: FY 05 - 06 [2]	Combined Growth Rate: FY 06 - 07 [3]	Combined Growth Rate: FY 07 - 08 [4]	Combined Growth Rate: FY 08 - 09 [5]	Combined Growth Rate: Long-Term [6]	Number of Estimates [7]
American States Water Co	26.2%	4.5%	4.5%	4.5%	4.5%	7.2%	2
California Water Service Gp	8.6%	8.2%	5.1%	5.1%	5.1%	6.3%	5
Middlesex Water Co	7.9%	13.7%	1.1%	1.1%	1.1%	6.0%	1
Aqua America Inc	11.7%	9.1%	10.0%	10.0%	10.0%	10.0%	5
Southwest Water Co	49.3%	-0.8%	-2.7%	-2.7%	-2.7%	7.5%	4
York Water Co	0.7%	5.9%	9.2%	9.2%	9.2%	7.0%	1

Sources and Notes:

I/B/E/S forecasts are weighted by the number of estimates in the I/B/E/S long-term growth rates, and Value Line estimates are weighted by one.

[1] - [4] and [6]: Weighted average of I/B/E/S and Value Line forecasts.

(The I/B/E/S Estimate from Workpaper #3 to Table No. MJV-5; Panel A x the number of I/B/E/S estimates + the Value Line Estimate from Workpaper #3 to Table No. MJV-5; Panel B) / [7].

Southwest Water Co, Middlesex Water Co and York Water Co have no long-term Value Line estimates. The I/B/E/S growth rates are used exclusively.

[5]: The I/B/E/S Estimate as there is no Value Line growth rate for that year.

[7]: The Number of I/B/E/S long-term growth rate estimates plus one for the Value Line estimate, if available.

Table No. MJV-6

DCF Cost of Equity of the 2004 Water Utility Sample

Panel A: Simple DCF Method (Quarterly)

Company	Stock Price [1]	Quarterly Dividend Q1, 2005 [2]	Annualized Dividend Yield [3]	Combined I/B/E/S and Value Line Long-Term Growth Rate [4]	Quarterly Growth Rate [5]	DCF Cost of Equity [6]
American States Water Co	$25.60	$0.22	3.8%	7.2%	1.7%	11.0%
California Water Service Gp	$33.83	$0.28	3.6%	6.3%	1.5%	9.9%
Middlesex Water Co	$17.98	$0.17	3.9%	6.0%	1.5%	10.0%
Aqua America Inc	$24.50	$0.13	2.3%	10.0%	2.4%	12.4%
Southwest Water Co	$10.97	$0.05	2.0%	7.5%	1.8%	9.5%
York Water Co	$19.16	$0.16	3.5%	7.0%	1.7%	10.5%

Sources and Notes:

[1]: Workpaper #1 to Table No. MJV-6.

[2]: Workpaper #2 to Table No. MJV-6.

[3]: [2] x 4 x (1+[4]) / [1].

[4]: Workpaper #3 to Table No. MJV-5; Panel C.
Middlesex Water Co, Southwest Water Co and York Water Co do not have Value Line long-term growth rates.
The values reported here are those from I/B/E/S.

[5]: {(1 + [4]) ^ (1/4)} - 1.

[6]: {((([2] / [1]) x (1 + [5]) + [5] + 1) ^ 4} - 1.

Table No. MJV-6

DCF Cost of Equity of the 2004 Water Utility Sample

Panel B: Multi-Stage DCF (Using the Blue-Chip Long-Term GDP Growth Forecast as the Perpetual Rate)

Company	Stock Price [1]	Quarterly Dividend Q1, 2005 [2]	Combined Growth Rate: FY 04 - 05 [3]	Combined Growth Rate: FY 05 - 06 [4]	Combined Growth Rate: FY 06 - 07 [5]	Combined Growth Rate: FY 07 - 08 [6]	Combined Growth Rate: FY 08 - 09 [7]	Combined Growth Rate: FY 09 - 10 [8]	Combined Growth Rate: FY 10 - 11 [9]	Combined Growth Rate: FY 11 - 12 [10]	Combined Growth Rate: FY 12 - 13 [11]	Combined Growth Rate: FY 13 - 14 [12]	GDP Long-Term Growth Rate [13]	DCF Cost of Equity [14]
American States Water Co	$25.60	$0.22	26.2%	4.5%	4.5%	4.5%	4.5%	6.8%	6.5%	6.2%	5.9%	5.6%	5.3%	9.6%
California Water Service Gp	$33.83	$0.28	8.6%	8.2%	5.1%	5.1%	5.1%	6.1%	6.0%	5.8%	5.6%	5.5%	5.3%	9.1%
Middlesex Water Co	$17.98	$0.17	7.9%	13.7%	1.1%	1.1%	1.1%	5.9%	5.8%	5.7%	5.5%	5.4%	5.3%	9.2%
Aqua America Inc	$24.50	$0.13	11.7%	9.1%	10.0%	10.0%	10.0%	9.2%	8.4%	7.7%	6.9%	6.1%	5.3%	8.3%
Southwest Water Co	$10.97	$0.05	49.3%	-0.8%	-2.7%	-2.7%	-2.7%	7.1%	6.8%	6.4%	6.0%	5.7%	5.3%	7.3%
York Water Co	$19.16	$0.16	0.7%	5.9%	9.2%	9.2%	9.2%	6.7%	6.4%	6.2%	5.9%	5.6%	5.3%	9.1%

Sources and Notes:

[1]: Workpaper #1 to Table No. MJV-6.

[2]: Workpaper #2 to Table No. MJV-6.

[3] - [7]: Workpaper #3 to Table No. MJV-5; Panel C.

The Combined I/B/E/S and Value Line Long-Term Growth Rate (Combined Rate) is from Workpaper #3 to Table No. MJV-5; Panel C, [6].

[8]: Combined Rate - (Combined Rate - [13]) / 6.

[9]: [8] - (Combined Rate - [13]) / 6.

[10]: [9] - (Combined Rate - [13]) / 6.

[11]: [10] - (Combined Rate - [13]) / 6.

[12]: [11] - (Combined Rate - [13]) / 6.

[13]: *Blue Chip Economic Indicators*, March 10, 2005, page 15. This number is assumed to be the perpetual growth rate.

[14]: Workpaper #3 to Table No. MJV-6.

Workpaper #1 to Table No. MJV-6

2004 Water Utility Sample

Common Stock Prices from March 11, 2005 to April 01, 2005
Common Stock Prices for Aqua America Inc from March 18, 2005 to April 08, 2005

Company	01-Apr-05 08-Apr-05	31-Mar-05 07-Apr-05	30-Mar-05 06-Apr-05	29-Mar-05 05-Apr-05	28-Mar-05 04-Apr-05	25-Mar-05 01-Apr-05	24-Mar-05 31-Mar-05	23-Mar-05 30-Mar-05	22-Mar-05 29-Mar-05	21-Mar-05 28-Mar-05	18-Mar-05 25-Mar-05	17-Mar-05 24-Mar-05	16-Mar-05 23-Mar-05	15-Mar-05 22-Mar-05	14-Mar-05 21-Mar-05	11-Mar-05 18-Mar-05	Average
American States Water Co	$25.10	$25.30	$25.90	$25.12	$25.50	-	$25.19	$25.11	$25.11	$25.32	$25.50	$25.52	$26.40	$26.38	$26.25	$26.23	$25.60
California Water Service Gp	$32.87	$33.37	$34.15	$33.53	$33.92	-	$33.41	$33.10	$33.61	$33.78	$33.75	$34.00	$34.05	$34.59	$34.74	$34.53	$33.83
Middlesex Water Co	$17.75	$18.15	$18.35	$17.86	$18.03	-	$17.94	$17.80	$18.05	$18.00	$17.78	$17.90	$17.93	$17.89	$18.30	$18.01	$17.98
Aqua America Inc *	$25.67	$25.17	$24.96	$24.80	$24.62	$24.20	$24.36	$24.52	$24.02	$24.20	-	$23.72	$23.96	$24.38	$24.56	$24.33	$24.50
Southwest Water Co	$10.67	$10.43	$10.84	$10.34	$10.81	-	$10.93	$11.02	$11.06	$10.99	$11.10	$11.11	$11.05	$11.25	$11.47	$11.44	$10.97
York Water Co	$18.68	$19.05	$19.15	$19.10	$19.10	-	$19.20	$19.20	$19.50	$18.52	$18.76	$19.00	$19.05	$19.35	$19.90	$19.90	$19.16

Sources and Notes:
Compustat as of April 2005.
The prices chosen are the daily closing prices from Compustat starting from I/B/E/S forecast day and ending fifteen trading days before.
*Aqua America's I/B/E/S date is April 8, 2005.

Workpaper #2 to Table No. MJV-6

2004 Water Utility Sample

Dividend Payments

Company	1st Quarter 2005 [1]
American States Water Co	$0.22
California Water Service Gp	$0.28
Middlesex Water Co	$0.17
Aqua America Inc	$0.13
Southwest Water Co	$0.05
York Water Co	$0.16

Sources and Notes:
Compustat as of April 2005.

Workpaper #3 to Table No. MJV-6

DCF Cost of Equity of the 2004 Water Utility Sample

Multi-Stage DCF (using the Blue Chip Indicators Long-Term GDP Growth Rate Forecast as the Perpetual Growth Rate)

Year	Company	American States Water Co	California Water Service Gp	Middlesex Water Co	Aqua America Inc	Southwest Water Co	York Water Co
	Current Stock Price	($25.60)	($33.83)	($17.98)	($24.50)	($10.97)	($19.16)
YEAR 2005	Dividend Q2 Estimate	$0.24	$0.29	$0.17	$0.13	$0.06	$0.16
YEAR 2005	Dividend Q3 Estimate	$0.25	$0.30	$0.17	$0.14	$0.06	$0.16
YEAR 2005	Dividend Q4 Estimate	$0.27	$0.30	$0.18	$0.14	$0.07	$0.16
YEAR 2006	Dividend Q1 Estimate	$0.27	$0.31	$0.18	$0.14	$0.07	$0.16
YEAR 2006	Dividend Q2 Estimate	$0.27	$0.32	$0.19	$0.15	$0.07	$0.16
YEAR 2006	Dividend Q3 Estimate	$0.28	$0.32	$0.20	$0.15	$0.07	$0.16
YEAR 2006	Dividend Q4 Estimate	$0.28	$0.33	$0.20	$0.15	$0.07	$0.17
YEAR 2007	Dividend Q1 Estimate	$0.28	$0.33	$0.20	$0.16	$0.07	$0.17
YEAR 2007	Dividend Q2 Estimate	$0.29	$0.34	$0.20	$0.16	$0.07	$0.17
YEAR 2007	Dividend Q3 Estimate	$0.29	$0.34	$0.20	$0.17	$0.07	$0.18
YEAR 2007	Dividend Q4 Estimate	$0.29	$0.34	$0.20	$0.17	$0.07	$0.18
YEAR 2008	Dividend Q1 Estimate	$0.30	$0.35	$0.20	$0.17	$0.06	$0.19
YEAR 2008	Dividend Q2 Estimate	$0.30	$0.35	$0.20	$0.18	$0.06	$0.19
YEAR 2008	Dividend Q3 Estimate	$0.30	$0.36	$0.21	$0.18	$0.06	$0.19
YEAR 2008	Dividend Q4 Estimate	$0.31	$0.36	$0.21	$0.19	$0.06	$0.20
YEAR 2009	Dividend Q1 Estimate	$0.31	$0.37	$0.21	$0.19	$0.06	$0.20
YEAR 2009	Dividend Q2 Estimate	$0.31	$0.37	$0.21	$0.20	$0.06	$0.21
YEAR 2009	Dividend Q3 Estimate	$0.32	$0.38	$0.21	$0.20	$0.06	$0.21
YEAR 2009	Dividend Q4 Estimate	$0.32	$0.38	$0.21	$0.21	$0.06	$0.22
YEAR 2010	Dividend Q1 Estimate	$0.32	$0.39	$0.21	$0.21	$0.06	$0.22
YEAR 2010	Dividend Q2 Estimate	$0.33	$0.39	$0.21	$0.21	$0.06	$0.22
YEAR 2010	Dividend Q3 Estimate	$0.34	$0.40	$0.22	$0.22	$0.07	$0.23
YEAR 2010	Dividend Q4 Estimate	$0.34	$0.40	$0.22	$0.22	$0.07	$0.23
YEAR 2011	Dividend Q1 Estimate	$0.35	$0.41	$0.22	$0.23	$0.07	$0.23
YEAR 2011	Dividend Q2 Estimate	$0.35	$0.42	$0.23	$0.23	$0.07	$0.24
YEAR 2011	Dividend Q3 Estimate	$0.36	$0.42	$0.23	$0.24	$0.07	$0.24
YEAR 2011	Dividend Q4 Estimate	$0.36	$0.43	$0.23	$0.24	$0.07	$0.25
YEAR 2012	Dividend Q1 Estimate	$0.37	$0.43	$0.24	$0.25	$0.07	$0.25
YEAR 2012	Dividend Q2 Estimate	$0.37	$0.44	$0.24	$0.25	$0.07	$0.25
YEAR 2012	Dividend Q3 Estimate	$0.38	$0.45	$0.24	$0.26	$0.07	$0.26
YEAR 2012	Dividend Q4 Estimate	$0.39	$0.45	$0.25	$0.26	$0.08	$0.26
YEAR 2013	Dividend Q1 Estimate	$0.39	$0.46	$0.25	$0.27	$0.08	$0.26
YEAR 2013	Dividend Q2 Estimate	$0.40	$0.47	$0.25	$0.27	$0.08	$0.27
YEAR 2013	Dividend Q3 Estimate	$0.40	$0.47	$0.26	$0.28	$0.08	$0.27
YEAR 2013	Dividend Q4 Estimate	$0.41	$0.48	$0.26	$0.28	$0.08	$0.28
YEAR 2014	Dividend Q1 Estimate	$0.41	$0.48	$0.26	$0.28	$0.08	$0.28
YEAR 2014	Dividend Q2 Estimate	$0.42	$0.49	$0.27	$0.29	$0.08	$0.28
YEAR 2014	Dividend Q3 Estimate	$0.43	$0.50	$0.27	$0.29	$0.08	$0.29
YEAR 2014	Dividend Q4 Estimate	$0.43	$0.50	$0.27	$0.30	$0.08	$0.29
YEAR 2015	Dividend Q1 Estimate	$0.44	$0.51	$0.28	$0.30	$0.09	$0.29
YEAR 2015	Dividend Q2 Estimate	$0.44	$0.52	$0.28	$0.30	$0.09	$0.30
YEAR 2015 Q2	Year 10 Stock Price	$44.48	$58.62	$30.79	$43.44	$18.73	$33.66
	Trial COE - Quarterly Rate	2.3%	2.2%	2.2%	2.0%	1.8%	2.2%
	Trial COE - Annual Rate	9.6%	9.1%	9.2%	8.3%	7.3%	9.1%
	Cost of Equity	9.6%	9.1%	9.2%	8.3%	7.3%	9.1%
	(Trial COE - COE) x 100	0.00	0.00	0.00	0.00	0.00	0.00

Sources and Notes:

All Growth Rate Estimates: Table No. MJV-6; Panel B.

Stock Prices and Dividends are from Compustat as of April 2005.

1. See Workpaper #1 to Table No. MJV-6 for the average closing stock price obtained from Compustat.
2. See Workpaper #2 to Table No. MJV-6 for the for the quarterly dividend obtained from Compustat.
3. The Blue Chip Long-Term GDP Growth Rate is used to calculate the Year 10 Stock Price.

{(the Dividend Year 2015 Q2 Estimate) x ((1 + the Perpetual Growth Rate) ^ (1/4))} /

{(Trial COE - Quarterly Rate) - ((1 + the Perpetual Growth Rate) ^ (1/4) -1)}.

Table No. MJV-7

Overall Cost of Capital of the 2004 Water Utility Sample

Panel A: Simple DCF Method (Quarterly)

Company	1st Quarter, 2005 Bond Rating [1]	1st Quarter, 2005 Preferred Equity Rating [2]	DCF Cost of Equity [3]	DCF Common Equity to Market Value Ratio [4]	Cost of Preferred Equity [5]	DCF Preferred Equity to Market Value Ratio [6]	Cost of Debt [7]	DCF Debt to Market Value Ratio [8]	Arizona-America Water Company's Income Tax Rate [9]	Overall After- Tax Cost of Capital [10]
American States Water Co	A	n/a	11.0%	0.56	n/a	-	5.6%	0.44	39.5%	7.6%
California Water Service Gp	A	A	9.9%	0.69	6.3%	0.00	5.6%	0.31	39.5%	7.9%
Middlesex Water Cc	A	A	10.0%	0.61	6.3%	0.01	5.6%	0.38	39.5%	7.5%
Aqua America Inc	A	n/a	12.4%	0.72	n/a	-	5.6%	0.28	39.5%	9.9%
Southwest Water Co	A	A	9.5%	0.64	6.3%	0.00	5.6%	0.36	39.5%	7.3%
York Water Co	A	n/a	10.5%	0.72	n/a	-	5.6%	0.28	39.5%	8.5%
Average [a]			10.5%	0.66	6.3%	0.00	5.6%	0.34	39.5%	8.1%
Average [b]			10.8%	0.64	6.3%	0.00	5.6%	0.35	39.5%	8.2%

Sources and Notes:

[1]: Moodys.com, Standardandpoors.com as of April 2005.
Southwest Water Co's rating is assumed.

[2]: Assumed to be the same as [1] if the company issues preferred equity.

[3]: Table No. MJV-6; Panel A, [6].

[4]: Table No. MJV-4, [1].

[5]: Mergent Bond Record, March 2005.

[6]: Table No. MJV-4, [2].

[7]: Mergent Bond Record, March 2005.

[9]: Federal Tax Rate + (1-Federal Tax Rate) x Arizona State Tax Rate: {35% + (1 - 35%) x 6.968%}.
Arizona State Tax Rate from http://www.taxadmin.org/fta/rate/corp_inc.html.

[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}.

[a]: Average over all companies.

[b]: Average excluding Southwest Water Co and York Water Co because
Southwest Water Co has only 37% of revenues from regulated activities, and York Water Co does not have a substantial amount of historical data.

Table No. MJV-7

Overall Cost of Capital of the 2004 Water Utility Sample

Panel B: Multi-Stage DCF (Using the Blue-Chip Long-Term GDP Growth Forecast as the Perpetual Rate)

Company	1st Quarter, 2005 Bond Rating [1]	1st Quarter, 2005 Preferred Equity Rating [2]	DCF Cost of Equity [3]	DCF Common Equity to Market Value Ratio [4]	Cost of Preferred Equity [5]	DCF Preferred Equity to Market Value Ratio [6]	Cost of Debt [7]	DCF Debt to Market Value Ratio [8]	Arizona-America Water Company's Income Tax Rate [9]	Overall After- Tax Cost of Capital [10]
American States Water Co	A	n/a	9.6%	0.56	n/a	-	5.6%	0.44	39.5%	6.8%
California Water Service Gp	A	A	9.1%	0.69	6.3%	0.00	5.6%	0.31	39.5%	7.3%
Middlesex Water Co	A	A	9.2%	0.61	6.3%	0.01	5.6%	0.38	39.5%	7.0%
Aqua America Inc	A	n/a	8.3%	0.72	n/a	-	5.6%	0.28	39.5%	6.9%
Southwest Water Co	A	A	7.3%	0.64	6.3%	0.00	5.6%	0.36	39.5%	5.9%
York Water Co	A	n/a	9.1%	0.72	n/a	-	5.6%	0.28	39.5%	7.5%
Average [a]			8.7%	0.66	6.3%	0.00	5.6%	0.34	39.5%	6.9%
Average [b]			9.0%	0.64	6.3%	0.00	5.6%	0.35	39.5%	7.0%

Sources and Notes:

[1]: Moodys.com, Standardandpoors.com as of April 2005.
Southwest Water Co's rating is assumed.
[2]: Assumed to be the same as [1] if the company issues preferred equity.
[3]: Table No. MJV-6; Panel A, [6].
[4]: Table No. MJV-4, [1].
[5]: Mergent Bond Record, March 2005.
[6]: Table No. MJV-4, [2].
[7]: Mergent Bond Record, March 2005.
[8]: Table No. MJV-4, [3].
[9]: Federal Tax Rate + (1-Federal Tax Rate) x Arizona State Tax Rate: {35% + (1 - 35%) x 6.968%}.
Arizona State Tax Rate from http://www.taxadmin.org/fta/rate/corp_inc.html.
[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}.

[a]: Average over all companies.
[b]: Average excluding Southwest Water Co and York Water Co because
Southwest Water Co has only 37% of revenues from regulated activities, and York Water Co

does not have a substantial amount of historical data.

Table No. MJV-8

DCF Cost of Equity at Paradise Valley Water Company's Capital Structure

2004 Water Utility Sample Return on Equity at the Company's Regulatory Capital Structure

	Overall Cost of Capital [1]	Paradise Valley Water Company's Regulatory % Long-Term Debt [2]	Paradise Valley Water Company's Cost of Long-Term Debt [3]	Arizona-America Water Company's Income Tax Rate [4]	Paradise Valley Water Company's Regulatory % Equity [5]	Estimated Return on Equity [6]
Average over all companies:						
Simple DCF Quarterly	8.1%	0.63	5.6%	39.5%	0.37	16.2%
Multi-Stage DCF - Using the Blue-Chip Long-Term GDP Growth Forecast as the Perpetual Rate	6.9%	0.63	5.6%	39.5%	0.37	12.9%
Average excluding Southwest Water Co and York Water Co:						
Simple DCF Quarterly	8.2%	0.63	5.6%	39.5%	0.37	16.5%
Multi-Stage DCF - Using the Blue-Chip Long-Term GDP Growth Forecast as the Perpetual Rate	7.0%	0.63	5.6%	39.5%	0.37	13.2%

Sources and Notes:
[1]: Table No. MJV-7; Panels A - B, [10].
[2] and [5]: Paradise Valley Water Company.
[3]: Workpaper #2 to Table No. MJV-10; Panel A. Based on an A rating.
[4]: Federal Tax Rate + (1-Federal Tax Rate) x Arizona State Tax Rate: {35% + (1 - 35%) x 6.968%}.
Arizona State Tax Rate from http://www.taxadmin.org/fta/rate/corp_inc.html.
[6]: {[1] - ([2] x [3] x (1 - [4]))} / [5].

Table No. MJV-9

Risk Positioning Cost of Equity of the 2004 Water Utility Sample

Panel A: Using Unadjusted Value Line Betas and the Long-Term Risk-Free Rate

	Long-Term Risk-Free Rate [1]	Unadjusted Beta on Market [2]	Long-Term Market Risk Premium [3]	CAPM Cost of Equity [4]	ECAPM (0.5%) Cost of Equity [5]	ECAPM (1.5%) Cost of Equity [6]
American States Water Co	5.0%	0.52	6.5%	8.4%	8.6%	9.1%
California Water Service Gp	5.0%	0.60	6.5%	8.9%	9.1%	9.5%
Connecticut Water Svc Inc	5.0%	0.45	6.5%	7.9%	8.2%	8.7%
Middlesex Water Co	5.0%	0.45	6.5%	7.9%	8.2%	8.7%
Aqua America Inc	5.0%	0.60	6.5%	8.9%	9.1%	9.5%
SJW Corp	5.0%	0.30	6.5%	6.9%	7.3%	8.0%
Southwest Water Co	5.0%	0.45	6.5%	7.9%	8.2%	8.7%
York Water Co	5.0%	0.30	6.5%	6.9%	7.3%	8.0%
Average [a]	5.0%	0.46	6.5%	8.0%	8.2%	8.8%
Average [b]	5.0%	0.49	6.5%	8.2%	8.4%	8.9%

Sources and Notes:

[1]: Table No. MJV-12; Panel A.

[2]: Workpaper # 1 to Table No. MJV-9.

[3]: MJV Written Testimony, Appendix B.

[4]: [1] + ([2] x [3]).

[5]: ([1] + 0.5%) + [2] x ([3] - 0.5%).

[6]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

[a]: Average over all companies.

[b]: Average excluding Southwest Water Co and York Water Co because Southwest Water Co has only 37% of revenues from regulated activities, and York Water Co does not have a substantial amount of historical data.

Table No. MJV-9

Risk Positioning Cost of Equity of the 2004 Water Utility Sample

Panel B: Using Unadjusted Value Line Betas and the Short-Term Risk-Free Rate

Company	Short-Term Risk-Free Rate [1]	Unadjusted Beta on Market [2]	Short-Term Market Risk Premium [3]	CAPM Cost of Equity [4]	ECAPM (1%) Cost of Equity [5]	ECAPM (2%) Cost of Equity [6]	ECAPM (3%) Cost of Equity [7]
American States Water Co	3.0%	0.52	8.0%	7.2%	7.7%	8.1%	8.6%
California Water Service Gp	3.0%	0.60	8.0%	7.8%	8.2%	8.6%	9.0%
Connecticut Water Svc Inc	3.0%	0.45	8.0%	6.6%	7.1%	7.7%	8.2%
Middlesex Water Co	3.0%	0.45	8.0%	6.6%	7.1%	7.7%	8.2%
Aqua America Inc	3.0%	0.60	8.0%	7.8%	8.2%	8.6%	9.0%
SJW Corp	3.0%	0.30	8.0%	5.4%	6.1%	6.8%	7.5%
Southwest Water Co	3.0%	0.45	8.0%	6.6%	7.1%	7.7%	8.2%
York Water Co	3.0%	0.30	8.0%	5.4%	6.1%	6.8%	7.5%
Average [a]	3.0%	0.46	8.0%	6.7%	7.2%	7.7%	8.3%
Average [b]	3.0%	0.52	8.0%	7.2%	7.7%	8.1%	8.6%

Sources and Notes:
[1]: Table No. MJV-12; Panel A.
[2]: Workpaper # 1 to Table No. MJV-9.
[3]: MJV Written Testimony, Appendix B.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1%) + [2] x ([3] - 1%).
[6]: ([1] + 2%) + [2] x ([3] - 2%).
[7]: ([1] + 3%) + [2] x ([3] - 3%).

[a]: Average over all companies.
[b]: Average ofcompanies with *cost of equity is greater than their cost of debt plus 25 basis point* and excluding Southwest Water Co and York Water Co because Southwest Water Co has only 37% of revenues from regulated activities, and York Water Co does not have a substantial amount of historical data.

Workpaper # 1 to Table No. MJV-9

2004 Water Utility Sample

Value Line Betas

Company	Beta as of January 28, 2005 [1]	Unadjusted Beta [2]	Beta as of January 30, 2004 [3]
American States Water Co	0.70	0.52	0.65
California Water Service Gp	0.75	0.60	0.65
Connecticut Water Svc Inc	0.65	0.45	0.60
Middlesex Water Co	0.65	0.45	0.55
Aqua America Inc	0.75	0.60	0.75
SJW Corp	0.55	0.30	0.55
Southwest Water Co	0.65	0.45	0.60
York Water Co	0.55	0.30	0.55

Sources and Notes:

[1]: Value Line beta as of January 28, 2005.

[2]: The reported beta in [1] by *Value Line* is unadjusted using the formula: ([1] - .35) / .67.

[3]: Value Line beta as of January 30, 2004.

Workpaper # 2 to Table No. MJV-9

2004 Water Utility Sample

52-Week Regression Statistics for Week Ending on 4/13/2005

Company	American States Water Co	California Water Service Gp	Connecticut Water Svc Inc	Middlesex Water Co	Aqua America Inc	Sjw Corp	Southwest Water Co	York Water Co	Average	Water Sample Portfolio
Beta	1.04	1.21	1.44	0.97	0.96	1.83	0.29	0.33	**1.01**	1.01
St. Dev	0.28	0.35	0.32	0.29	0.23	0.33	0.30	0.23	**0.29**	0.15
T-Stat	3.75	3.48	4.52	3.42	4.13	5.51	0.95	1.45	**3.47**	6.53

Sources and Notes:
Compustat as of April 2005.
Risk-free rate taken from the St. Louis Federal Reserve Bank.
Regression in Question:
(Company Returns - Risk-Free Rate) = Intercept + Beta (S&P 500 Returns - Risk-Free Rate).
Weekly data set is constructed using closing prices as of Wednesday, if available. If not available, Tuesday's closing price was taken.
The week including September 11, 2001 was excluded from this analysis.

Table No. MJV-10

Overall Cost of Capital of the 2004 Water Utility Sample

Panel A: CAPM Cost of Equity Based on Unadjusted Value Line Betas and a Long-Term Risk-Free Rate

Company	CAPM Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	Weighted - Average Cost of Preferred Equity [3]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted - Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	Arizona-America Water Company's Income Tax Rate [7]	Overall After- Tax Cost of Capital [8]
American States Water Co	8.4%	0.56	6.3%	0.00	5.6%	0.44	39.5%	6.2%
California Water Service Gp	8.9%	0.64	6.2%	0.00	5.6%	0.36	39.5%	6.9%
Connecticut Water Svc Inc	7.9%	0.74	6.3%	0.00	5.6%	0.25	39.5%	6.8%
Middlesex Water Co	7.9%	0.64	6.3%	0.01	5.6%	0.34	39.5%	6.3%
Aqua America Inc	8.9%	0.70	6.3%	0.00	5.6%	0.30	39.5%	7.2%
SJW Corp	6.9%	0.70	n/a	-	5.6%	0.30	39.5%	5.9%
Southwest Water Co	7.9%	0.66	6.3%	0.00	5.6%	0.34	39.5%	6.4%
York Water Co	6.9%	0.71	n/a	-	5.6%	0.29	39.5%	5.9%
Average [a]	8.0%	0.67	6.3%	0.00	5.6%	0.33	39.5%	6.4%
Average [b]	8.2%	0.66	6.3%	0.00	5.6%	0.33	39.5%	6.5%

Sources and Notes:

[1]: Table No. MJV-9; Panel A, [4].
[2]: Table No. MJV-4, [4].
[3]: Workpaper #2 to Table No. MJV-10; Panel B, [8].
[4]: Table No. MJV-4, [5].
[5]: Workpaper #2 to Table No. MJV-10; Panel A, [8].
[6]: Table No. MJV-4, [6].
[7]: Federal Tax Rate + (1-Federal Tax Rate) x Arizona State Tax Rate: {35% + (1 - 35%) x 6.968%}.
Arizona State Tax Rate from http://www.taxadmin.org/fta/rate/corp_inc.html.
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

[a]: Average over all companies.
[b]: Average excluding Southwest Water Co and York Water Co because Southwest Water Co has only 37% of revenues from regulated activities, and York Water Co does not have a substantial amount of historical data.

Table No. MJV-10

Overall Cost of Capital of the 2004 Water Utility Sample

Panel B: ECAPM (0.5%) Cost of Equity Based on Unadjusted Value Line Betas and a Long-Term Risk-Free Rate

Company	ECAPM (0.5%) Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	Weighted - Average Cost of Preferred Equity [3]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted - Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	Arizona-America Water Company's Income Tax Rate [7]	Overall After- Tax Cost of Capital [8]
American States Water Co	8.6%	0.56	6.3%	0.00	5.6%	0.44	39.5%	6.3%
California Water Service Gp	9.1%	0.64	6.2%	0.00	5.6%	0.36	39.5%	7.0%
Connecticut Water Svc Inc	8.2%	0.74	6.3%	0.00	5.6%	0.25	39.5%	7.0%
Middlesex Water Co	8.2%	0.64	6.3%	0.01	5.6%	0.34	39.5%	6.5%
Aqua America Inc	9.1%	0.70	6.3%	0.00	5.6%	0.30	39.5%	7.4%
SJW Corp	7.3%	0.70	n/a	-	5.6%	0.30	39.5%	6.1%
Southwest Water Co	8.2%	0.66	6.3%	0.00	5.6%	0.34	39.5%	6.5%
York Water Co	7.3%	0.71	n/a	-	5.6%	0.29	39.5%	6.2%
Average [a]	8.2%	0.67	6.3%	0.00	5.6%	0.33	39.5%	6.6%
Average [b]	8.4%	0.66	6.3%	0.00	5.6%	0.33	39.5%	6.7%

Sources and Notes:

[1]: Table No. MJV-9; Panel A, [5].
[2]: Table No. MJV-4, [4].
[3]: Workpaper #2 to Table No. MJV-10; Panel B, [8].
[4]: Table No. MJV-4, [5].
[5]: Workpaper #2 to Table No. MJV-10; Panel A, [8].
[6]: Table No. MJV-4, [6].
[7]: Federal Tax Rate + (1-Federal Tax Rate) x Arizona State Tax Rate: {35% + (1 - 35%) x 6.968%}.
Arizona State Tax Rate from http://www.taxadmin.org/fta/rate/corp_inc.html.
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

[a]: Average over all companies.
[b]: Average excluding Southwest Water Co and York Water Co because Southwest Water Co has only 37% of revenues from regulated activities, and York Water Co does not have a substantial amount of historical data.

Table No. MJV-10

Overall Cost of Capital of the 2004 Water Utility Sample

Panel C: ECAPM (1.5%) Cost of Equity Based on Unadjusted Value Line Betas and a Long-Term Risk-Free Rate

Company	ECAPM (1.5%) Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	Weighted - Average Cost of Preferred Equity [3]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted - Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	Arizona-America Water Company's Income Tax Rate [7]	Overall After- Tax Cost of Capital [8]
American States Water Co	9.1%	0.56	6.3%	0.00	5.6%	0.44	39.5%	6.6%
California Water Service Gp	9.5%	0.64	6.2%	0.00	5.6%	0.36	39.5%	7.3%
Connecticut Water Svc Inc	8.7%	0.74	6.3%	0.00	5.6%	0.25	39.5%	7.4%
Middlesex Water Co	8.7%	0.64	6.3%	0.01	5.6%	0.34	39.5%	6.9%
Aqua America Inc	9.5%	0.70	6.3%	0.00	5.6%	0.30	39.5%	7.6%
SJW Corp	8.0%	0.70	n/a	-	5.6%	0.30	39.5%	6.6%
Southwest Water Co	8.7%	0.66	6.3%	0.00	5.6%	0.34	39.5%	6.9%
York Water Co	8.0%	0.71	n/a	-	5.6%	0.29	39.5%	6.7%
Average [a]	8.8%	0.67	6.3%	0.00	5.6%	0.33	39.5%	7.0%
Average [b]	8.9%	0.66	6.3%	0.00	5.6%	0.33	39.5%	7.1%

Sources and Notes:

[1]: Table No. MJV-9; Panel A, [6].
[2]: Table No. MJV-4, [4].
[3]: Workpaper #2 to Table No. MJV-10; Panel B, [8].
[4]: Table No. MJV-4, [5].
[5]: Workpaper #2 to Table No. MJV-10; Panel A, [8].
[6]: Table No. MJV-4, [6].
[7]: Federal Tax Rate + (1-Federal Tax Rate) x Arizona State Tax Rate: {35% + (1 - 35%) x 6.968%}.
Arizona State Tax Rate from http://www.taxadmin.org/fta/rate/corp_inc.html.
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

[a]: Average over all companies.
[b]: Average excluding Southwest Water Co and York Water Co because
Southwest Water Co has only 37% of revenues from regulated activities, and York Water Co does not have a substantial amount of historical data.

Table No. MJV-10

Overall Cost of Capital of the 2004 Water Utility Sample

Panel D: CAPM Cost of Equity Based on Unadjusted Value Line Betas and a Short-Term Risk-Free Rate

Company	CAPM Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	Weighted - Average Cost of Preferred Equity [3]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted - Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	Arizona-America Water Company's Income Tax Rate [7]	Overall After- Tax Cost of Capital [8]
American States Water Co	7.2%	0.56	6.3%	0.00	5.6%	0.44	39.5%	5.5%
California Water Service Gp	7.8%	0.64	6.2%	0.00	5.6%	0.36	39.5%	6.2%
Connecticut Water Svc Inc	6.6%	0.74	6.3%	0.00	5.6%	0.25	39.5%	5.8%
Middlesex Water Co	6.6%	0.64	6.3%	0.01	5.6%	0.34	39.5%	5.5%
Aqua America Inc	7.8%	0.70	6.3%	0.00	5.6%	0.30	39.5%	6.4%
SJW Corp	5.4%	0.70	n/a	-	5.6%	0.30	39.5%	4.8%
Southwest Water Co	6.6%	0.66	6.3%	0.00	5.6%	0.34	39.5%	5.5%
York Water Co	5.4%	0.71	n/a	-	5.6%	0.29	39.5%	4.8%
Average [a]	6.7%	0.67	6.3%	0.00	5.6%	0.33	39.5%	5.6%
Average [b]	7.2%	0.65	6.3%	0.00	5.6%	0.34	39.5%	5.9%

Sources and Notes:

[1]: Table No. MJV-9; Panel B, [4].

[2]: Table No. MJV-4, [4].

[3]: Workpaper #2 to Table No. MJV-10; Panel B, [8].

[4]: Table No. MJV-4, [5].

[5]: Workpaper #2 to Table No. MJV-10; Panel A, [8].

[6]: Table No. MJV-4, [6].

[7]: Federal Tax Rate + (1-Federal Tax Rate) x Arizona State Tax Rate: {35% + (1 - 35%) x 6.968%}.
Arizona State Tax Rate from http://www.taxadmin.org/fta/rate/corp_inc.html.

[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

[a]: Average over all companies.

[b]: Average ofcompanies with cost of equity is greater than their cost of debt plus 25 basis point and excluding Southwest Water Co and York Water Co because Southwest Water Co has only 37% of revenues from regulated activities, and York Water Co does not have a substantial amount of historical data.

Table No. MJV-10

Overall Cost of Capital of the 2004 Water Utility Sample

Panel E: ECAPM (1%) Cost of Equity Based on Unadjusted Value Line Betas and a Short-Term Risk-Free Rate

Company	ECAPM (1%) Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	Weighted - Average Cost of Preferred Equity [3]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted - Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	Arizona-America Water Company's Income Tax Rate [7]	Overall After- Tax Cost of Capital [8]
American States Water Co	7.7%	0.56	6.3%	0.00	5.6%	0.44	39.5%	5.8%
California Water Service Gp	8.2%	0.64	6.2%	0.00	5.6%	0.36	39.5%	6.4%
Connecticut Water Svc Inc	7.1%	0.74	6.3%	0.00	5.6%	0.25	39.5%	6.2%
Middlesex Water Co	7.1%	0.64	6.3%	0.01	5.6%	0.34	39.5%	5.8%
Aqua America Inc	8.2%	0.70	6.3%	0.00	5.6%	0.30	39.5%	6.7%
SJW Corp	6.1%	0.70	n/a	-	5.6%	0.30	39.5%	5.3%
Southwest Water Co	7.1%	0.66	6.3%	0.00	5.6%	0.34	39.5%	5.9%
York Water Co	6.1%	0.71	n/a	-	5.6%	0.29	39.5%	5.3%
Average [a]	7.2%	0.67	6.3%	0.00	5.6%	0.33	39.5%	5.9%
Average [b]	7.7%	0.65	6.3%	0.00	5.6%	0.34	39.5%	6.2%

Sources and Notes:

[1]: Table No. MJV-9; Panel B, [5].
[2]: Table No. MJV-4, [4].
[3]: Workpaper #2 to Table No. MJV-10; Panel B, [8].
[4]: Table No. MJV-4, [5].
[5]: Workpaper #2 to Table No. MJV-10; Panel A, [8].
[6]: Table No. MJV-4, [6].
[7]: Federal Tax Rate + (1-Federal Tax Rate) x Arizona State Tax Rate: {35% + (1 - 35%) x 6.968%}.
Arizona State Tax Rate from http://www.taxadmin.org/fta/rate/corp_inc.html.
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

[a]: Average over all companies.
[b]: Average ofcompanies with cost of equity is greater than their cost of debt plus 25 basis point and excluding Southwest Water Co and York Water Co because Southwest Water Co has only 37% of revenues from regulated activities, and York Water Co does not have a substantial amount of historical data.

Table No. MJV-10

Overall Cost of Capital of the 2004 Water Utility Sample

Panel F: ECAPM (2%) Cost of Equity Based on Unadjusted Value Line Betas and a Short-Term Risk-Free Rate

Company	ECAPM (2%) Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	Weighted - Average Cost of Preferred Equity [3]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted - Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	Arizona-America Water Company's Income Tax Rate [7]	Overall After- Tax Cost of Capital [8]
American States Water Co	8.1%	0.56	6.3%	0.00	5.6%	0.44	39.5%	6.0%
California Water Service Gp	8.6%	0.64	6.2%	0.00	5.6%	0.36	39.5%	6.7%
Connecticut Water Svc Inc	7.7%	0.74	6.3%	0.00	5.6%	0.25	39.5%	6.6%
Middlesex Water Co	7.7%	0.64	6.3%	0.01	5.6%	0.34	39.5%	6.2%
Aqua America Inc	8.6%	0.70	6.3%	0.00	5.6%	0.30	39.5%	7.0%
SJW Corp	6.8%	0.70	n/a	-	5.6%	0.30	39.5%	5.8%
Southwest Water Co	7.7%	0.66	6.3%	0.00	5.6%	0.34	39.5%	6.2%
York Water Co	6.8%	0.71	n/a	-	5.6%	0.29	39.5%	5.8%
Average [a]	7.7%	0.67	6.3%	0.00	5.6%	0.33	39.5%	6.3%
Average [b]	8.1%	0.65	6.3%	0.00	5.6%	0.34	39.5%	6.5%

Sources and Notes:

[1]: Table No. MJV-9; Panel B, [6].

[2]: Table No. MJV-4, [4].

[3]: Workpaper #2 to Table No. MJV-10; Panel B, [8].

[4]: Table No. MJV-4, [5].

[5]: Workpaper #2 to Table No. MJV-10; Panel A, [8].

[6]: Table No. MJV-4, [6].

[7]: Federal Tax Rate + (1-Federal Tax Rate) x Arizona State Tax Rate: {35% + (1 - 35%) x 6.968%}.
Arizona State Tax Rate from http://www.taxadmin.org/fta/rate/corp_inc.html.

[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

[a]: Average over all companies.

[b]: Average ofcompanies with cost of equity is greater than their cost of debt plus 25 basis point and excluding Southwest Water Co and York Water Co because Southwest Water Co has only 37% of revenues from regulated activities, and York Water Co does not have a substantial amount of historical data.

Table No. MJV-10

Overall Cost of Capital of the 2004 Water Utility Sample

Panel G: ECAPM (3%) Cost of Equity Based on Unadjusted Value Line Betas and a Short-Term Risk-Free Rate

Company	ECAPM (3%) Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	Weighted - Average Cost of Preferred Equity [3]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted - Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	Arizona-America Water Company's Income Tax Rate [7]	Overall After- Tax Cost of Capital [8]
American States Water Co	8.6%	0.56	6.3%	0.00	5.6%	0.44	39.5%	6.3%
California Water Service Gp	9.0%	0.64	6.2%	0.00	5.6%	0.36	39.5%	7.0%
Connecticut Water Svc Inc	8.2%	0.74	6.3%	0.00	5.6%	0.25	39.5%	7.0%
Middlesex Water Co	8.2%	0.64	6.3%	0.01	5.6%	0.34	39.5%	6.5%
Aqua America Inc	9.0%	0.70	6.3%	0.00	5.6%	0.30	39.5%	7.3%
SJW Corp	7.5%	0.70	n/a	-	5.6%	0.30	39.5%	6.2%
Southwest Water Co	8.2%	0.66	6.3%	0.00	5.6%	0.34	39.5%	6.6%
York Water Co	7.5%	0.71	n/a	-	5.6%	0.29	39.5%	6.3%
Average [a]	8.3%	0.67	6.3%	0.00	5.6%	0.33	39.5%	6.7%
Average [b]	8.6%	0.65	6.3%	0.00	5.6%	0.34	39.5%	6.8%

Sources and Notes:

[1]: Table No. MJV-9; Panel B, [7].
[2]: Table No. MJV-4, [4].
[3]: Workpaper #2 to Table No. MJV-10; Panel B, [8].
[4]: Table No. MJV-4, [5].
[5]: Workpaper #2 to Table No. MJV-10; Panel A, [8].
[6]: Table No. MJV-4, [6].
[7]: Federal Tax Rate + (1-Federal Tax Rate) x Arizona State Tax Rate: {35% + (1 - 35%) x 6.968%}.
Arizona State Tax Rate from http://www.taxadmin.org/fta/rate/corp_inc.html.
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

[a]: Average over all companies.
[b]: Average ofcompanies with cost of equity is greater than their cost of debt plus 25 basis point and excluding Southwest Water Co and York Water Co because Southwest Water Co has only 37% of revenues from regulated activities, and York Water Co does not have a substantial amount of historical data.

Workpaper #1 to Table No. MJV-10

2004 Water Utility Sample

Panel A: Bond Rating Summary from 2000 to 2004

Company	Year End 2004	Year End 2003	Year End 2002	Year End 2001	Year End 2000	Days at Rating			
						Aa	A	Baa	Total Days
American States Water Co	A	A	A	A	A	0	1827	0	1827
California Water Service Gp	A	A	A	Aa	Aa	1052	775	0	1827
Connecticut Water Svc Inc	A	A	A	A	A	0	1827	0	1827
Middlesex Water Co	A	A	A	A	A	0	1827	0	1827
Aqua America Inc	A	A	A	A	A	0	1827	0	1827
SJW Corp	A	A	A	A	A	0	1827	0	1827
Southwest Water Co	A	A	A	A	A	0	1827	0	1827
York Water Co	A	A	A	A	A	0	1827	0	1827

Sources and Notes:

Bond ratings for American States Water Co are obtained from www.moodys.com as of April 2005. They are the senior unsecured rating for the subsidiary Southern California Water Company.

Bond ratings for California Water Service Co are obtained from www.moodys.com as of April 2005. They are the first mortgage bond rating for said company.

Bond ratings for Connecticut Water Svc Inc are obtained from www.standardandpoors.com as of April 2005 from September 2003 onward. They are assumed to be the same from 2000 to August 2003.

Bond ratings for Middlesex Water Co are obtained from www.standardandpoors.com as of April 2005.

Bond ratings for Aqua America Inc are obtained from www.standardandpoors.com as of April 2005. They are the credit rating for the subsidiary Aqua Pennsylvania from January 2002 onward. They are assumed to be the same from 2000 to December 2001.

Bond ratings for SJW Corp are set equal to A as no rating information was found.

Bond rating for Southwest Water Co are set equal to A as no rating information was found.

Bond ratings for York Water Co are obtained from www.standardandpoors.com as of April 2005 from March 2004 onward. They are assumed to be the same from 2000 to February 2004.

Workpaper #1 to Table No. MJV-10

2004 Water Utility Sample

Panel B: Preferred Equity Rating Summary from 2000 to 2004

						Days at Rating			
Company	Year End 2004	Year End 2003	Year End 2002	Year End 2001	Year End 2000	Aa	A	Baa	Total Days
American States Water Co	n/a	n/a	n/a	A	A	0	731	0	731
California Water Service Gp	A	A	A	Aa	Aa	1052	775	0	1827
Connecticut Water Svc Inc	A	A	A	A	A	0	1827	0	1827
Middlesex Water Co	A	A	A	A	A	0	1827	0	1827
Aqua America Inc	n/a	n/a	A	A	A	0	1096	0	1096
SJW Corp	n/a	n/a	n/a	n/a	n/a	0	0	0	n/a
Southwest Water Co	A	A	A	A	A	0	1827	0	1827
York Water Co	n/a	n/a	n/a	n/a	n/a	0	0	0	n/a

Sources and Notes:

Preferred ratings are assumed to be equal to bond ratings.

The change date for American States Water Co is assumed to be 1/1/2002, and the change date for Aqua America Inc is assumed to be 1/1/2003.

Workpaper #2 to Table No. MJV-10

2004 Water Utility Sample

Panel A: Bond Yield Summary, 2000 to 2004

Company	% Days at Rating				Current Bond Yields			
	Aa [1]	A [2]	Baa [3]	Total [4]	Aa [5]	A [6]	Baa [7]	5-Year Weighted Average Bond Yield [8]
American States Water Co	0%	100%	0%	100%	5.55%	5.61%	5.76%	5.61%
California Water Service Gp	58%	42%	0%	100%	5.55%	5.61%	5.76%	5.58%
Connecticut Water Svc Inc	0%	100%	0%	100%	5.55%	5.61%	5.76%	5.61%
Middlesex Water Co	0%	100%	0%	100%	5.55%	5.61%	5.76%	5.61%
Aqua America Inc	0%	100%	0%	100%	5.55%	5.61%	5.76%	5.61%
SJW Corp	0%	100%	0%	100%	5.55%	5.61%	5.76%	5.61%
Southwest Water Co	0%	100%	0%	100%	5.55%	5.61%	5.76%	5.61%
York Water Co	0%	100%	0%	100%	5.55%	5.61%	5.76%	5.61%

Sources and Notes:
[1] - [3]: Calculated from Workpaper #1 to Table No. MJV-10; Panel A.
[4]: [1] + [2] + [3].
[5] - [7]: Mergent Bond Record, March 2005.
[8]: [1] x [5] + [2] x [6] + [3] x [7].

Workpaper #2 to Table No. MJV-10

2004 Water Utility Sample

Panel B: Preferred Equity Yield Summary, 2000 to 2004

Company	% Days at Rating				Preferred Equity Yields			
	Aa [1]	A [2]	Baa [3]	Total [4]	Aa [5]	A [6]	Baa [7]	5-Year Weighted Average Preferred Yield [8]
American States Water Co	0%	100%	0%	100%	6.22%	6.29%	6.36%	6.29%
California Water Service Gp	58%	42%	0%	100%	6.22%	6.29%	6.36%	6.25%
Connecticut Water Svc Inc	0%	100%	0%	100%	6.22%	6.29%	6.36%	6.29%
Middlesex Water Co	0%	100%	0%	100%	6.22%	6.29%	6.36%	6.29%
Aqua America Inc	0%	100%	0%	100%	6.22%	6.29%	6.36%	6.29%
SJW Corp	n/a	n/a	n/a	n/a	6.22%	6.29%	6.36%	n/a
Southwest Water Co	0%	100%	0%	100%	6.22%	6.29%	6.36%	6.29%
York Water Co	n/a	n/a	n/a	n/a	6.22%	6.29%	6.36%	n/a

Sources and Notes:
[1] - [3]: Calculated from Workpaper #1 to Table No. MJV-10; Panel B.
[4]: [1] + [2] + [3].
[5]: [6] - ([7] - [6]).
[6] - [7]: Mergent Bond Record, March 2005.
[8]: [1] x [5] + [2] x [6] + [3] x [7].

Table No. MJV-11

Risk Positioning Cost of Equity at Paradise Valley Water Company's Capital Structure

2004 Water Utility Sample Return on Equity at the Company's Regulatory Capital Structure

Panel A: 2004 Water Utility Sample
Using All Companies

	Overall Cost of Capital [1]	Paradise Valley Water Company's Regulatory % Long-Term Debt [2]	Paradise Valley Water Company's Cost of Long-Term Debt [3]	Arizona-America Water Company's Income Tax Rate [4]	Paradise Valley Water Company's Regulatory % Equity [5]	Estimated Return on Equity [6]
Using Long-Term Risk-Free rates:						
CAPM using Unadjusted Value Line Betas	6.4%	0.63	5.6%	39.5%	0.37	11.7%
ECAPM (0.5%) using Unadjusted Value Line Betas	6.6%	0.63	5.6%	39.5%	0.37	12.2%
ECAPM (1.5%) using Unadjusted Value Line Betas	7.0%	0.63	5.6%	39.5%	0.37	13.2%
Using Short-Term Risk-Free rates:						
CAPM using Unadjusted Value Line Betas	5.6%	0.63	5.6%	39.5%	0.37	9.3%
ECAPM (1.0%) using Unadjusted Value Line Betas	5.9%	0.63	5.6%	39.5%	0.37	10.3%
ECAPM (2.0%) using Unadjusted Value Line Betas	6.3%	0.63	5.6%	39.5%	0.37	11.3%
ECAPM (3.0%) using Unadjusted Value Line Betas	6.7%	0.63	5.6%	39.5%	0.37	12.3%

Sources and Notes:

[1]: Table No. MJV-10; Panels A - G, [8].

[2] and [5]: Paradise Valley Water Company.

[3]: Workpaper #2 to Table No. MJV-10, Panel A. Based on an A rating.

[4]: Federal Tax Rate + (1-Federal Tax Rate) x Arizona State Tax Rate: {35% + (1 - 35%) x 6.968%}.
Arizona State Tax Rate from http://www.taxadmin.org/fta/rate/corp_inc.html.

[6]: {[1] - ([2] x [3] x (1 - [4]))} / [5].

Table No. MJV-11

Risk Positioning Cost of Equity at Paradise Valley Water Company's Capital Structure

2004 Water Utility Sample Return on Equity at the Company's Regulatory Capital Structure

Panel B: 2004 Water Utility Sample

Using Companies With Cost of Equity Greater than Cost of Debt Plus 25 Basis Points and Excluding Southwest Water Co and York Water Co.

	Overall Cost of Capital [1]	Paradise Valley Water Company's Regulatory % Long-Term Debt [2]	Paradise Valley Water Company's Cost of Long-Term Debt [3]	Arizona-America Water Company's Income Tax Rate [4]	Paradise Valley Water Company's Regulatory % Equity [5]	Estimated Return on Equity [6]
Using Long-Term Risk-Free rates:						
CAPM using Unadjusted Value Line Betas	6.5%	0.63	5.6%	39.5%	0.37	12.0%
ECAPM (0.5%) using Unadjusted Value Line Betas	6.7%	0.63	5.6%	39.5%	0.37	12.4%
ECAPM (1.5%) using Unadjusted Value Line Betas	7.1%	0.63	5.6%	39.5%	0.37	13.4%
Using Short-Term Risk-Free rates:						
CAPM using Unadjusted Value Line Betas	5.9%	0.63	5.6%	39.5%	0.37	10.2%
ECAPM (1.0%) using Unadjusted Value Line Betas	6.2%	0.63	5.6%	39.5%	0.37	11.0%
ECAPM (2.0%) using Unadjusted Value Line Betas	6.5%	0.63	5.6%	39.5%	0.37	11.9%
ECAPM (3.0%) using Unadjusted Value Line Betas	6.8%	0.63	5.6%	39.5%	0.37	12.7%

Sources and Notes:

[1]: Table No. MJV-10; Panels A - G, [8].

[2] and [5]: Paradise Valley Water Company.

[3]: Workpaper #2 to Table No. MJV-10, Panel A. Based on an A rating.

[4]: Federal Tax Rate + (1-Federal Tax Rate) x Arizona State Tax Rate: {35% + (1 - 35%) x 6.968%}.
Arizona State Tax Rate from http://www.taxadmin.org/fta/rate/corp_inc.html.

[6]: {[1] - ([2] x [3] x (1 - [4]))} / [5].

Table No. MJV-12

Panel A: US Interest Rate Series (All Constant Maturity Series)

Trade Date	30 Day	90 Day	180 Day	1 Year	2 Year	3 Year	5 Year	7 Year	10 Year	Long Term
2005-03-28	2.69%	2.84%	3.19%	3.43%	3.90%	4.09%	4.33%	4.48%	4.64%	5.01%
2005-03-29	2.70%	2.84%	3.17%	3.41%	3.87%	4.05%	4.30%	4.44%	4.60%	4.98%
2005-03-30	2.71%	2.83%	3.15%	3.39%	3.86%	4.03%	4.26%	4.40%	4.56%	4.93%
2005-03-31	2.63%	2.79%	3.13%	3.35%	3.80%	3.96%	4.18%	4.33%	4.50%	4.88%
2005-04-01	2.66%	2.80%	3.13%	3.34%	3.75%	3.90%	4.13%	4.29%	4.46%	4.85%
2005-04-04	2.64%	2.80%	3.14%	3.34%	3.74%	3.90%	4.13%	4.30%	4.47%	4.84%
2005-04-05	2.63%	2.79%	3.13%	3.34%	3.75%	3.91%	4.15%	4.31%	4.48%	4.87%
2005-04-06	2.60%	2.76%	3.11%	3.31%	3.70%	3.86%	4.09%	4.26%	4.44%	4.85%
2005-04-07	2.61%	2.77%	3.12%	3.32%	3.72%	3.89%	4.13%	4.30%	4.49%	4.90%
2005-04-08	2.61%	2.79%	3.14%	3.35%	3.77%	3.94%	4.17%	4.32%	4.50%	4.88%
2005-04-11	2.60%	2.76%	3.17%	3.37%	3.75%	3.91%	4.13%	4.28%	4.45%	4.84%
2005-04-12	2.62%	2.76%	3.16%	3.34%	3.71%	3.85%	4.05%	4.20%	4.38%	4.78%
2005-04-13	2.62%	2.77%	3.15%	3.32%	3.66%	3.83%	4.03%	4.20%	4.38%	4.80%
2005-04-14	2.62%	2.78%	3.14%	3.30%	3.60%	3.76%	3.99%	4.17%	4.37%	4.80%
2005-04-15	2.63%	2.79%	3.12%	3.26%	3.54%	3.68%	3.90%	4.09%	4.27%	4.73%
Average	2.64%	2.79%	3.14%	3.34%	3.74%	3.90%	4.13%	4.29%	4.47%	4.86%

Sources and Notes:
St. Louis Federal Bank.

Table No. MJV-12

Panel B: Spread Between Moody's Corporate Yields and US Long-Term Government Yields (%)

Month	US LT Gov't Bond Yield [1]	Moody's Aaa Corporate Bond Yield [2]	Moody's Aa Corporate Bond Yield [3]	Moody's A Corporate Bond Yield [4]	Moody's Baa Corporate Bond Yield [5]	Spread (Corporate Aaa - LT Gov't) [6]	Spread (Corporate Aa - LT Gov't) [7]	Spread (Corporate A - LT Gov't) [8]	Spread (Corporate Baa - LT Gov't) [9]	Cumulative Mean (Corporate Aaa - LT Gov't Spread) [10]	Cumulative Mean (Corporate Aa - LT Gov't Spread) [11]	Cumulative Mean (Corporate A - LT Gov't Spread) [12]	Cumulative Mean (Corporate Baa - LT Gov't Spread) [13]
Jan-80	11.14	11.09	11.56	11.88	12.42	-0.05	0.42	0.74	1.28	-0.05	0.42	0.74	1.28
Feb-80	11.86	12.38	12.73	12.99	13.57	0.52	0.87	1.13	1.71	0.23	0.64	0.93	1.49
Mar-80	12.39	12.96	13.51	13.97	14.45	0.57	1.12	1.58	2.06	0.34	0.80	1.15	1.68
Apr-80	10.76	12.04	13.06	13.55	14.19	1.28	2.30	2.79	3.43	0.58	1.18	1.56	2.12
May-80	10.37	10.99	11.91	12.35	13.17	0.62	1.54	1.98	2.80	0.59	1.25	1.64	2.26
Jun-80	10.06	10.58	11.39	11.89	12.71	0.52	1.33	1.83	2.65	0.58	1.26	1.67	2.32
Jul-80	10.74	11.07	11.43	11.95	12.65	0.33	0.69	1.21	1.91	0.54	1.18	1.61	2.26
Aug-80	11.40	11.64	12.09	12.44	13.15	0.24	0.69	1.04	1.75	0.50	1.12	1.54	2.20
Sep-80	11.85	12.02	12.52	12.97	13.70	0.17	0.67	1.12	1.85	0.47	1.07	1.49	2.16
Oct-80	12.31	12.31	12.68	13.05	14.23	0.00	0.37	0.74	1.92	0.42	1.00	1.42	2.14
Nov-80	12.30	12.97	13.34	13.59	14.64	0.67	1.04	1.29	2.34	0.44	1.00	1.40	2.15
Dec-80	11.99	13.21	13.78	14.03	15.14	1.22	1.79	2.04	3.15	0.51	1.07	1.46	2.24
Jan-81	12.11	12.81	13.52	13.83	15.03	0.70	1.41	1.72	2.92	0.52	1.10	1.48	2.29
Feb-81	12.83	13.35	13.89	14.27	15.37	0.52	1.06	1.44	2.54	0.52	1.09	1.48	2.31
Mar-81	12.48	13.33	13.90	14.47	15.34	0.85	1.42	1.99	2.86	0.54	1.12	1.51	2.35
Apr-81	13.32	13.88	14.39	14.82	15.56	0.56	1.07	1.50	2.24	0.55	1.11	1.51	2.34
May-81	12.65	14.32	14.88	15.43	15.95	1.67	2.23	2.78	3.30	0.61	1.18	1.58	2.40
Jun-81	13.04	13.75	14.41	15.08	15.80	0.71	1.37	2.04	2.76	0.62	1.19	1.61	2.42
Jul-81	13.70	14.38	14.79	15.36	16.17	0.68	1.09	1.66	2.47	0.62	1.18	1.61	2.42
Aug-81	14.45	14.89	15.42	15.76	16.34	0.44	0.97	1.31	1.89	0.61	1.17	1.60	2.39
Sep-81	14.82	15.49	15.95	16.36	16.92	0.67	1.13	1.54	2.10	0.61	1.17	1.59	2.38
Oct-81	13.84	15.40	15.82	16.47	17.11	1.56	1.98	2.63	3.27	0.66	1.21	1.64	2.42
Nov-81	12.20	14.22	14.97	15.82	16.39	2.02	2.77	3.62	4.19	0.72	1.28	1.73	2.50
Dec-81	13.34	14.23	15.00	15.75	16.55	0.89	1.66	2.41	3.21	0.72	1.29	1.76	2.53
Jan-82	14.15	15.18	15.75	16.19	17.10	1.03	1.60	2.04	2.95	0.74	1.30	1.77	2.54
Feb-82	14.02	15.27	15.72	16.35	17.18	1.25	1.70	2.33	3.16	0.76	1.32	1.79	2.57
Mar-82	13.87	14.58	15.21	16.12	16.82	0.72	1.35	2.26	2.96	0.75	1.32	1.81	2.58
Apr-82	13.48	14.46	14.90	15.95	16.78	0.98	1.42	2.47	3.30	0.76	1.32	1.83	2.61
May-82	13.58	14.26	14.77	15.70	16.64	0.68	1.19	2.12	3.06	0.76	1.32	1.84	2.62
Jun-82	14.12	14.81	15.26	16.07	16.92	0.69	1.14	1.95	2.80	0.76	1.31	1.84	2.63
Jul-82	13.52	14.61	15.21	16.20	16.80	1.09	1.69	2.68	3.28	0.77	1.33	1.87	2.65
Aug-82	12.54	13.71	14.48	15.70	16.32	1.17	1.94	3.16	3.78	0.78	1.34	1.91	2.68
Sep-82	11.83	12.94	13.72	15.07	15.63	1.11	1.89	3.24	3.80	0.79	1.36	1.95	2.72
Oct-82	11.12	12.12	12.97	14.34	14.73	1.00	1.85	3.22	3.61	0.80	1.38	1.99	2.74
Nov-82	11.25	11.68	12.51	13.81	14.30	0.43	1.26	2.56	3.05	0.79	1.37	2.00	2.75
Dec-82	10.95	11.83	12.44	13.66	14.14	0.88	1.49	2.71	3.19	0.79	1.38	2.02	2.77
Jan-83	11.13	11.79	12.35	13.53	13.94	0.66	1.22	2.40	2.81	0.79	1.37	2.03	2.77
Feb-83	10.60	12.01	12.58	13.52	13.95	1.41	1.98	2.92	3.35	0.80	1.39	2.06	2.78
Mar-83	10.83	11.73	12.32	13.15	13.61	0.90	1.49	2.32	2.78	0.80	1.39	2.06	2.78
Apr-83	10.51	11.51	12.06	12.86	13.29	1.00	1.55	2.35	2.78	0.81	1.39	2.07	2.78
May-83	11.12	11.46	11.95	12.68	13.09	0.34	0.83	1.56	1.97	0.80	1.38	2.06	2.76
Jun-83	11.19	11.74	12.15	12.88	13.37	0.55	0.96	1.69	2.18	0.79	1.37	2.05	2.75
Jul-83	11.98	12.15	12.39	12.99	13.39	0.17	0.41	1.01	1.41	0.78	1.35	2.03	2.72

Table No. MJV-12

Panel B: Spread Between Moody's Corporate Yields and US Long-Term Government Yields (%)

Month	US LT Gov't Bond Yield [1]	Moody's Aaa Corporate Bond Yield [2]	Moody's Aa Corporate Bond Yield [3]	Moody's A Corporate Bond Yield [4]	Moody's Baa Corporate Bond Yield [5]	Spread (Corporate Aaa - LT Gov't) [6]	Spread (Corporate Aa - LT Gov't) [7]	Spread (Corporate A - LT Gov't) [8]	Spread (Corporate Baa - LT Gov't) [9]	Cumulative Mean (Corporate Aaa - LT Gov't Spread) [10]	Cumulative Mean (Corporate Aa - LT Gov't Spread) [11]	Cumulative Mean (Corporate A - LT Gov't Spread) [12]	Cumulative Mean (Corporate Baa - LT Gov't Spread) [13]
Aug-83	12.10	12.51	12.72	13.17	13.64	0.41	0.62	1.07	1.54	0.77	1.33	2.00	2.69
Sep-83	11.57	12.37	12.62	13.11	13.55	0.80	1.05	1.54	1.98	0.77	1.32	1.99	2.67
Oct-83	11.88	12.25	12.49	12.97	13.46	0.37	0.61	1.09	1.58	0.76	1.31	1.97	2.65
Nov-83	11.76	12.41	12.61	13.09	13.61	0.65	0.85	1.33	1.85	0.76	1.30	1.96	2.63
Dec-83	11.97	12.57	12.76	13.21	13.75	0.60	0.79	1.24	1.78	0.76	1.29	1.95	2.62
Jan-84	11.80	12.20	12.71	13.13	13.65	0.40	0.91	1.33	1.85	0.75	1.28	1.93	2.60
Feb-84	12.17	12.08	12.70	13.11	13.59	-0.09	0.53	0.94	1.42	0.73	1.27	1.91	2.58
Mar-84	12.53	12.57	13.22	13.54	13.99	0.04	0.69	1.01	1.46	0.72	1.25	1.90	2.55
Apr-84	12.84	12.81	13.48	13.77	14.31	-0.03	0.64	0.93	1.47	0.70	1.24	1.88	2.53
May-84	13.81	13.28	14.10	14.37	14.74	-0.53	0.29	0.56	0.93	0.68	1.23	1.85	2.50
Jun-84	13.74	13.55	14.33	14.66	15.05	-0.19	0.59	0.92	1.31	0.66	1.21	1.83	2.48
Jul-84	12.93	13.44	14.12	14.57	15.15	0.51	1.19	1.64	2.22	0.66	1.21	1.83	2.48
Aug-84	12.70	12.87	13.47	14.13	14.63	0.17	0.77	1.43	1.93	0.65	1.20	1.82	2.47
Sep-84	12.35	12.66	13.27	13.94	14.35	0.31	0.92	1.59	2.00	0.65	1.20	1.82	2.46
Oct-84	11.73	12.63	13.11	13.61	13.94	0.90	1.38	1.88	2.21	0.65	1.20	1.82	2.45
Nov-84	11.69	12.29	12.66	13.09	13.48	0.60	0.97	1.40	1.79	0.65	1.20	1.81	2.44
Dec-84	11.70	12.13	12.50	12.92	13.40	0.43	0.80	1.22	1.70	0.65	1.19	1.80	2.43
Jan-85	11.27	12.08	12.43	12.80	13.26	0.81	1.16	1.53	1.99	0.65	1.19	1.80	2.42
Feb-85	12.09	12.13	12.49	12.80	13.23	0.04	0.40	0.71	1.14	0.64	1.18	1.78	2.40
Mar-85	11.81	12.56	12.91	13.36	13.69	0.75	1.10	1.55	1.88	0.64	1.18	1.78	2.39
Apr-85	11.62	12.23	12.69	13.14	13.51	0.61	1.07	1.52	1.89	0.64	1.18	1.77	2.39
May-85	10.62	11.72	12.30	12.70	13.15	1.10	1.68	2.08	2.53	0.65	1.18	1.78	2.39
Jun-85	10.55	10.94	11.46	11.98	12.40	0.39	0.91	1.43	1.85	0.64	1.18	1.77	2.38
Jul-85	10.91	10.97	11.42	11.92	12.43	0.06	0.51	1.01	1.52	0.63	1.17	1.76	2.37
Aug-85	10.68	11.05	11.47	12.00	12.50	0.37	0.79	1.32	1.82	0.63	1.16	1.76	2.36
Sep-85	10.82	11.07	11.46	11.99	12.48	0.25	0.64	1.17	1.66	0.63	1.16	1.75	2.35
Oct-85	10.51	11.02	11.45	11.94	12.36	0.51	0.94	1.43	1.85	0.62	1.15	1.74	2.34
Nov-85	10.11	10.55	11.07	11.54	11.99	0.44	0.96	1.43	1.88	0.62	1.15	1.74	2.34
Dec-85	9.56	10.16	10.63	11.19	11.58	0.60	1.07	1.63	2.02	0.62	1.15	1.74	2.33
Jan-86	9.58	10.05	10.46	11.04	11.44	0.47	0.88	1.46	1.86	0.62	1.15	1.73	2.33
Feb-86	8.41	9.67	10.13	10.67	11.11	1.26	1.72	2.26	2.70	0.63	1.15	1.74	2.33
Mar-86	7.66	9.00	9.49	10.15	10.49	1.34	1.83	2.49	2.83	0.64	1.16	1.75	2.34
Apr-86	7.82	8.79	9.21	9.83	10.19	0.97	1.39	2.01	2.37	0.64	1.17	1.75	2.34
May-86	8.48	9.09	9.43	9.94	10.29	0.61	0.95	1.46	1.81	0.64	1.16	1.75	2.33
Jun-86	7.90	9.13	9.49	9.96	10.34	1.23	1.59	2.06	2.44	0.65	1.17	1.75	2.33
Jul-86	8.09	8.88	9.28	9.76	10.16	0.79	1.19	1.67	2.07	0.65	1.17	1.75	2.33
Aug-86	7.63	8.72	9.22	9.64	10.18	1.09	1.59	2.01	2.55	0.66	1.17	1.76	2.33
Sep-86	8.27	8.89	9.36	9.73	10.20	0.62	1.09	1.46	1.93	0.66	1.17	1.75	2.33
Oct-86	8.03	8.86	9.33	9.72	10.24	0.83	1.30	1.69	2.21	0.66	1.17	1.75	2.32
Nov-86	7.79	8.68	9.20	9.51	10.07	0.89	1.41	1.72	2.28	0.66	1.18	1.75	2.32
Dec-86	7.89	8.49	9.02	9.41	9.97	0.60	1.13	1.52	2.08	0.66	1.18	1.75	2.32
Jan-87	7.78	8.36	8.86	9.23	9.72	0.58	1.08	1.45	1.94	0.66	1.18	1.74	2.32
Feb-87	7.63	8.38	8.88	9.20	9.65	0.75	1.25	1.57	2.02	0.66	1.18	1.74	2.31

Table No. MJV-12

Panel B: Spread Between Moody's Corporate Yields and US Long-Term Government Yields (%)

Month	US LT Gov't Bond Yield [1]	Moody's Aaa Corporate Bond Yield [2]	Moody's Aa Corporate Bond Yield [3]	Moody's A Corporate Bond Yield [4]	Moody's Baa Corporate Bond Yield [5]	Spread (Corporate Aaa - LT Gov't) [6]	Spread (Corporate Aa - LT Gov't) [7]	Spread (Corporate A - LT Gov't) [8]	Spread (Corporate Baa - LT Gov't) [9]	Cumulative Mean (Corporate Aaa - LT Gov't Spread) [10]	Cumulative Mean (Corporate Aa - LT Gov't Spread) [11]	Cumulative Mean (Corporate A - LT Gov't Spread) [12]	Cumulative Mean (Corporate Baa - LT Gov't Spread) [13]
Mar-87	7.95	8.36	8.84	9.13	9.61	0.41	0.89	1.18	1.66	0.66	1.17	1.74	2.31
Apr-87	8.59	8.85	9.15	9.36	10.04	0.26	0.56	0.77	1.45	0.65	1.17	1.73	2.30
May-87	8.80	9.33	9.59	9.83	10.51	0.53	0.79	1.03	1.71	0.65	1.16	1.72	2.29
Jun-87	8.77	9.32	9.65	9.98	10.52	0.55	0.88	1.21	1.75	0.65	1.16	1.71	2.28
Jul-87	9.07	9.42	9.64	10.00	10.61	0.35	0.57	0.93	1.54	0.65	1.15	1.70	2.28
Aug-87	9.36	9.67	9.86	10.20	10.80	0.31	0.50	0.84	1.44	0.64	1.15	1.69	2.27
Sep-87	9.92	10.18	10.35	10.72	11.31	0.26	0.43	0.80	1.39	0.64	1.14	1.68	2.26
Oct-87	9.26	10.52	10.74	10.98	11.62	1.26	1.48	1.72	2.36	0.65	1.14	1.68	2.26
Nov-87	9.31	10.01	10.27	10.63	11.23	0.70	0.96	1.32	1.92	0.65	1.14	1.68	2.25
Dec-87	9.20	10.11	10.33	10.62	11.29	0.91	1.13	1.42	2.09	0.65	1.14	1.68	2.25
Jan-88	8.52	9.88	10.09	10.43	11.07	1.36	1.57	1.91	2.55	0.66	1.14	1.68	2.26
Feb-88	8.54	9.40	9.60	9.94	10.62	0.86	1.06	1.40	2.08	0.66	1.14	1.68	2.25
Mar-88	9.01	9.39	9.59	9.89	10.57	0.38	0.58	0.88	1.56	0.66	1.14	1.67	2.25
Apr-88	9.29	9.67	9.86	10.17	10.90	0.38	0.57	0.88	1.61	0.65	1.13	1.66	2.24
May-88	9.52	9.90	10.10	10.41	11.04	0.38	0.58	0.89	1.52	0.65	1.13	1.65	2.23
Jun-88	9.17	9.86	10.13	10.42	11.00	0.69	0.96	1.25	1.83	0.65	1.12	1.65	2.23
Jul-88	9.47	9.96	10.26	10.55	11.11	0.49	0.79	1.08	1.64	0.65	1.12	1.64	2.22
Aug-88	9.50	10.11	10.37	10.63	11.21	0.61	0.87	1.13	1.71	0.65	1.12	1.64	2.22
Sep-88	9.17	9.82	10.06	10.34	10.90	0.65	0.89	1.17	1.73	0.65	1.12	1.63	2.21
Oct-88	8.89	9.51	9.71	9.99	10.41	0.62	0.82	1.10	1.52	0.65	1.11	1.63	2.21
Nov-88	9.23	9.45	9.72	9.99	10.48	0.22	0.49	0.76	1.25	0.64	1.11	1.62	2.20
Dec-88	9.19	9.57	9.81	10.11	10.65	0.39	0.63	0.92	1.47	0.64	1.10	1.62	2.19
Jan-89	9.03	9.62	9.81	10.10	10.65	0.59	0.78	1.07	1.62	0.64	1.10	1.61	2.19
Feb-89	9.35	9.64	9.83	10.13	10.61	0.29	0.48	0.78	1.26	0.64	1.09	1.60	2.18
Mar-89	9.29	9.80	9.98	10.27	10.67	0.51	0.69	0.98	1.38	0.64	1.09	1.60	2.17
Apr-89	9.18	9.79	9.94	10.20	10.61	0.61	0.76	1.02	1.43	0.64	1.09	1.59	2.16
May-89	8.78	9.57	9.75	10.00	10.46	0.79	0.97	1.22	1.68	0.64	1.09	1.59	2.16
Jun-89	8.22	9.10	9.29	9.59	10.03	0.89	1.08	1.38	1.82	0.64	1.09	1.59	2.16
Jul-89	8.01	8.93	9.14	9.42	9.87	0.92	1.13	1.41	1.86	0.64	1.09	1.59	2.15
Aug-89	8.41	8.96	9.14	9.45	9.88	0.55	0.73	1.04	1.47	0.64	1.08	1.58	2.15
Sep-89	8.47	9.01	9.23	9.51	9.91	0.54	0.76	1.04	1.44	0.64	1.08	1.58	2.14
Oct-89	8.10	8.92	9.19	9.44	9.81	0.82	1.09	1.34	1.71	0.64	1.08	1.57	2.14
Nov-89	8.08	8.89	9.14	9.42	9.81	0.81	1.06	1.34	1.73	0.64	1.08	1.57	2.14
Dec-89	8.16	8.86	9.11	9.39	9.82	0.70	0.95	1.23	1.66	0.64	1.08	1.57	2.13
Jan-90	8.65	8.99	9.27	9.54	9.94	0.34	0.62	0.89	1.29	0.64	1.08	1.56	2.12
Feb-90	8.76	9.22	9.44	9.75	10.14	0.46	0.68	0.99	1.38	0.64	1.07	1.56	2.12
Mar-90	8.89	9.37	9.51	9.82	10.21	0.48	0.62	0.93	1.32	0.64	1.07	1.55	2.11
Apr-90	9.24	9.46	9.64	9.89	10.30	0.22	0.40	0.65	1.06	0.64	1.06	1.55	2.10
May-90	8.83	9.47	9.70	9.89	10.41	0.64	0.87	1.06	1.58	0.64	1.06	1.54	2.10
Jun-90	8.64	9.26	9.49	9.70	10.22	0.62	0.85	1.06	1.58	0.64	1.06	1.54	2.10
Jul-90	8.60	9.24	9.47	9.69	10.20	0.64	0.87	1.09	1.60	0.64	1.06	1.54	2.09
Aug-90	9.20	9.41	9.63	9.89	10.41	0.21	0.43	0.69	1.21	0.63	1.05	1.53	2.08
Sep-90	9.14	9.56	9.77	10.09	10.64	0.42	0.63	0.95	1.50	0.63	1.05	1.52	2.08

Table No. MJV-12

Panel B: Spread Between Moody's Corporate Yields and US Long-Term Government Yields (%)

Month	US LT Gov't Bond Yield [1]	Moody's Aaa Corporate Bond Yield [2]	Moody's Aa Corporate Bond Yield [3]	Moody's A Corporate Bond Yield [4]	Moody's Baa Corporate Bond Yield [5]	Spread (Corporate Aaa - LT Gov't) [6]	Spread (Corporate Aa - LT Gov't) [7]	Spread (Corporate A - LT Gov't) [8]	Spread (Corporate Baa - LT Gov't) [9]	Cumulative Mean (Corporate Aaa - LT Gov't Spread) [10]	Cumulative Mean (Corporate Aa - LT Gov't Spread) [11]	Cumulative Mean (Corporate A - LT Gov't Spread) [12]	Cumulative Mean (Corporate Baa - LT Gov't Spread) [13]
Oct-90	8.98	9.53	9.77	10.06	10.74	0.55	0.79	1.08	1.76	0.63	1.05	1.52	2.08
Nov-90	8.58	9.30	9.59	9.88	10.62	0.72	1.01	1.30	2.04	0.63	1.05	1.52	2.08
Dec-90	8.44	9.05	9.39	9.64	10.43	0.61	0.95	1.20	1.99	0.63	1.05	1.52	2.08
Jan-91	8.37	9.04	9.37	9.61	10.45	0.67	1.00	1.24	2.08	0.63	1.05	1.51	2.08
Feb-91	8.41	8.83	9.16	9.38	10.07	0.42	0.75	0.97	1.66	0.63	1.05	1.51	2.07
Mar-91	8.44	8.93	9.21	9.50	10.09	0.49	0.77	1.06	1.65	0.63	1.04	1.51	2.07
Apr-91	8.37	8.86	9.12	9.39	9.94	0.49	0.75	1.02	1.57	0.63	1.04	1.50	2.07
May-91	8.45	8.86	9.15	9.41	9.86	0.41	0.70	0.96	1.41	0.63	1.04	1.50	2.06
Jun-91	8.60	9.01	9.28	9.55	9.96	0.41	0.68	0.95	1.36	0.62	1.04	1.50	2.06
Jul-91	8.50	9.00	9.25	9.51	9.89	0.50	0.75	1.01	1.39	0.62	1.03	1.49	2.05
Aug-91	8.18	8.75	8.99	9.26	9.65	0.57	0.81	1.08	1.47	0.62	1.03	1.49	2.05
Sep-91	7.90	8.61	8.86	9.11	9.51	0.71	0.96	1.21	1.61	0.62	1.03	1.49	2.04
Oct-91	7.91	8.55	8.83	9.08	9.49	0.64	0.92	1.17	1.58	0.62	1.03	1.48	2.04
Nov-91	7.89	8.48	8.78	9.01	9.45	0.59	0.89	1.12	1.56	0.62	1.03	1.48	2.04
Dec-91	7.30	8.31	8.61	8.82	9.26	1.01	1.31	1.52	1.96	0.63	1.03	1.48	2.04
Jan-92	7.76	8.20	8.51	8.72	9.13	0.44	0.75	0.96	1.37	0.62	1.03	1.48	2.03
Feb-92	7.77	8.29	8.67	8.83	9.23	0.52	0.90	1.06	1.46	0.62	1.03	1.48	2.03
Mar-92	7.97	8.35	8.73	8.89	9.25	0.38	0.76	0.92	1.28	0.62	1.03	1.47	2.02
Apr-92	8.03	8.33	8.69	8.87	9.21	0.30	0.66	0.84	1.18	0.62	1.02	1.47	2.02
May-92	7.81	8.28	8.63	8.81	9.13	0.47	0.82	1.00	1.32	0.62	1.02	1.46	2.01
Jun-92	7.65	8.22	8.56	8.70	9.05	0.57	0.91	1.05	1.40	0.62	1.02	1.46	2.01
Jul-92	7.26	8.07	8.37	8.49	8.84	0.81	1.11	1.23	1.58	0.62	1.02	1.46	2.01
Aug-92	7.25	7.95	8.21	8.34	8.65	0.70	0.96	1.09	1.40	0.62	1.02	1.46	2.00
Sep-92	7.10	7.92	8.17	8.31	8.62	0.82	1.07	1.21	1.52	0.62	1.02	1.46	2.00
Oct-92	7.41	7.99	8.32	8.49	8.84	0.58	0.91	1.08	1.43	0.62	1.02	1.45	2.00
Nov-92	7.48	8.10	8.40	8.58	8.96	0.62	0.92	1.10	1.48	0.62	1.02	1.45	1.99
Dec-92	7.26	7.98	8.24	8.37	8.81	0.72	0.98	1.11	1.55	0.62	1.02	1.45	1.99
Jan-93	7.25	7.91	8.11	8.26	8.67	0.66	0.86	1.01	1.42	0.62	1.02	1.45	1.99
Feb-93	6.98	7.71	7.90	8.03	8.39	0.73	0.92	1.05	1.41	0.62	1.02	1.44	1.98
Mar-93	7.02	7.58	7.72	7.86	8.15	0.56	0.70	0.84	1.13	0.62	1.02	1.44	1.98
Apr-93	7.01	7.46	7.62	7.80	8.14	0.45	0.61	0.79	1.13	0.62	1.02	1.44	1.97
May-93	7.01	7.43	7.61	7.85	8.21	0.42	0.60	0.84	1.20	0.62	1.01	1.43	1.97
Jun-93	6.68	7.33	7.51	7.74	8.07	0.65	0.83	1.06	1.39	0.62	1.01	1.43	1.96
Jul-93	6.56	7.17	7.35	7.53	7.93	0.61	0.79	0.97	1.37	0.62	1.01	1.43	1.96
Aug-93	6.23	6.85	7.06	7.25	7.60	0.62	0.83	1.02	1.37	0.62	1.01	1.43	1.96
Sep-93	6.27	6.66	6.85	7.05	7.34	0.39	0.58	0.78	1.07	0.62	1.01	1.42	1.95
Oct-93	6.23	6.67	6.87	7.04	7.31	0.44	0.64	0.81	1.08	0.62	1.00	1.42	1.95
Nov-93	6.51	6.93	7.12	7.29	7.66	0.42	0.61	0.78	1.15	0.62	1.00	1.41	1.94
Dec-93	6.54	6.93	7.12	7.31	7.69	0.39	0.58	0.77	1.15	0.62	1.00	1.41	1.94
Jan-94	6.37	6.93	7.12	7.30	7.65	0.56	0.75	0.93	1.28	0.61	1.00	1.41	1.93
Feb-94	6.82	7.08	7.29	7.44	7.76	0.26	0.47	0.62	0.94	0.61	0.99	1.40	1.93
Mar-94	7.25	7.48	7.69	7.82	8.13	0.23	0.44	0.57	0.88	0.61	0.99	1.40	1.92
Apr-94	7.45	7.88	8.08	8.22	8.52	0.43	0.63	0.77	1.07	0.61	0.99	1.39	1.91

Table No. MJV-12

Panel B: Spread Between Moody's Corporate Yields and US Long-Term Government Yields (%)

Month	US LT Gov't Bond Yield [1]	Moody's Aaa Corporate Bond Yield [2]	Moody's Aa Corporate Bond Yield [3]	Moody's A Corporate Bond Yield [4]	Moody's Baa Corporate Bond Yield [5]	Spread (Corporate Aaa - LT Gov't) [6]	Spread (Corporate Aa - LT Gov't) [7]	Spread (Corporate A - LT Gov't) [8]	Spread (Corporate Baa - LT Gov't) [9]	Cumulative Mean (Corporate Aaa - LT Gov't Spread) [10]	Cumulative Mean (Corporate Aa - LT Gov't Spread) [11]	Cumulative Mean (Corporate A - LT Gov't Spread) [12]	Cumulative Mean (Corporate Baa - LT Gov't Spread) [13]
May-94	7.59	7.99	8.19	8.32	8.62	0.40	0.60	0.73	1.03	0.61	0.99	1.39	1.91
Jun-94	7.74	7.97	8.17	8.31	8.65	0.23	0.43	0.57	0.91	0.61	0.98	1.39	1.90
Jul-94	7.46	8.11	8.31	8.44	8.80	0.65	0.85	0.98	1.34	0.61	0.98	1.38	1.90
Aug-94	7.61	8.07	8.25	8.38	8.74	0.46	0.64	0.77	1.13	0.61	0.98	1.38	1.90
Sep-94	8.00	8.34	8.49	8.61	8.98	0.34	0.49	0.61	0.98	0.60	0.98	1.38	1.89
Oct-94	8.09	8.57	8.71	8.82	9.20	0.48	0.62	0.73	1.11	0.60	0.98	1.37	1.89
Nov-94	8.08	8.68	8.83	8.94	9.32	0.60	0.75	0.86	1.24	0.60	0.98	1.37	1.88
Dec-94	7.99	8.46	8.62	8.73	9.11	0.47	0.63	0.74	1.12	0.60	0.97	1.37	1.88
Jan-95	7.80	8.46	8.60	8.70	9.08	0.66	0.80	0.90	1.28	0.60	0.97	1.36	1.88
Feb-95	7.58	8.26	8.39	8.48	8.85	0.68	0.81	0.90	1.27	0.60	0.97	1.36	1.87
Mar-95	7.55	8.12	8.24	8.33	8.70	0.57	0.69	0.78	1.15	0.60	0.97	1.36	1.87
Apr-95	7.45	8.03	8.12	8.23	8.60	0.58	0.67	0.78	1.15	0.60	0.97	1.35	1.86
May-95	6.77	7.65	7.74	7.86	8.20	0.88	0.97	1.09	1.43	0.60	0.97	1.35	1.86
Jun-95	6.70	7.30	7.43	7.53	7.90	0.60	0.73	0.83	1.20	0.60	0.97	1.35	1.86
Jul-95	6.91	7.41	7.54	7.65	8.04	0.50	0.63	0.74	1.13	0.60	0.97	1.35	1.85
Aug-95	6.74	7.57	7.69	7.79	8.19	0.83	0.95	1.05	1.45	0.61	0.97	1.34	1.85
Sep-95	6.63	7.32	7.45	7.56	7.93	0.69	0.82	0.93	1.30	0.61	0.96	1.34	1.85
Oct-95	6.41	7.12	7.27	7.39	7.75	0.71	0.86	0.98	1.34	0.61	0.96	1.34	1.85
Nov-95	6.23	7.02	7.18	7.32	7.68	0.79	0.95	1.09	1.45	0.61	0.96	1.34	1.84
Dec-95	6.03	6.82	6.99	7.13	7.49	0.79	0.96	1.10	1.46	0.61	0.96	1.34	1.84
Jan-96	6.09	6.81	6.99	7.12	7.47	0.72	0.90	1.03	1.38	0.61	0.96	1.34	1.84
Feb-96	6.59	6.99	7.16	7.31	7.63	0.40	0.57	0.72	1.04	0.61	0.96	1.33	1.84
Mar-96	6.84	7.35	7.52	7.68	8.03	0.51	0.68	0.84	1.19	0.61	0.96	1.33	1.83
Apr-96	7.06	7.50	7.68	7.83	8.19	0.44	0.62	0.77	1.13	0.61	0.96	1.33	1.83
May-96	7.17	7.62	7.77	7.94	8.30	0.45	0.60	0.77	1.13	0.61	0.96	1.33	1.83
Jun-96	7.03	7.71	7.87	8.02	8.40	0.68	0.84	0.99	1.37	0.61	0.96	1.32	1.82
Jul-96	7.07	7.65	7.82	7.97	8.35	0.58	0.75	0.90	1.28	0.61	0.95	1.32	1.82
Aug-96	7.26	7.46	7.63	7.77	8.18	0.20	0.37	0.51	0.92	0.60	0.95	1.32	1.82
Sep-96	7.04	7.66	7.82	7.95	8.35	0.62	0.78	0.91	1.31	0.60	0.95	1.32	1.81
Oct-96	6.71	7.39	7.58	7.70	8.07	0.68	0.87	0.99	1.36	0.60	0.95	1.31	1.81
Nov-96	6.43	7.10	7.31	7.41	7.79	0.67	0.88	0.98	1.36	0.60	0.95	1.31	1.81
Dec-96	6.73	7.20	7.41	7.51	7.89	0.47	0.68	0.78	1.16	0.60	0.95	1.31	1.81
Jan-97	6.89	7.42	7.63	7.71	8.09	0.53	0.74	0.82	1.20	0.60	0.95	1.31	1.80
Feb-97	6.94	7.31	7.54	7.59	7.94	0.37	0.60	0.65	1.00	0.60	0.95	1.30	1.80
Mar-97	7.23	7.55	7.77	7.82	8.18	0.32	0.54	0.59	0.95	0.60	0.94	1.30	1.80
Apr-97	7.05	7.73	7.93	7.98	8.34	0.68	0.88	0.93	1.29	0.60	0.94	1.30	1.79
May-97	7.01	7.58	7.80	7.86	8.20	0.57	0.79	0.85	1.19	0.60	0.94	1.30	1.79
Jun-97	6.88	7.41	7.62	7.68	8.02	0.53	0.74	0.80	1.14	0.60	0.94	1.29	1.79
Jul-97	6.37	7.14	7.36	7.42	7.75	0.77	0.99	1.05	1.38	0.60	0.94	1.29	1.78
Aug-97	6.72	7.22	7.40	7.46	7.82	0.50	0.68	0.74	1.10	0.60	0.94	1.29	1.78
Sep-97	6.49	7.15	7.34	7.39	7.70	0.66	0.85	0.90	1.21	0.60	0.94	1.29	1.78
Oct-97	6.23	7.00	7.20	7.27	7.57	0.77	0.97	1.04	1.34	0.60	0.94	1.29	1.78
Nov-97	6.14	6.87	7.07	7.15	7.42	0.73	0.93	1.01	1.28	0.60	0.94	1.29	1.77

Table No. MJV-12

Panel B: Spread Between Moody's Corporate Yields and US Long-Term Government Yields (%)

Month	US LT Gov't Bond Yield [1]	Moody's Aaa Corporate Bond Yield [2]	Moody's Aa Corporate Bond Yield [3]	Moody's A Corporate Bond Yield [4]	Moody's Baa Corporate Bond Yield [5]	Spread (Corporate Aaa - LT Gov't) [6]	Spread (Corporate Aa - LT Gov't) [7]	Spread (Corporate A - LT Gov't) [8]	Spread (Corporate Baa - LT Gov't) [9]	Cumulative Mean (Corporate Aaa - LT Gov't Spread) [10]	Cumulative Mean (Corporate Aa - LT Gov't Spread) [11]	Cumulative Mean (Corporate A - LT Gov't Spread) [12]	Cumulative Mean (Corporate Baa - LT Gov't Spread) [13]
Dec-97	6.02	6.76	6.99	7.05	7.32	0.74	0.97	1.03	1.30	0.60	0.94	1.28	1.77
Jan-98	5.89	6.61	6.82	6.93	7.19	0.72	0.93	1.04	1.30	0.60	0.94	1.28	1.77
Feb-98	5.99	6.67	6.88	7.01	7.25	0.68	0.89	1.02	1.26	0.60	0.94	1.28	1.77
Mar-98	6.02	6.72	6.93	7.05	7.32	0.70	0.91	1.03	1.30	0.60	0.94	1.28	1.77
Apr-98	6.04	6.69	6.90	7.03	7.33	0.65	0.86	0.99	1.29	0.60	0.94	1.28	1.76
May-98	5.92	6.69	6.91	7.03	7.30	0.77	0.99	1.11	1.38	0.61	0.94	1.28	1.76
Jun-98	5.76	6.53	6.78	6.88	7.13	0.77	1.02	1.12	1.37	0.61	0.94	1.28	1.76
Jul-98	5.84	6.55	6.78	6.89	7.15	0.71	0.94	1.05	1.31	0.61	0.94	1.28	1.76
Aug-98	5.47	6.52	6.77	6.89	7.14	1.05	1.30	1.42	1.67	0.61	0.94	1.28	1.76
Sep-98	5.17	6.41	6.69	6.82	7.09	1.24	1.52	1.65	1.92	0.61	0.95	1.28	1.76
Oct-98	5.40	6.37	6.69	6.85	7.18	0.97	1.29	1.45	1.78	0.61	0.95	1.28	1.76
Nov-98	5.35	6.41	6.79	6.95	7.34	1.06	1.44	1.60	1.99	0.62	0.95	1.28	1.76
Dec-98	5.42	6.22	6.65	6.80	7.23	0.80	1.23	1.38	1.81	0.62	0.95	1.28	1.76
Jan-99	5.36	6.24	6.68	6.84	7.29	0.88	1.32	1.48	1.93	0.62	0.95	1.28	1.76
Feb-99	5.87	6.40	6.79	6.97	7.39	0.53	0.92	1.10	1.52	0.62	0.95	1.28	1.76
Mar-99	5.92	6.62	6.98	7.14	7.53	0.70	1.06	1.22	1.61	0.62	0.95	1.28	1.76
Apr-99	5.94	6.64	6.96	7.13	7.48	0.70	1.02	1.19	1.54	0.62	0.95	1.28	1.76
May-99	6.15	6.93	7.23	7.40	7.72	0.78	1.08	1.25	1.57	0.62	0.95	1.28	1.76
Jun-99	6.27	7.23	7.52	7.69	8.02	0.96	1.25	1.42	1.75	0.62	0.95	1.28	1.76
Jul-99	6.39	7.19	7.48	7.65	7.95	0.80	1.09	1.26	1.56	0.62	0.95	1.28	1.76
Aug-99	6.49	7.40	7.68	7.84	8.15	0.91	1.19	1.35	1.66	0.62	0.96	1.28	1.76
Sep-99	6.46	7.39	7.68	7.84	8.20	0.93	1.22	1.38	1.74	0.62	0.96	1.28	1.76
Oct-99	6.51	7.55	7.79	7.99	8.38	1.04	1.28	1.48	1.87	0.62	0.96	1.28	1.76
Nov-99	6.62	7.36	7.62	7.79	8.15	0.74	1.00	1.17	1.53	0.63	0.96	1.28	1.76
Dec-99	6.82	7.55	7.78	7.96	8.19	0.73	0.96	1.14	1.37	0.63	0.96	1.28	1.75
Jan-00	6.66	7.78	7.96	8.15	8.33	1.12	1.30	1.49	1.67	0.63	0.96	1.28	1.75
Feb-00	6.46	7.68	7.82	8.06	8.29	1.22	1.36	1.60	1.83	0.63	0.96	1.28	1.75
Mar-00	6.18	7.68	7.83	8.07	8.37	1.50	1.65	1.89	2.19	0.63	0.96	1.29	1.76
Apr-00	6.30	7.64	7.82	8.07	8.40	1.34	1.52	1.77	2.10	0.64	0.97	1.29	1.76
May-00	6.40	7.99	8.24	8.49	8.90	1.59	1.84	2.09	2.50	0.64	0.97	1.29	1.76
Jun-00	6.22	7.67	7.87	8.18	8.48	1.45	1.65	1.96	2.26	0.64	0.97	1.30	1.76
Jul-00	6.11	7.65	7.81	8.11	8.35	1.54	1.70	2.00	2.24	0.65	0.98	1.30	1.76
Aug-00	5.94	7.55	7.70	8.02	8.26	1.61	1.76	2.08	2.32	0.65	0.98	1.30	1.77
Sep-00	6.12	7.62	7.83	8.13	8.35	1.50	1.71	2.01	2.23	0.65	0.98	1.30	1.77
Oct-00	6.00	7.55	7.81	8.11	8.34	1.55	1.81	2.11	2.34	0.66	0.99	1.31	1.77
Nov-00	5.76	7.45	7.75	8.09	8.28	1.69	1.99	2.33	2.52	0.66	0.99	1.31	1.77
Dec-00	5.58	7.21	7.48	7.88	8.02	1.63	1.90	2.30	2.44	0.67	0.99	1.32	1.78
Jan-01	5.62	7.15	7.38	7.75	7.93	1.53	1.76	2.13	2.31	0.67	1.00	1.32	1.78
Feb-01	5.49	7.10	7.32	7.69	7.87	1.61	1.83	2.20	2.38	0.67	1.00	1.32	1.78
Mar-01	5.59	6.98	7.22	7.61	7.84	1.39	1.63	2.02	2.25	0.68	1.00	1.32	1.78
Apr-01	5.93	7.20	7.43	7.82	8.07	1.27	1.50	1.89	2.14	0.68	1.00	1.33	1.78
May-01	5.94	7.29	7.50	7.88	8.07	1.35	1.56	1.94	2.13	0.68	1.01	1.33	1.78
Jun-01	5.90	7.18	7.34	7.73	7.97	1.28	1.44	1.83	2.07	0.68	1.01	1.33	1.79

Table No. MJV-12

Panel B: Spread Between Moody's Corporate Yields and US Long-Term Government Yields (%)

Month	US LT Gov't Bond Yield [1]	Moody's Aaa Corporate Bond Yield [2]	Moody's Aa Corporate Bond Yield [3]	Moody's A Corporate Bond Yield [4]	Moody's Baa Corporate Bond Yield [5]	Spread (Corporate Aaa - LT Gov't) [6]	Spread (Corporate Aa - LT Gov't) [7]	Spread (Corporate A - LT Gov't) [8]	Spread (Corporate Baa - LT Gov't) [9]	Cumulative Mean (Corporate Aaa - LT Gov't Spread) [10]	Cumulative Mean (Corporate Aa - LT Gov't Spread) [11]	Cumulative Mean (Corporate A - LT Gov't Spread) [12]	Cumulative Mean (Corporate Baa - LT Gov't Spread) [13]
Jul-01	5.61	7.13	7.27	7.65	7.97	1.52	1.66	2.04	2.36	0.69	1.01	1.33	1.79
Aug-01	5.46	7.02	7.11	7.48	7.85	1.56	1.65	2.02	2.39	0.69	1.01	1.34	1.79
Sep-01	5.42	7.17	7.27	7.67	8.03	1.75	1.85	2.25	2.61	0.69	1.02	1.34	1.79
Oct-01	5.06	7.03	7.13	7.59	7.91	1.97	2.07	2.53	2.85	0.70	1.02	1.34	1.80
Nov-01	5.53	6.97	7.01	7.49	7.81	1.44	1.48	1.96	2.28	0.70	1.02	1.35	1.80
Dec-01	5.75	6.76	7.19	7.70	8.05	1.01	1.44	1.95	2.30	0.70	1.02	1.35	1.80
Jan-02	5.69	6.55	7.03	7.50	7.87	0.86	1.34	1.81	2.18	0.70	1.02	1.35	1.80
Feb-02	5.63	6.51	6.95	7.37	7.89	0.88	1.32	1.74	2.26	0.70	1.03	1.35	1.80
Mar-02	6.04	6.81	7.22	7.62	8.11	0.77	1.18	1.58	2.07	0.70	1.03	1.35	1.81
Apr-02	5.75	6.76	7.16	7.49	8.04	1.01	1.41	1.74	2.29	0.71	1.03	1.35	1.81
May-02	5.78	6.75	7.20	7.43	8.09	0.97	1.42	1.65	2.31	0.71	1.03	1.36	1.81
Jun-02	5.66	6.64	7.08	7.25	7.96	0.98	1.42	1.59	2.30	0.71	1.03	1.36	1.81
Jul-02	5.44	6.53	6.98	7.14	7.90	1.09	1.54	1.70	2.46	0.71	1.03	1.36	1.81
Aug-02	5.10	6.37	6.84	6.95	7.58	1.27	1.74	1.85	2.48	0.71	1.03	1.36	1.82
Sep-02	4.80	6.15	6.63	6.76	7.40	1.35	1.83	1.96	2.60	0.71	1.04	1.36	1.82
Oct-02	5.08	6.33	6.74	6.95	7.74	1.25	1.66	1.87	2.66	0.72	1.04	1.36	1.82
Nov-02	5.21	6.31	6.71	6.89	7.62	1.10	1.50	1.68	2.41	0.72	1.04	1.36	1.82
Dec-02	4.84	6.21	6.63	6.80	7.45	1.37	1.79	1.96	2.61	0.72	1.04	1.37	1.83
Jan-03	4.95	6.17	6.59	6.76	7.35	1.22	1.64	1.81	2.40	0.72	1.05	1.37	1.83
Feb-03	4.72	5.95	6.34	6.63	7.06	1.23	1.62	1.91	2.34	0.72	1.05	1.37	1.83
Mar-03	4.86	5.89	6.28	6.54	6.95	1.03	1.42	1.68	2.09	0.72	1.05	1.37	1.83
Apr-03	4.81	5.74	6.22	6.45	6.85	0.93	1.41	1.64	2.04	0.72	1.05	1.37	1.83
May-03	4.36	5.22	5.85	6.08	6.38	0.86	1.49	1.72	2.02	0.73	1.05	1.37	1.83
Jun-03	4.52	4.97	5.72	5.92	6.19	0.45	1.20	1.40	1.67	0.72	1.05	1.37	1.83
Jul-03	5.42	5.49	6.07	6.34	6.62	0.07	0.65	0.92	1.20	0.72	1.05	1.37	1.83
Aug-03	5.32	5.87	6.31	6.63	7.01	0.55	0.99	1.31	1.69	0.72	1.05	1.37	1.83
Sep-03	4.90	5.72	6.13	6.42	6.79	0.82	1.23	1.52	1.89	0.72	1.05	1.37	1.83
Oct-03	5.18	5.70	6.11	6.33	6.73	0.52	0.93	1.15	1.55	0.72	1.05	1.37	1.83
Nov-03	5.19	5.65	6.08	6.28	6.66	0.46	0.89	1.09	1.47	0.72	1.05	1.37	1.83
Dec-03	5.11	5.65	6.02	6.19	6.60	0.54	0.91	1.08	1.49	0.72	1.05	1.37	1.83
Jan-04	4.99	5.54	5.91	6.08	6.44	0.55	0.92	1.09	1.45	0.72	1.05	1.37	1.83
Feb-04	4.83	5.50	5.87	6.04	6.27	0.67	1.04	1.21	1.44	0.72	1.05	1.37	1.82
Mar-04	4.74	5.33	5.70	5.86	6.11	0.59	0.96	1.12	1.37	0.72	1.05	1.37	1.82
Apr-04	5.31	5.73	6.10	6.25	6.46	0.42	0.79	0.94	1.15	0.72	1.05	1.37	1.82
May-04	5.39	6.04	6.40	6.54	6.75	0.65	1.01	1.15	1.36	0.72	1.05	1.37	1.82
Jun-04	5.32	6.01	6.21	6.42	6.78	0.69	0.89	1.10	1.46	0.72	1.05	1.36	1.82
Jul-04	5.23	5.82	6.02	6.23	6.62	0.59	0.79	1.00	1.39	0.72	1.05	1.36	1.82
Aug-04	4.93	5.65	5.87	6.08	6.48	0.72	0.94	1.15	1.55	0.72	1.05	1.36	1.81
Sep-04	4.88	5.46	5.73	5.91	6.27	0.58	0.85	1.03	1.39	0.72	1.05	1.36	1.81
Oct-04	4.78	5.47	5.69	5.86	6.21	0.69	0.91	1.08	1.43	0.72	1.05	1.36	1.81
Nov-04	5.02	5.52	5.72	5.88	6.21	0.50	0.70	0.86	1.19	0.72	1.04	1.36	1.81

Table No. MJV-12

Panel B: Spread Between Moody's Corporate Yields and US Long-Term Government Yields (%)

Month	US LT Gov't Bond Yield [1]	Moody's Aaa Corporate Bond Yield [2]	Moody's Aa Corporate Bond Yield [3]	Moody's A Corporate Bond Yield [4]	Moody's Baa Corporate Bond Yield [5]	Spread (Corporate Aaa - LT Gov't) [6]	Spread (Corporate Aa - LT Gov't) [7]	Spread (Corporate A - LT Gov't) [8]	Spread (Corporate Baa - LT Gov't) [9]	Cumulative Mean (Corporate Aaa - LT Gov't Spread) [10]	Cumulative Mean (Corporate Aa - LT Gov't Spread) [11]	Cumulative Mean (Corporate A - LT Gov't Spread) [12]	Cumulative Mean (Corporate Baa - LT Gov't Spread) [13]
Dec-04	4.84	5.47	5.69	5.82	6.15	0.63	0.85	0.98	1.31	0.71	1.04	1.36	1.81
Jan-05	4.65	5.36	5.58	5.68	6.02	0.71	0.93	1.03	1.37	0.71	1.04	1.36	1.81
Feb-05	4.79	5.20	5.44	5.51	5.82	0.41	0.65	0.72	1.03	0.71	1.04	1.35	1.80
Average Spread -- January 1980 to February 2005						0.71	1.04	1.35	1.80	0.65	1.07	1.51	2.07
Average Spread -- January 1990 to August 1998						0.57	0.78	0.94	1.33	0.61	0.99	1.40	1.92
Average Spread -- January 1990 to December 2000						0.69	0.91	1.08	1.45	0.62	0.99	1.38	1.89
Average Spread -- January 1990 to February 2005						0.76	1.02	1.21	1.59	0.64	1.00	1.37	1.87
Average Spread -- December 2000 to December 2001						1.49	1.67	2.08	2.35	0.68	1.01	1.33	1.79
Average Spread -- December 2000 to December 2002						1.29	1.60	1.93	2.37	0.70	1.02	1.34	1.80
Average Spread -- December 2000 to February 2005						0.97	1.30	1.57	1.96	0.71	1.03	1.36	1.81
Average Spread -- January 2001 to December 2001						1.47	1.66	2.06	2.34	0.69	1.01	1.33	1.79
Average Spread -- January 2002 to December 2002						1.08	1.51	1.76	2.39	0.71	1.03	1.36	1.81
Average Spread -- January 2003 to February 2005						0.66	1.02	1.22	1.57	0.72	1.05	1.37	1.82

Sources and Notes:
[1]: Ibbotson Long-Term Government bond yields from the *Ibbotson Associates Yearbook*.
[2] - [5]: Mergent Bond Record.
[6]: [2] - [1].
[7]: [3] - [1].
[8]: [4] - [1].
[9]: [5] - [1].
[10]: Cumulative average of column [6].
[11]: Cumulative average of column [7].
[12]: Cumulative average of column [8].
[13]: Cumulative average of column [9].

Table No. MJV-12

Panel C: Spread Between US 30-Day T-Bills and US Government Bond Yields and Utility Bonds Yields

Date	30 Day T-Bill Total Return [1]	US LT Gov't Bond Yield [2]	Moodys A Utility Bond Yield [3]	Moodys Baa Utility Bond Yield [4]	Spread (Gov't.- 30 day T-bill) [5]	Spread (A Util- 30 day T-bill) [6]	Spread (Baa Util- 30 day T-bill) [7]
01/31/1980	0.100	0.111	0.123	0.129	0.012	0.023	0.029
02/29/1980	0.112	0.119	0.136	0.144	0.007	0.024	0.033
03/31/1980	0.155	0.124	0.147	0.153	-0.031	-0.008	-0.002
04/30/1980	0.162	0.108	0.139	0.144	-0.054	-0.023	-0.018
05/31/1980	0.102	0.104	0.125	0.129	0.002	0.024	0.028
06/30/1980	0.076	0.101	0.122	0.126	0.025	0.046	0.050
07/31/1980	0.065	0.107	0.123	0.128	0.042	0.057	0.062
08/31/1980	0.079	0.114	0.130	0.135	0.035	0.050	0.056
09/30/1980	0.094	0.118	0.134	0.141	0.024	0.040	0.046
10/31/1980	0.120	0.123	0.136	0.144	0.003	0.016	0.024
11/30/1980	0.121	0.123	0.141	0.148	0.002	0.020	0.027
12/31/1980	0.169	0.120	0.146	0.153	-0.049	-0.022	-0.016
01/31/1981	0.132	0.121	0.143	0.153	-0.011	0.011	0.021
02/28/1981	0.136	0.128	0.149	0.159	-0.008	0.013	0.022
03/31/1981	0.155	0.125	0.151	0.158	-0.030	-0.004	0.003
04/30/1981	0.137	0.133	0.155	0.161	-0.004	0.018	0.024
05/31/1981	0.148	0.126	0.163	0.167	-0.021	0.015	0.019
06/30/1981	0.174	0.130	0.157	0.163	-0.044	-0.017	-0.011
07/31/1981	0.159	0.137	0.162	0.170	-0.022	0.003	0.010
08/31/1981	0.165	0.144	0.166	0.172	-0.020	0.001	0.007
09/30/1981	0.160	0.148	0.172	0.178	-0.012	0.012	0.018
10/31/1981	0.155	0.138	0.172	0.177	-0.016	0.017	0.022
11/30/1981	0.136	0.122	0.162	0.165	-0.014	0.026	0.029
12/31/1981	0.110	0.133	0.163	0.170	0.023	0.053	0.060
01/31/1982	0.100	0.142	0.168	0.178	0.042	0.069	0.079
02/28/1982	0.117	0.140	0.168	0.178	0.024	0.052	0.062
03/31/1982	0.124	0.139	0.165	0.172	0.014	0.041	0.047
04/30/1982	0.144	0.135	0.163	0.170	-0.009	0.019	0.026
05/31/1982	0.135	0.136	0.160	0.167	0.001	0.026	0.032
06/30/1982	0.121	0.141	0.164	0.172	0.020	0.043	0.051
07/31/1982	0.134	0.135	0.164	0.171	0.002	0.031	0.037

Table No. MJV-12

Panel C: Spread Between US 30-Day T-Bills and US Government Bond Yields and Utility Bonds Yields

Date	30 Day T-Bill Total Return [1]	US LT Gov't Bond Yield [2]	Moodys A Utility Bond Yield [3]	Moodys Baa Utility Bond Yield [4]	Spread (Gov't.- 30 day T-bill) [5]	Spread (A Util- 30 day T-bill) [6]	Spread (Baa Util- 30 day T-bill) [7]
08/31/1982	0.095	0.125	0.158	0.164	0.030	0.063	0.068
09/30/1982	0.063	0.118	0.154	0.157	0.055	0.091	0.094
10/31/1982	0.073	0.111	0.148	0.151	0.038	0.075	0.078
11/30/1982	0.079	0.112	0.145	0.148	0.034	0.066	0.069
12/31/1982	0.084	0.110	0.144	0.147	0.026	0.060	0.063
01/31/1983	0.086	0.111	0.142	0.146	0.026	0.057	0.060
02/28/1983	0.077	0.106	0.143	0.146	0.029	0.066	0.069
03/31/1983	0.079	0.108	0.139	0.143	0.030	0.061	0.065
04/30/1983	0.089	0.105	0.136	0.141	0.016	0.047	0.052
05/31/1983	0.086	0.111	0.135	0.141	0.025	0.049	0.054
06/30/1983	0.083	0.112	0.136	0.142	0.029	0.053	0.059
07/31/1983	0.093	0.120	0.136	0.140	0.027	0.043	0.048
08/31/1983	0.095	0.121	0.136	0.142	0.026	0.040	0.047
09/30/1983	0.095	0.116	0.134	0.141	0.021	0.039	0.046
10/31/1983	0.095	0.119	0.133	0.140	0.024	0.037	0.044
11/30/1983	0.088	0.118	0.134	0.141	0.030	0.046	0.053
12/31/1983	0.091	0.120	0.135	0.142	0.029	0.044	0.051
01/31/1984	0.095	0.118	0.134	0.141	0.023	0.039	0.046
02/29/1984	0.089	0.122	0.134	0.141	0.033	0.045	0.051
03/31/1984	0.091	0.125	0.139	0.146	0.034	0.048	0.055
04/30/1984	0.102	0.128	0.142	0.148	0.026	0.039	0.046
05/31/1984	0.098	0.138	0.149	0.153	0.040	0.051	0.055
06/30/1984	0.094	0.137	0.151	0.155	0.043	0.057	0.061
07/31/1984	0.103	0.129	0.148	0.155	0.027	0.045	0.052
08/31/1984	0.104	0.127	0.144	0.148	0.023	0.040	0.044
09/30/1984	0.108	0.124	0.142	0.145	0.015	0.034	0.037
10/31/1984	0.126	0.117	0.138	0.142	-0.009	0.012	0.015
11/30/1984	0.092	0.117	0.132	0.137	0.025	0.041	0.046
12/31/1984	0.080	0.117	0.131	0.135	0.037	0.051	0.055
01/31/1985	0.081	0.113	0.130	0.134	0.032	0.049	0.053
02/28/1985	0.072	0.121	0.131	0.134	0.049	0.059	0.063

Table No. MJV-12

Panel C: Spread Between US 30-Day T-Bills and US Government Bond Yields and Utility Bonds Yields

Date	30 Day T-Bill Total Return [1]	US LT Gov't Bond Yield [2]	Moodys A Utility Bond Yield [3]	Moodys Baa Utility Bond Yield [4]	Spread (Gov't.- 30 day T-bill) [5]	Spread (A Util- 30 day T-bill) [6]	Spread (Baa Util- 30 day T-bill) [7]
03/31/1985	0.076	0.118	0.139	0.142	0.042	0.062	0.065
04/30/1985	0.089	0.116	0.136	0.141	0.027	0.047	0.052
05/31/1985	0.083	0.106	0.131	0.136	0.024	0.049	0.054
06/30/1985	0.069	0.105	0.121	0.127	0.037	0.053	0.058
07/31/1985	0.078	0.109	0.121	0.127	0.031	0.043	0.049
08/31/1985	0.068	0.107	0.121	0.127	0.039	0.053	0.059
09/30/1985	0.075	0.108	0.121	0.127	0.033	0.046	0.052
10/31/1985	0.081	0.105	0.120	0.125	0.024	0.039	0.045
11/30/1985	0.075	0.101	0.115	0.120	0.026	0.039	0.045
12/31/1985	0.081	0.096	0.110	0.115	0.015	0.029	0.034
01/31/1986	0.069	0.096	0.108	0.112	0.027	0.039	0.043
02/28/1986	0.065	0.084	0.103	0.107	0.019	0.037	0.042
03/31/1986	0.074	0.077	0.095	0.099	0.003	0.021	0.025
04/30/1986	0.064	0.078	0.091	0.096	0.014	0.027	0.032
05/31/1986	0.061	0.085	0.096	0.100	0.024	0.035	0.039
06/30/1986	0.065	0.079	0.096	0.100	0.014	0.031	0.035
07/31/1986	0.064	0.081	0.094	0.097	0.017	0.029	0.033
08/31/1986	0.057	0.076	0.093	0.097	0.020	0.036	0.040
09/30/1986	0.055	0.083	0.095	0.100	0.027	0.040	0.044
10/31/1986	0.057	0.080	0.095	0.100	0.023	0.038	0.042
11/30/1986	0.048	0.078	0.093	0.097	0.030	0.045	0.049
12/31/1986	0.060	0.079	0.091	0.095	0.019	0.031	0.035
01/31/1987	0.051	0.078	0.090	0.093	0.027	0.039	0.042
02/28/1987	0.053	0.076	0.090	0.092	0.023	0.037	0.039
03/31/1987	0.058	0.080	0.089	0.092	0.022	0.031	0.034
04/30/1987	0.055	0.086	0.094	0.099	0.031	0.039	0.044
05/31/1987	0.046	0.088	0.099	0.104	0.042	0.053	0.058
06/30/1987	0.059	0.088	0.100	0.105	0.028	0.041	0.045
07/31/1987	0.056	0.091	0.102	0.106	0.034	0.045	0.050
08/31/1987	0.058	0.094	0.105	0.109	0.036	0.046	0.051
09/30/1987	0.056	0.099	0.112	0.116	0.044	0.057	0.060

Table No. MJV-12

Panel C: Spread Between US 30-Day T-Bills and US Government Bond Yields and Utility Bonds Yields

Date	30 Day T-Bill Total Return [1]	US LT Gov't Bond Yield [2]	Moodys A Utility Bond Yield [3]	Moodys Baa Utility Bond Yield [4]	Spread (Gov't.- 30 day T-bill) [5]	Spread (A Util- 30 day T-bill) [6]	Spread (Baa Util- 30 day T-bill) [7]
10/31/1987	0.074	0.093	0.113	0.119	0.019	0.039	0.045
11/30/1987	0.042	0.093	0.108	0.114	0.051	0.066	0.072
12/31/1987	0.048	0.092	0.110	0.116	0.044	0.062	0.068
01/31/1988	0.036	0.085	0.108	0.113	0.049	0.072	0.078
02/29/1988	0.056	0.085	0.101	0.107	0.029	0.045	0.050
03/31/1988	0.054	0.090	0.101	0.107	0.036	0.047	0.053
04/30/1988	0.057	0.093	0.105	0.112	0.036	0.049	0.055
05/31/1988	0.062	0.095	0.108	0.114	0.033	0.046	0.051
06/30/1988	0.060	0.092	0.108	0.113	0.032	0.048	0.053
07/31/1988	0.063	0.095	0.110	0.115	0.032	0.048	0.053
08/31/1988	0.074	0.095	0.112	0.117	0.021	0.038	0.043
09/30/1988	0.077	0.092	0.106	0.111	0.015	0.030	0.035
10/31/1988	0.076	0.089	0.100	0.103	0.013	0.024	0.027
11/30/1988	0.070	0.092	0.099	0.104	0.022	0.029	0.033
12/31/1988	0.079	0.092	0.101	0.104	0.013	0.022	0.026
01/31/1989	0.068	0.090	0.101	0.104	0.022	0.033	0.036
02/28/1989	0.076	0.093	0.101	0.104	0.017	0.025	0.028
03/31/1989	0.084	0.093	0.102	0.105	0.009	0.019	0.021
04/30/1989	0.084	0.092	0.102	0.105	0.008	0.018	0.021
05/31/1989	0.099	0.088	0.100	0.103	-0.011	0.001	0.004
06/30/1989	0.089	0.082	0.096	0.098	-0.006	0.008	0.009
07/31/1989	0.087	0.080	0.095	0.096	-0.007	0.008	0.010
08/31/1989	0.092	0.084	0.095	0.096	-0.008	0.003	0.004
09/30/1989	0.081	0.085	0.096	0.097	0.003	0.014	0.016
10/31/1989	0.084	0.081	0.095	0.096	-0.003	0.011	0.012
11/30/1989	0.086	0.081	0.095	0.096	-0.005	0.010	0.011
12/31/1989	0.075	0.082	0.094	0.096	0.006	0.019	0.021
01/31/1990	0.070	0.086	0.096	0.097	0.016	0.025	0.027
02/28/1990	0.070	0.088	0.098	0.100	0.017	0.027	0.029
03/31/1990	0.080	0.089	0.099	0.101	0.009	0.018	0.021
04/30/1990	0.086	0.092	0.099	0.101	0.007	0.014	0.016

Table No. MJV-12

Panel C: Spread Between US 30-Day T-Bills and US Government Bond Yields and Utility Bonds Yields

Date	30 Day T-Bill Total Return [1]	US LT Gov't Bond Yield [2]	Moodys A Utility Bond Yield [3]	Moodys Baa Utility Bond Yield [4]	Spread (Gov't.- 30 day T-bill) [5]	Spread (A Util- 30 day T-bill) [6]	Spread (Baa Util- 30 day T-bill) [7]
05/31/1990	0.084	0.088	0.100	0.102	0.004	0.016	0.017
06/30/1990	0.078	0.086	0.098	0.100	0.009	0.020	0.022
07/31/1990	0.084	0.086	0.098	0.099	0.002	0.013	0.015
08/31/1990	0.082	0.092	0.099	0.101	0.010	0.017	0.019
09/30/1990	0.074	0.091	0.101	0.103	0.017	0.027	0.029
10/31/1990	0.085	0.090	0.101	0.103	0.005	0.016	0.018
11/30/1990	0.070	0.086	0.099	0.101	0.016	0.029	0.031
12/31/1990	0.074	0.084	0.097	0.100	0.010	0.023	0.025
01/31/1991	0.064	0.084	0.097	0.100	0.020	0.033	0.036
02/28/1991	0.059	0.084	0.095	0.097	0.025	0.036	0.038
03/31/1991	0.054	0.084	0.096	0.097	0.030	0.042	0.043
04/30/1991	0.066	0.084	0.095	0.096	0.018	0.029	0.030
05/31/1991	0.058	0.085	0.094	0.096	0.026	0.036	0.038
06/30/1991	0.051	0.086	0.096	0.098	0.035	0.045	0.047
07/31/1991	0.060	0.085	0.096	0.097	0.025	0.035	0.037
08/31/1991	0.057	0.082	0.093	0.095	0.025	0.036	0.038
09/30/1991	0.056	0.079	0.092	0.093	0.023	0.036	0.037
10/31/1991	0.052	0.079	0.091	0.093	0.027	0.039	0.041
11/30/1991	0.048	0.079	0.091	0.093	0.031	0.042	0.045
12/31/1991	0.046	0.073	0.089	0.091	0.027	0.042	0.044
01/31/1992	0.041	0.078	0.088	0.090	0.036	0.047	0.048
02/29/1992	0.034	0.078	0.089	0.091	0.043	0.055	0.056
03/31/1992	0.041	0.080	0.090	0.092	0.038	0.048	0.050
04/30/1992	0.039	0.080	0.089	0.091	0.041	0.050	0.052
05/31/1992	0.034	0.078	0.089	0.090	0.044	0.055	0.056
06/30/1992	0.039	0.077	0.088	0.089	0.037	0.049	0.050
07/31/1992	0.038	0.073	0.086	0.087	0.035	0.048	0.049
08/31/1992	0.032	0.073	0.084	0.086	0.041	0.053	0.054
09/30/1992	0.032	0.071	0.084	0.085	0.039	0.052	0.054
10/31/1992	0.028	0.074	0.085	0.088	0.046	0.057	0.060
11/30/1992	0.028	0.075	0.086	0.089	0.047	0.058	0.061

Table No. MJV-12

Panel C: Spread Between US 30-Day T-Bills and US Government Bond Yields and Utility Bonds Yields

Date	30 Day T-Bill Total Return	US LT Gov't Bond Yield	Moodys A Utility Bond Yield	Moodys Baa Utility Bond Yield	Spread (Gov't.- 30 day T-bill)	Spread (A Util- 30 day T-bill)	Spread (Baa Util- 30 day T-bill)
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
12/31/1992	0.034	0.073	0.084	0.087	0.038	0.050	0.053
01/31/1993	0.028	0.073	0.083	0.086	0.045	0.055	0.058
02/28/1993	0.027	0.070	0.080	0.083	0.043	0.054	0.056
03/31/1993	0.030	0.070	0.079	0.081	0.040	0.049	0.051
04/30/1993	0.029	0.070	0.078	0.081	0.041	0.049	0.052
05/31/1993	0.027	0.070	0.079	0.082	0.043	0.052	0.055
06/30/1993	0.030	0.067	0.078	0.081	0.036	0.047	0.050
07/31/1993	0.029	0.066	0.075	0.079	0.036	0.046	0.050
08/31/1993	0.030	0.062	0.073	0.076	0.032	0.042	0.045
09/30/1993	0.032	0.063	0.070	0.074	0.031	0.039	0.042
10/31/1993	0.027	0.062	0.070	0.073	0.036	0.044	0.046
11/30/1993	0.030	0.065	0.073	0.077	0.035	0.043	0.046
12/31/1993	0.028	0.065	0.073	0.077	0.037	0.045	0.049
01/31/1994	0.030	0.064	0.073	0.077	0.033	0.043	0.046
02/28/1994	0.025	0.068	0.075	0.078	0.043	0.049	0.052
03/31/1994	0.033	0.073	0.079	0.081	0.040	0.046	0.048
04/30/1994	0.033	0.075	0.082	0.085	0.042	0.049	0.052
05/31/1994	0.039	0.076	0.083	0.086	0.037	0.044	0.047
06/30/1994	0.038	0.077	0.083	0.086	0.040	0.045	0.049
07/31/1994	0.034	0.075	0.085	0.088	0.040	0.051	0.054
08/31/1994	0.045	0.076	0.084	0.087	0.031	0.039	0.042
09/30/1994	0.045	0.080	0.086	0.090	0.035	0.041	0.044
10/31/1994	0.047	0.081	0.089	0.092	0.034	0.042	0.046
11/30/1994	0.045	0.081	0.090	0.094	0.035	0.044	0.048
12/31/1994	0.054	0.080	0.088	0.092	0.026	0.034	0.038
01/31/1995	0.052	0.078	0.087	0.092	0.026	0.036	0.040
02/28/1995	0.049	0.076	0.085	0.089	0.027	0.036	0.040
03/31/1995	0.057	0.076	0.084	0.088	0.019	0.027	0.031
04/30/1995	0.054	0.075	0.083	0.087	0.020	0.029	0.033
05/31/1995	0.067	0.068	0.079	0.083	0.001	0.012	0.016
06/30/1995	0.058	0.067	0.076	0.080	0.009	0.018	0.022

Table No. MJV-12

Panel C: Spread Between US 30-Day T-Bills and US Government Bond Yields and Utility Bonds Yields

Date	30 Day T-Bill Total Return	US LT Gov't Bond Yield	Moodys A Utility Bond Yield	Moodys Baa Utility Bond Yield	Spread (Gov't.- 30 day T-bill)	Spread (A Util- 30 day T-bill)	Spread (Baa Util- 30 day T-bill)
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
07/31/1995	0.055	0.069	0.077	0.081	0.014	0.022	0.026
08/31/1995	0.058	0.067	0.078	0.082	0.010	0.020	0.025
09/30/1995	0.053	0.066	0.076	0.080	0.013	0.023	0.027
10/31/1995	0.058	0.064	0.075	0.078	0.006	0.017	0.020
11/30/1995	0.052	0.062	0.074	0.078	0.011	0.023	0.027
12/31/1995	0.060	0.060	0.072	0.076	0.000	0.012	0.016
01/31/1996	0.053	0.061	0.072	0.076	0.008	0.019	0.024
02/29/1996	0.048	0.066	0.074	0.078	0.018	0.026	0.030
03/31/1996	0.048	0.068	0.077	0.082	0.021	0.029	0.034
04/30/1996	0.057	0.071	0.079	0.083	0.014	0.022	0.027
05/31/1996	0.052	0.072	0.080	0.085	0.020	0.028	0.033
06/30/1996	0.049	0.070	0.081	0.085	0.021	0.032	0.036
07/31/1996	0.055	0.071	0.080	0.084	0.015	0.025	0.029
08/31/1996	0.050	0.073	0.078	0.083	0.022	0.028	0.032
09/30/1996	0.054	0.070	0.080	0.084	0.016	0.026	0.030
10/31/1996	0.052	0.067	0.078	0.082	0.016	0.026	0.030
11/30/1996	0.050	0.064	0.075	0.079	0.014	0.025	0.028
12/31/1996	0.057	0.067	0.076	0.080	0.011	0.019	0.023
01/31/1997	0.055	0.069	0.078	0.082	0.014	0.022	0.026
02/28/1997	0.048	0.069	0.076	0.080	0.022	0.029	0.032
03/31/1997	0.053	0.072	0.079	0.083	0.019	0.026	0.030
04/30/1997	0.053	0.071	0.080	0.084	0.018	0.027	0.031
05/31/1997	0.060	0.070	0.079	0.083	0.010	0.018	0.022
06/30/1997	0.045	0.069	0.077	0.081	0.023	0.032	0.036
07/31/1997	0.053	0.064	0.075	0.079	0.011	0.022	0.026
08/31/1997	0.050	0.067	0.075	0.079	0.017	0.025	0.029
09/30/1997	0.054	0.065	0.075	0.078	0.011	0.021	0.024
10/31/1997	0.052	0.062	0.074	0.077	0.011	0.022	0.025
11/30/1997	0.048	0.061	0.073	0.075	0.014	0.025	0.027
12/31/1997	0.059	0.060	0.072	0.074	0.001	0.012	0.015
01/31/1998	0.053	0.059	0.070	0.073	0.006	0.018	0.020

Table No. MJV-12

Panel C: Spread Between US 30-Day T-Bills and US Government Bond Yields and Utility Bonds Yields

Date	30 Day T-Bill Total Return [1]	US LT Gov't Bond Yield [2]	Moodys A Utility Bond Yield [3]	Moodys Baa Utility Bond Yield [4]	Spread (Gov't.- 30 day T-bill) [5]	Spread (A Util- 30 day T-bill) [6]	Spread (Baa Util- 30 day T-bill) [7]
02/28/1998	0.048	0.060	0.071	0.074	0.012	0.023	0.026
03/31/1998	0.048	0.060	0.072	0.074	0.012	0.024	0.026
04/30/1998	0.053	0.060	0.072	0.074	0.008	0.019	0.021
05/31/1998	0.049	0.059	0.072	0.073	0.010	0.023	0.024
06/30/1998	0.050	0.058	0.070	0.072	0.007	0.020	0.022
07/31/1998	0.049	0.058	0.070	0.072	0.009	0.021	0.023
08/31/1998	0.053	0.055	0.070	0.072	0.002	0.017	0.019
09/30/1998	0.057	0.052	0.069	0.071	-0.005	0.013	0.015
10/31/1998	0.039	0.054	0.070	0.071	0.015	0.031	0.032
11/30/1998	0.038	0.054	0.070	0.073	0.016	0.032	0.035
12/31/1998	0.047	0.054	0.069	0.072	0.008	0.023	0.026
01/31/1999	0.043	0.054	0.070	0.073	0.011	0.027	0.030
02/28/1999	0.043	0.059	0.071	0.074	0.016	0.028	0.031
03/31/1999	0.053	0.059	0.073	0.076	0.006	0.020	0.023
04/30/1999	0.045	0.059	0.072	0.075	0.014	0.027	0.030
05/31/1999	0.042	0.062	0.075	0.077	0.020	0.033	0.036
06/30/1999	0.049	0.063	0.077	0.080	0.014	0.028	0.031
07/31/1999	0.047	0.064	0.077	0.080	0.017	0.031	0.033
08/31/1999	0.048	0.065	0.079	0.082	0.017	0.031	0.034
09/30/1999	0.048	0.065	0.079	0.082	0.017	0.031	0.034
10/31/1999	0.048	0.065	0.081	0.083	0.017	0.033	0.035
11/30/1999	0.044	0.066	0.079	0.081	0.022	0.035	0.037
12/31/1999	0.054	0.068	0.081	0.083	0.014	0.027	0.029

Table No. MJV-12

Panel C: Spread Between US 30-Day T-Bills and US Government Bond Yields and Utility Bonds Yields

Date	30 Day T-Bill Total Return [1]	US LT Gov't Bond Yield [2]	Moodys A Utility Bond Yield [3]	Moodys Baa Utility Bond Yield [4]	Spread (Gov't.- 30 day T-bill) [5]	Spread (A Util- 30 day T-bill) [6]	Spread (Baa Util- 30 day T-bill) [7]
01/31/2000	0.050	0.067	0.084	0.084	0.016	0.033	0.034
02/29/2000	0.053	0.065	0.083	0.083	0.012	0.030	0.030
03/31/2000	0.058	0.062	0.083	0.084	0.004	0.025	0.026
04/30/2000	0.057	0.063	0.083	0.084	0.006	0.026	0.027
05/31/2000	0.062	0.064	0.087	0.089	0.002	0.025	0.027
06/30/2000	0.049	0.062	0.084	0.085	0.013	0.035	0.036
07/31/2000	0.059	0.061	0.083	0.083	0.002	0.023	0.024
08/31/2000	0.062	0.059	0.081	0.083	-0.002	0.020	0.021
09/30/2000	0.063	0.061	0.082	0.083	-0.002	0.019	0.020
10/31/2000	0.069	0.060	0.081	0.083	-0.009	0.012	0.014
11/30/2000	0.063	0.058	0.081	0.083	-0.005	0.018	0.020
12/31/2000	0.062	0.056	0.078	0.080	-0.006	0.017	0.018
01/31/2001	0.067	0.056	0.078	0.080	-0.011	0.011	0.013
02/28/2001	0.047	0.055	0.077	0.079	0.008	0.031	0.033
03/31/2001	0.052	0.056	0.077	0.079	0.004	0.025	0.027
04/30/2001	0.048	0.059	0.079	0.081	0.011	0.032	0.033
05/31/2001	0.039	0.059	0.080	0.081	0.020	0.041	0.042
06/30/2001	0.034	0.059	0.079	0.080	0.025	0.044	0.046
07/31/2001	0.037	0.056	0.078	0.081	0.020	0.041	0.044
08/31/2001	0.038	0.055	0.076	0.080	0.017	0.038	0.042
09/30/2001	0.034	0.054	0.078	0.081	0.020	0.043	0.047
10/31/2001	0.027	0.051	0.076	0.080	0.024	0.050	0.053
11/30/2001	0.021	0.055	0.076	0.080	0.035	0.055	0.059
12/31/2001	0.018	0.058	0.078	0.083	0.039	0.060	0.065
01/31/2002	0.017	0.057	0.077	0.081	0.040	0.060	0.064
02/28/2002	0.016	0.056	0.075	0.082	0.041	0.060	0.066

Table No. MJV-12

Panel C: Spread Between US 30-Day T-Bills and US Government Bond Yields and Utility Bonds Yields

Date	30 Day T-Bill Total Return [1]	US LT Gov't Bond Yield [2]	Moodys A Utility Bond Yield [3]	Moodys Baa Utility Bond Yield [4]	Spread (Gov't.- 30 day T-bill) [5]	Spread (A Util- 30 day T-bill) [6]	Spread (Baa Util- 30 day T-bill) [7]
03/31/2002	0.016	0.060	0.078	0.083	0.045	0.062	0.067
04/30/2002	0.018	0.058	0.076	0.083	0.039	0.058	0.064
05/31/2002	0.017	0.058	0.075	0.083	0.041	0.058	0.066
06/30/2002	0.016	0.057	0.074	0.083	0.041	0.058	0.067
07/31/2002	0.018	0.054	0.073	0.081	0.036	0.055	0.063
08/31/2002	0.017	0.051	0.072	0.077	0.034	0.055	0.060
09/30/2002	0.017	0.048	0.071	0.076	0.031	0.054	0.059
10/31/2002	0.017	0.051	0.072	0.080	0.034	0.055	0.063
11/30/2002	0.014	0.052	0.071	0.078	0.038	0.057	0.063
12/31/2002	0.013	0.048	0.071	0.076	0.035	0.057	0.063
01/31/2003	0.012	0.050	0.071	0.075	0.037	0.059	0.063
02/28/2003	0.011	0.047	0.069	0.072	0.036	0.058	0.061
03/31/2003	0.012	0.049	0.068	0.071	0.037	0.056	0.058
04/30/2003	0.012	0.048	0.066	0.069	0.036	0.054	0.057
05/31/2003	0.013	0.044	0.064	0.065	0.030	0.050	0.051
06/30/2003	0.012	0.045	0.062	0.063	0.033	0.050	0.051
07/31/2003	0.008	0.054	0.066	0.067	0.046	0.057	0.058
08/31/2003	0.008	0.053	0.068	0.071	0.045	0.059	0.062
09/30/2003	0.010	0.049	0.066	0.069	0.039	0.056	0.059
10/31/2003	0.008	0.052	0.064	0.068	0.043	0.056	0.059
11/30/2003	0.008	0.052	0.064	0.067	0.043	0.055	0.058
12/31/2003	0.010	0.051	0.063	0.066	0.041	0.053	0.056
01/31/2004	0.008	0.050	0.062	0.065	0.041	0.053	0.056
02/29/2004	0.007	0.048	0.062	0.063	0.041	0.054	0.056
03/31/2004	0.011	0.047	0.060	0.061	0.037	0.049	0.050
04/30/2004	0.010	0.053	0.064	0.065	0.043	0.054	0.055
05/31/2004	0.007	0.054	0.066	0.068	0.047	0.059	0.060
06/30/2004	0.010	0.053	0.065	0.068	0.044	0.055	0.059
07/31/2004	0.012	0.052	0.063	0.067	0.040	0.051	0.055
08/31/2004	0.013	0.049	0.061	0.065	0.036	0.048	0.051
09/30/2004	0.013	0.049	0.060	0.063	0.036	0.047	0.049

Table No. MJV-12

Panel C: Spread Between US 30-Day T-Bills and US Government Bond Yields and Utility Bonds Yields

Date	30 Day T-Bill Total Return	US LT Gov't Bond Yield	Moodys A Utility Bond Yield	Moodys Baa Utility Bond Yield	Spread (Gov't.- 30 day T-bill)	Spread (A Util- 30 day T-bill)	Spread (Baa Util- 30 day T-bill)
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
10/31/2004	0.013	0.048	0.059	0.062	0.035	0.046	0.048
11/30/2004	0.018	0.050	0.060	0.062	0.032	0.042	0.043
12/31/2004	0.019	0.048	0.059	0.061	0.029	0.040	0.042
01/31/2005	0.019	0.047	0.058	0.060	0.027	0.038	0.040
02/28/2005	0.019	0.048	0.056	0.058	0.029	0.037	0.038
Average Spread -- January 1980 to February 2005					**0.021**	**0.036**	**0.040**
Average Spread -- January 1990 to August 1998					**0.023**	**0.033**	**0.036**
Average Spread -- January 1990 to December 2000					**0.020**	**0.032**	**0.034**
Average Spread -- January 1990 to February 2005					**0.024**	**0.037**	**0.040**
Average Spread -- December 2000 to December 2001					**0.016**	**0.038**	**0.040**
Average Spread -- December 2000 to December 2002					**0.026**	**0.047**	**0.052**
Average Spread -- December 2000 to February 2005					**0.032**	**0.049**	**0.053**
Average Spread -- January 2001 to December 2001					**0.018**	**0.039**	**0.042**
Average Spread -- January 2002 to December 2002					**0.038**	**0.057**	**0.064**
Average Spread -- January 2004 to February 2005					**0.037**	**0.048**	**0.050**

Sources and Notes:

[1] - [2]: Ibbotson Associates Yearbook.

[3] -[4]: Mergent Bond Records.

[5]: [2] - [1].

[6]: [3] - [1].

[7]: [4] - [1].

Table No. MJV-13

2004 Gas LDC Sample

Percentage of Revenue from Regulated Activity

Company		State [1]	Restructuring Status [2]	2004 [3]	2003 [4]	2002 [5]	2001 [6]	2000 [7]	Average [8]
Cascade Natural Gas Corp	*	WA	5	100%	100%	100%	100%	100%	100%
Keyspan Corp		NY	1	66%	64%	58%	54%	50%	59%
Laclede Group Inc	*	MO	5	100%	100%	100%	92%	93%	97%
Northwest Natural Gas Co	*	OR	5	98%	97%	97%	98%	100%	98%
Peoples Energy Corp	*	IL	3	66%	71%	72%	81%	79%	74%
South Jersey Industries Inc	*	NJ	1	70%	77%	82%	87%	87%	81%
Southwest Gas Corp	*	NJ	1	85%	84%	84%	85%	84%	85%
Wgl Holdings Inc		DC	1	62%	64%	59%	75%	83%	68%

Sources and Notes:

[1]: Compustat as of April 05.

[2]: Workpaper #1 to Table No. MJV-13.

[3] - [7]: Workpaper #2 to Table No. MJV-13; Panel's A - H.

[8]: {[3] + [4] + [5] + [6] + [7]} / 5.

* Companies marked with an asterisk represent the companies whose 5-year average revenues from regulated activities is greater than 70%.

Workpaper #1 to Table No. MJV-13

2004 Gas LDC Sample

Restructuring Status of Each State as of Dec. 04

State	Restructuring Status
AK	5
AL	5
AR	5
AZ	5
CA	2
CO	2
CT	5
DC	1
DE	6
FL	3
GA	2
HI	5
IA	4
ID	5
IL	3
IN	3
KS	4
KY	3
LA	5
MA	2
MD	2
ME	4
MI	2
MN	4
MO	5
MS	5
MT	3
NC	5
ND	5
NE	3
NH	4
NJ	1
NM	1
NV	4
NY	1
OH	2
OK	4
OR	5
PA	1
RI	5
SC	5
SD	3
TN	5
TX	5
UT	5
VA	2
VT	4
WA	5
WI	6
WV	1
WY	3

Sources and Notes:

"Status of Natural Gas Residential Choice Programs by State as of December 2004"
by the Energy Information Administration, dated December, 2004.

1: Statewide unbundling - 100% eligibility.
2: Statewide unbundling - implementation phase.
3: Pilot programs / partial unbundling.
4: No unbundling - considering action.
5: No unbundling.
6: Pilot program discontinued.

http://www.eia.doe.gov/oil_gas/natural_gas/restructure/restructure.html

Workpaper #2 to Table No. MJV-13

2004 Gas LDC Sample: Revenue Breakdown

Panel A: Cascade Natural Gas Corp ($MM)

	% total 2004	2004	2003	2002	2001	2000
Operating Revenues*	100%	318.08	302.76	320.98	335.81	241.94
Estimated % Regulated Revenues (includes *)	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Sources and Notes:
Cascade Natural Gas Corp's 2000 - 2004 10-Ks.
Revenue amounts reflect restated numbers in later 10-Ks.

Workpaper #2 to Table No. MJV-13

2004 Gas LDC Sample: Revenue Breakdown

Panel B: KeySpan Corp ($MM)

	% total 2004	2004	2003	2002	2001	2000
Operating Revenues						
Gas Distribution*	66%	4407.29	4161.27	3163.76	3613.55	2555.79
Electric Services	26%	1738.66	1606.07	1645.79	1421.08	1444.71
Energy Services and Other	3%	193.92	166.38	208.62	1100.17	770.11
Gas Exploration and Production	4%	280.00	501.26	357.45	-	-
Energy Investments and Other	1%	46.99	113.12	90.78	498.32	310.10
Eliminations	0%	-16.39	-12.58	-1.23	-	-
Total Revenues	**100%**	**6650.47**	**6535.52**	**5465.17**	**6633.12**	**5080.70**
Estimated % Regulated Revenues (includes *)	**66%**	**66%**	**64%**	**58%**	**54%**	**50%**

Sources and Notes:
Keyspan Corp's 2000 - 2004 10-Ks.
Revenue amounts reflect restated numbers in later 10-Ks.
Segment revenues include intersegment revenues.

Workpaper #2 to Table No. MJV-13

2004 Gas LDC Sample: Revenue Breakdown

Panel C: Laclede Group ($MM)

	% total 2004	2004	2003	2002	2001	2000
Operating Revenues						
(Gas) Utility*	100%	868.91	774.77	592.10	923.24	529.25
Non-Regulated Services	0%	2.58	2.39	2.52	-	-
All Other (non-utility)	-	-	-	-	78.87	36.88
Total Revenues	**100%**	**871.48**	**777.16**	**594.62**	**1002.11**	**566.13**
Estimated % Regulated Revenues (includes *)	**100%**	**100%**	**100%**	**100%**	**92%**	**93%**

Sources and Notes:
Laclede Group Inc's 2000 - 2004 10-Ks.
Revenue amounts reflect restated numbers in later 10-Ks.

Workpaper #2 to Table No. MJV-13

2004 Gas LDC Sample: Revenue Breakdown

Panel D: Northwest Nat. Gas ($MM)

	% total 2004	2004	2003	2002	2001	2000
Operating Revenues						
Utility*	98%	301.769	278.856	279.414	271.47	257.36
Interstate Gas Storage	2%	6.423	9.036	7.944	-	-
Other	0%	0.168	0.174	0.186	-	-
Non-Utility Net Operating Revenues	-	-	-	-	4.54	0.59
Net Operating Revenues	**100%**	**308.36**	**288.066**	**287.544**	**276.011**	**257.95**
Estimated % Regulated Revenues (includes *)	**98%**	**98%**	**97%**	**97%**	**98%**	**100%**

Sources and Notes:
Northwest Natural Gas Co's 2000 - 2004 10-Ks.
Revenue amounts reflect restated numbers in later 10-Ks.

Workpaper #2 to Table No. MJV-13

2004 Gas LDC Sample: Revenue Breakdown

Panel E: Peoples Energy ($MM)

	% total 2004	2004	2003	2002	2001	2000
Operating Revenues						
Gas Distribution*	66%	1494.46	1512.44	1067.30	1835.43	1116.14
Power Generation Segment	-	-	-	4.62	-	-
Midstream Services Segment	16%	362.85	306.83	193.00	131.96	132.72
Retail Energy Services Segment	14%	323.43	251.11	167.79	256.54	142.23
Oil and Gas Production Segment	5%	123.78	106.36	65.71	53.99	31.14
Other Segment	0%	0.26	0.20	0.05	0.12	0.04
Corporate and Adjustment	-2%	-44.58	-38.55	-15.93	-7.81	-4.74
Total Revenues	**100%**	**2260.20**	**2138.39**	**1482.53**	**2270.22**	**1417.53**
Estimated % Regulated Revenues (includes *)	**66%**	**66%**	**71%**	**72%**	**81%**	**79%**

Sources and Notes:

Peoples Energy Corp's 2000 - 2004 10-Ks.

Revenue amounts reflect restated numbers in later 10-Ks.

Workpaper #2 to Table No. MJV-13

2004 Gas LDC Sample: Revenue Breakdown

Panel F: South Jersey Ind. ($MM)

	% total 2004	2004	2003	2002	2001	2000
Operating Revenues						
Gas Utility Operations*	61%	502.47	526.85	415.64	475.46	445.82
Wholesale Gas Operations	2%	18.06	10.56	5.00	6.14	-
Retail Gas and Other Operations	26%	213.79	175.51	112.00	96.75	82.76
Retail Electric Operations*	9%	72.85	14.87	2.70	-	-
On-site Energy Production	3%	20.87	12.74	0.85	-	-
Appliance Service Operations	2%	12.73	9.60	8.39	-	-
Intersegment Revenues	-3%	-21.69	-44.92	-32.69	-32.37	-15.96
Total Operatings Revenues	**100%**	**819.08**	**705.20**	**511.89**	**545.99**	**512.62**
Estimated % Regulated Revenues (includes *)	**70%**	**70%**	**77%**	**82%**	**87%**	**87%**

Sources and Notes:

South Jersey Industries Inc's 2000 - 2004 10-Ks.

Revenue amounts reflect restated numbers in later 10-Ks.

Revenues "Retail Electric Operations" are assumed to be generated from regulated activities.

Workpaper #2 to Table No. MJV-13

2004 Gas LDC Sample: Revenue Breakdown

Panel G: Southwest Gas ($MM)

	% total 2004	2004	2003	2002	2001	2000
Operating Revenues:						
Gas Operating Revenues*	85%	1262.05	1034.35	1115.90	1193.10	870.71
Constructions Revenues	15%	215.01	196.65	205.01	203.59	163.38
Total Operating Revenues	**100%**	**1477.06**	**1231.00**	**1320.91**	**1396.69**	**1034.09**
Estimated % Regulated Revenues (includes *)	**85%**	**85%**	**84%**	**84%**	**85%**	**84%**

Sources and Notes:
Southwest Gas Corp's 2000 - 2004 10-Ks.
Revenue amounts reflect restated numbers in later 10-Ks.
Segment revenues include intersegment revenues.

Workpaper #2 to Table No. MJV-13

2004 Gas LDC Sample: Revenue Breakdown

Panel H: WGL Holdings Inc. ($MM)

	% total 2004	2004	2003	2002	2001	2000
Operating Revenues						
Regulated Utility*	62%	1293.68	1313.04	938.80	1446.46	1031.11
Retail Energy Marketing	38%	789.86	726.23	595.87	419.23	166.71
HVAC	1%	30.12	35.52	61.89	70.28	47.47
Other Activities	0%	1.67	1.44	1.92	3.56	3.91
Eliminations / Other	-1%	-25.73	-11.98	-13.67	-	-
Total Operating Revenues	**100%**	**2089.60**	**2064.25**	**1584.80**	**1939.52**	**1249.19**
Estimated % Regulated Revenues (includes *)	**62%**	**62%**	**64%**	**59%**	**75%**	**83%**

Sources and Notes:
Wgl Holdings Inc's 2000 - 2004 10-Ks.
Revenue amounts reflect restated numbers in later 10-Ks.

Table No. MJV-14

Market Value of the 2004 Gas LDC Sample

Panel A: Cascade Natural Gas Corp

($MM)

	DCF Capital Structure	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Year End, 2000	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$123	$123	$119	$118	$125	$125	[a]
Shares Outstanding (in millions) - Common	11	11	11	11	11	11	[b]
Price per Share - Common	$20.23	$21.31	$21.47	$20.07	$21.74	$19.99	[c]
Market Value of Common Equity	$228	$241	$240	$222	$240	$221	[d] = [b] x [c].
Market to Book Value of Common Equity	1.86	1.96	2.02	1.88	1.92	1.77	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$86	$86	$67	$62	$67	$72	[h]
Current Liabilities	$116	$116	$83	$50	$60	$76	[i]
Current Portion of Long-Term Debt	$14	$14	$22	$0	$0	$0	[j]
Net Working Capital	($16)	($16)	$6	$12	$7	($4)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$34	$34	$4	$0	$40	$2	[l]
Adjusted Short-Term Debt	$16	$16	$0	$0	$0	$2	[m] = See Sources and Notes.
Long-Term Debt	$129	$129	$139	$165	$165	$125	[n]
Book Value of Long-Term Debt	$143	$143	$161	$165	$165	$125	[o] = [n] + [j].
Market Value of Long-Term Debt	$143	$143	$161	$165	$165	$125	[p] = [o].
Market Value of Debt	$158	$158	$161	$165	$165	$127	[q] = [p] + [m].
MARKET VALUE OF FIRM							
	$387	$399	$401	$387	$405	$347	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	59.04%	60.29%	59.86%	57.34%	59.28%	63.57%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	[t] = [g] / [r].
Debt - Market Value Ratio	40.96%	39.71%	40.14%	42.66%	40.72%	36.43%	[u] = [q] / [r].

Sources and Notes:
Compustat as of April 2005.
The DCF Capital structure is calculated using Year End 2004 balance sheet information and a 15-trading day average price ending on 4/1/2005.
Prices are reported in Workpaper #1 to Table No. MJV-17.
[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-14

Market Value of the 2004 Gas LDC Sample

Panel B: Keyspan Corp

($MM)

	DCF Capital Structure	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Year End, 2000	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$3,895	$3,895	$3,662	$2,945	$2,891	$2,816	[a]
Shares Outstanding (in millions) - Common	161	161	160	142	139	136	[b]
Price per Share - Common	$39.12	$39.44	$36.77	$35.21	$34.64	$42.13	[c]
Market Value of Common Equity	$6,291	$6,342	$5,871	$5,014	$4,830	$5,744	[d] = [b] x [c].
Market to Book Value of Common Equity	1.62	1.63	1.60	1.70	1.67	2.04	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$20	$20	$84	$84	$84	$84	[f]
Market Value of Preferred Equity	$20	$20	$84	$84	$84	$84	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$3,079	$3,079	$2,387	$2,216	$1,998	$2,403	[h]
Current Liabilities	$2,282	$2,282	$1,849	$2,220	$2,385	$2,974	[i]
Current Portion of Long-Term Debt	$16	$16	$1	$11	$1	$5	[j]
Net Working Capital	$812	$812	$540	$8	($385)	($565)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$912	$912	$482	$916	$1,048	$1,300	[l]
Adjusted Short-Term Debt	$0	$0	$0	$0	$385	$565	[m] = See Sources and Notes.
Long-Term Debt	$4,419	$4,419	$5,611	$5,224	$4,698	$4,275	[n]
Book Value of Long-Term Debt	$4,435	$4,435	$5,613	$5,235	$4,699	$4,280	[o] = [n] + [j].
Market Value of Long-Term Debt	$4,435	$4,435	$5,613	$5,235	$4,699	$4,280	[p] = [o].
Market Value of Debt	$4,435	$4,435	$5,613	$5,235	$5,084	$4,846	[q] = [p] + [m].
MARKET VALUE OF FIRM							
	$10,746	$10,797	$11,568	$10,334	$9,998	$10,674	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	58.55%	58.74%	50.76%	48.52%	48.31%	53.81%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	0.18%	0.18%	0.72%	0.81%	0.84%	0.79%	[t] = [g] / [r].
Debt - Market Value Ratio	41.27%	41.08%	48.52%	50.66%	50.85%	45.40%	[u] = [q] / [r].

Sources and Notes:
Compustat as of April 2005.
The DCF Capital structure is calculated using Year End 2004 balance sheet information and a 15-trading day average price ending on 4/1/2005.
Prices are reported in Workpaper #1 to Table No. MJV-17.
[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-14

Market Value of the 2004 Gas LDC Sample

Panel C: Laclede Group Inc

($MM)

	DCF Capital Structure	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Year End, 2000	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$369	$369	$309	$295	$289	$295	[a]
Shares Outstanding (in millions) - Common	21	21	19	19	19	19	[b]
Price per Share - Common	$29.80	$31.19	$29.32	$24.20	$23.78	$23.85	[c]
Market Value of Common Equity	$627	$656	$561	$459	$449	$450	[d] = [b] x [c].
Market to Book Value of Common Equity	1.70	1.78	1.81	1.55	1.55	1.53	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$1	$1	$1	$1	$1	$2	[f]
Market Value of Preferred Equity	$1	$1	$1	$1	$1	$2	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$465	$465	$378	$300	$242	$349	[h]
Current Liabilities	$401	$401	$455	$360	$262	$363	[i]
Current Portion of Long-Term Debt	$25	$25	$0	$25	$0	$0	[j]
Net Working Capital	$89	$89	($77)	($35)	($19)	($14)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$71	$71	$218	$162	$117	$127	[l]
Adjusted Short-Term Debt	$0	$0	$77	$35	$19	$14	[m] = See Sources and Notes.
Long-Term Debt	$380	$380	$280	$305	$284	$234	[n]
Book Value of Long-Term Debt	$406	$406	$280	$330	$284	$234	[o] = [n] + [j].
Market Value of Long-Term Debt	$406	$406	$280	$330	$284	$234	[p] = [o].
Market Value of Debt	$406	$406	$357	$365	$304	$249	[q] = [p] + [m].
MARKET VALUE OF FIRM	$1,033	$1,062	$919	$825	$754	$701	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	60.64%	61.73%	61.01%	55.64%	59.53%	64.24%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	0.11%	0.10%	0.14%	0.15%	0.17%	0.25%	[t] = [g] / [r].
Debt - Market Value Ratio	39.25%	38.17%	38.86%	44.21%	40.30%	35.51%	[u] = [q] / [r].

Sources and Notes:

Compustat as of April 2005.

The DCF Capital structure is calculated using Year End 2004 balance sheet information and a 15-trading day average price ending on 4/1/2005.

Prices are reported in Workpaper #1 to Table No. MJV-17.

[m] =

(1): 0 if [k] > 0.

(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].

(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-14

Market Value of the 2004 Gas LDC Sample

Panel D: Northwest Natural Gas Co

($MM)

	DCF Capital Structure	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Year End, 2000	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$569	$569	$506	$483	$468	$452	[a]
Shares Outstanding (in millions) - Common	28	28	26	26	25	25	[b]
Price per Share - Common	$35.86	$33.68	$31.01	$27.18	$25.79	$26.79	[c]
Market Value of Common Equity	$988	$928	$804	$695	$651	$676	[d] = [b] x [c].
Market to Book Value of Common Equity	1.74	1.63	1.59	1.44	1.39	1.49	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$0	$0	$0	$8	$34	$35	[f]
Market Value of Preferred Equity	$0	$0	$0	$8	$34	$35	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$237	$237	$200	$194	$210	$187	[h]
Current Liabilities	$267	$267	$214	$205	$274	$221	[i]
Current Portion of Long-Term Debt	$15	$15	$0	$20	$40	$20	[j]
Net Working Capital	($15)	($15)	($15)	$9	($23)	($14)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$103	$103	$85	$70	$108	$56	[l]
Adjusted Short-Term Debt	$15	$15	$15	$0	$23	$14	[m] = See Sources and Notes.
Long-Term Debt	$484	$484	$500	$446	$378	$401	[n]
Book Value of Long-Term Debt	$499	$499	$500	$466	$418	$421	[o] = [n] + [j].
Market Value of Long-Term Debt	$499	$499	$500	$466	$418	$421	[p] = [o].
Market Value of Debt	$514	$514	$515	$466	$442	$435	[q] = [p] + [m].
MARKET VALUE OF FIRM	$1,502	$1,442	$1,319	$1,170	$1,126	$1,145	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	65.77%	64.34%	60.95%	59.46%	57.77%	59.01%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	-	-	-	0.71%	3.02%	3.03%	[t] = [g] / [r].
Debt - Market Value Ratio	34.23%	35.66%	39.05%	39.84%	39.21%	37.96%	[u] = [q] / [r].

Sources and Notes:

Compustat as of April 2005.

The DCF Capital structure is calculated using Year End 2004 balance sheet information and a 15-trading day average price ending on 4/1/2005.

Prices are reported in Workpaper #1 to Table No. MJV-17.

[m] =

(1): 0 if [k] > 0.

(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].

(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-14

Market Value of the 2004 Gas LDC Sample

Panel E: Peoples Energy Corp

($MM)

	DCF Capital Structure	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Year End, 2000	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$884	$884	$863	$815	$809	$766	[a]
Shares Outstanding (in millions) - Common	38	38	37	36	35	35	[b]
Price per Share ($) - Common	$42.72	$44.28	$42.02	$38.55	$38.18	$45.11	[c]
Market Value of Common Equity	$1,618	$1,677	$1,554	$1,371	$1,353	$1,596	[d] = [b] x [c].
Market to Book Value of Common Equity	1.83	1.90	1.80	1.68	1.67	2.08	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$801	$801	$702	$581	$562	$927	[h]
Current Liabilities	$715	$715	$744	$998	$797	$1,308	[i]
Current Portion of Long-Term Debt	$0	$0	$0	$90	$100	$0	[j]
Net Working Capital	$85	$85	($42)	($327)	($135)	($381)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$56	$56	$208	$288	$507	$568	[l]
Adjusted Short-Term Debt	$0	$0	$42	$288	$135	$381	[m] = See Sources and Notes.
Long-Term Debt	$897	$897	$846	$529	$644	$419	[n]
Book Value of Long-Term Debt	$897	$897	$846	$619	$744	$419	[o] = [n] + [j].
Market Value of Long-Term Debt	$897	$897	$846	$619	$744	$419	[p] = [o].
Market Value of Debt	$897	$897	$889	$907	$879	$800	[q] = [p] + [m].
MARKET VALUE OF FIRM							
	$2,515	$2,574	$2,443	$2,278	$2,233	$2,396	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	64.33%	65.14%	63.62%	60.18%	60.61%	66.61%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	[t] = [g] / [r].
Debt - Market Value Ratio	35.67%	34.86%	36.38%	39.82%	39.39%	33.39%	[u] = [q] / [r].

Sources and Notes:
Compustat as of April 2005.
The DCF Capital structure is calculated using Year End 2004 balance sheet information and a 15-trading day average price ending on 4/1/2005.
Prices are reported in Workpaper #1 to Table No. MJV-17.
[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-14

Market Value of the 2004 Gas LDC Sample

Panel F: South Jersey Industries Inc

($MM)

	DCF Capital Structure	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Year End, 2000	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$344	$344	$298	$238	$220	$202	[a]
Shares Outstanding (in millions) - Common	14	14	13	12	12	12	[b]
Price per Share ($) - Common	$56.20	$52.46	$40.42	$33.06	$33.09	$29.44	[c]
Market Value of Common Equity	$780	728.14	534.66	403.53	392.46	338.53	[d] = [b] x [c].
Market to Book Value of Common Equity	2.26	2.11	1.79	1.70	1.78	1.68	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$2	$2	$2	$2	$2	$2	[f]
Market Value of Preferred Equity	$2	$2	$2	$2	$2	$2	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$284	$284	$266	$213	$222	$175	[h]
Current Liabilities	$285	$285	$268	$317	$310	$257	[i]
Current Portion of Long-Term Debt	$5	$5	$5	$11	$10	$12	[j]
Net Working Capital	$4	$4	$3	($93)	($78)	($70)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$92	$92	$113	$167	$152	$121	[l]
Adjusted Short-Term Debt	$0	$0	$0	$93	$78	$70	[m] = See Sources and Notes.
Long-Term Debt	$329	$329	$309	$273	$294	$240	[n]
Book Value of Long-Term Debt	$334	$334	$314	$284	$304	$252	[o] = [n] + [j].
Market Value of Long-Term Debt	$334	$334	$314	$284	$304	$252	[p] = [o].
Market Value of Debt	$334	$334	$314	$377	$382	$322	[q] = [p] + [m].
MARKET VALUE OF FIRM							
	$1,116	$1,064	$850	$782	$776	$663	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	69.90%	68.43%	62.87%	51.59%	50.54%	51.10%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	0.15%	0.16%	0.20%	0.22%	0.22%	0.27%	[t] = [g] / [r].
Debt - Market Value Ratio	29.95%	31.41%	36.93%	48.19%	49.24%	48.63%	[u] = [q] / [r].

Sources and Notes:

Compustat as of April 2005.

The DCF Capital structure is calculated using Year End 2004 balance sheet information and a 15-trading day average price ending on 4/1/2005.

Prices are reported in Workpaper #1 to Table No. MJV-17.

[m] =

(1): 0 if [k] > 0.

(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].

(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-14

Market Value of the 2004 Gas LDC Sample

Panel G: Southwest Gas Corp

($MM)

	DCF Capital Structure	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Year End, 2000	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$706	$706	$630	$596	$561	$533	[a]
Shares Outstanding (in millions) - Common	37	37	34	33	32	32	[b]
Price per Share ($) - Common	$24.55	$25.49	$22.89	$23.14	$22.69	$21.91	[c]
Market Value of Common Equity	$903	$938	$784	$770	$737	$695	[d] = [b] x [c].
Market to Book Value of Common Equity	1.28	1.33	1.24	1.29	1.31	1.30	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$432	$432	$281	$262	$400	$403	[h]
Current Liabilities	$483	$483	$310	$313	$653	$482	[i]
Current Portion of Long-Term Debt	$30	$30	$6	$9	$308	$8	[j]
Net Working Capital	($21)	($21)	($23)	($43)	$55	($70)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$100	$100	$52	$53	$93	$131	[l]
Adjusted Short-Term Debt	$21	$21	$23	$43	$0	$70	[m] = See Sources and Notes.
Long-Term Debt	$1,263	$1,263	$1,221	$1,152	$856	$956	[n]
Book Value of Long-Term Debt	$1,293	$1,293	$1,228	$1,161	$1,164	$965	[o] = [n] + [j].
Market Value of Long-Term Debt	$1,293	$1,293	$1,228	$1,161	$1,164	$965	[p] = [o].
Market Value of Debt	$1,314	$1,314	$1,250	$1,204	$1,164	$1,035	[q] = [p] + [m].
MARKET VALUE OF FIRM	$2,217	$2,252	$2,034	$1,974	$1,901	$1,730	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	40.74%	41.65%	38.53%	39.03%	38.78%	40.17%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	[t] = [g] / [r].
Debt - Market Value Ratio	59.26%	58.35%	61.47%	60.97%	61.22%	59.83%	[u] = [q] / [r].

Sources and Notes:
Compustat as of April 2005.
The DCF Capital structure is calculated using Year End 2004 balance sheet information and a 15-trading day average price ending on 4/1/2005.
Prices are reported in Workpaper #1 to Table No. MJV-17.
[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-14

Market Value of the 2004 Gas LDC Sample

Panel H: Wgl Holdings Inc

($MM)

	DCF Capital Structure	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Year End, 2000	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$881	$881	$843	$802	$803	$748	[a]
Shares Outstanding (in millions) - Common	49	49	49	49	49	46	[b]
Price per Share ($) - Common	$31.12	$31.01	$28.11	$24.01	$29.22	$30.59	[c]
Market Value of Common Equity	$1,515	$1,509	$1,367	$1,167	$1,419	$1,422	[d] = [b] x [c].
Market to Book Value of Common Equity	1.72	1.71	1.62	1.45	1.77	1.90	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$28	$28	$28	$28	$28	$28	[f]
Market Value of Preferred Equity	$28	$28	$28	$28	$28	$28	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$631	$631	$591	$513	$476	$641	[h]
Current Liabilities	$627	$627	$552	$529	$422	$594	[i]
Current Portion of Long-Term Debt	$61	$61	$12	$42	$48	$2	[j]
Net Working Capital	$65	$65	$51	$26	$102	$48	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$96	$96	$167	$91	$134	$161	[l]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	[m] = See Sources and Notes.
Long-Term Debt	$574	$574	$638	$623	$613	$578	[n]
Book Value of Long-Term Debt	$634	$634	$650	$666	$661	$579	[o] = [n] + [j].
Market Value of Long-Term Debt	$634	$634	$650	$666	$661	$579	[p] = [o].
Market Value of Debt	$634	$634	$650	$666	$661	$579	[q] = [p] + [m].
MARKET VALUE OF FIRM	$2,177	$2,172	$2,045	$1,860	$2,108	$2,029	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	69.57%	69.49%	66.85%	62.71%	67.30%	70.06%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	1.29%	1.30%	1.38%	1.51%	1.34%	1.39%	[t] = [g] / [r].
Debt - Market Value Ratio	29.13%	29.21%	31.78%	35.78%	31.36%	28.56%	[u] = [q] / [r].

Sources and Notes:
Compustat as of April 2005.
The DCF Capital structure is calculated using Year End 2004 balance sheet information and a 15-trading day average price ending on 4/1/2005.
Prices are reported in Workpaper #1 to Table No. MJV-17.
[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-15

2004 Gas LDC Sample

Capital Structure Summary

Company	DCF Capital Structure			5-Year Average Capital Structure		
	Common Equity - Value Ratio [1]	Preferred Equity - Value Ratio [2]	Debt - Value Ratio [3]	Common Equity - Value Ratio [4]	Preferred Equity - Value Ratio [5]	Debt - Value Ratio [6]
Cascade Natural Gas Corp	0.59	-	0.41	0.60	-	0.40
Keyspan Corp	0.59	0.00	0.41	0.52	0.01	0.47
Laclede Group Inc	0.61	0.00	0.39	0.60	0.00	0.39
Northwest Natural Gas Co	0.66	-	0.34	0.60	0.01	0.38
Peoples Energy Corp	0.64	-	0.36	0.63	-	0.37
South Jersey Industries Inc	0.70	0.00	0.30	0.57	0.00	0.43
Southwest Gas Corp	0.41	-	0.59	0.40	-	0.60
Wgl Holdings Inc	0.70	0.01	0.29	0.67	0.01	0.31

Sources and Notes:
[1], [4]: Workpaper #1 to Table No. MJV-15.
[2], [5]: Workpaper #2 to Table No. MJV-15.
[3], [6]: Workpaper #3 to Table No. MJV-15.
Values in this table may not add up to one because of rounding.

Workpaper #1 to Table No. MJV-15

2004 Gas LDC Sample

Calculation of the Average Common Equity - Market Value Ratio from 2000 to 2004

Company	DCF Capital Structure [1]	2004 [2]	2003 [3]	2002 [4]	2001 [5]	2000 [6]	5-Year Average [7]
Cascade Natural Gas Corp	0.59	0.60	0.60	0.57	0.59	0.64	0.60
Keyspan Corp	0.59	0.59	0.51	0.49	0.48	0.54	0.52
Laclede Group Inc	0.61	0.62	0.61	0.56	0.60	0.64	0.60
Northwest Natural Gas Co	0.66	0.64	0.61	0.59	0.58	0.59	0.60
Peoples Energy Corp	0.64	0.65	0.64	0.60	0.61	0.67	0.63
South Jersey Industries Inc	0.70	0.68	0.63	0.52	0.51	0.51	0.57
Southwest Gas Corp	0.41	0.42	0.39	0.39	0.39	0.40	0.40
Wgl Holdings Inc	0.70	0.69	0.67	0.63	0.67	0.70	0.67

Sources and Notes:
[1] - [6]: Table No. MJV-14; Panels A - H, [s].
[7]: { [2] + [3] + [4] + [5] + [6] } / 5.

Workpaper #2 to Table No. MJV-15

2004 Gas LDC Sample

Calculation of the Average Preferred Equity - Market Value Ratio from 2000 to 2004

Company	DCF Capital Structure [1]	2004 [2]	2003 [3]	2002 [4]	2001 [5]	2000 [6]	5-Year Average [7]
Cascade Natural Gas Corp	-	-	-	-	-	-	-
Keyspan Corp	0.00	0.00	0.01	0.01	0.01	0.01	0.01
Laclede Group Inc	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Northwest Natural Gas Co	-	-	-	0.01	0.03	0.03	0.01
Peoples Energy Corp	-	-	-	-	-	-	-
South Jersey Industries Inc	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Southwest Gas Corp	-	-	-	-	-	-	-
Wgl Holdings Inc	0.01	0.01	0.01	0.02	0.01	0.01	0.01

Sources and Notes:

[1] - [6]: Table No. MJV-14; Panel's A - H, [t].

[7]: { [2] + [3] + [4] + [5] + [6] } / 5.

Values reported as 0.00 have an insignificant amount of preferred equity.

Workpaper #3 to Table No. MJV-15

2004 Gas LDC Sample

Calculation of the Average Debt - Market Value Ratio from 2000 to 2004

Company	DCF Capital Structure [1]	2004 [2]	2003 [3]	2002 [4]	2001 [5]	2000 [6]	5-Year Average [7]
Cascade Natural Gas Corp	0.41	0.40	0.40	0.43	0.41	0.36	0.40
Keyspan Corp	0.41	0.41	0.49	0.51	0.51	0.45	0.47
Laclede Group Inc	0.39	0.38	0.39	0.44	0.40	0.36	0.39
Northwest Natural Gas Co	0.34	0.36	0.39	0.40	0.39	0.38	0.38
Peoples Energy Corp	0.36	0.35	0.36	0.40	0.39	0.33	0.37
South Jersey Industries Inc	0.30	0.31	0.37	0.48	0.49	0.49	0.43
Southwest Gas Corp	0.59	0.58	0.61	0.61	0.61	0.60	0.60
Wgl Holdings Inc	0.29	0.29	0.32	0.36	0.31	0.29	0.31

Sources and Notes:
[1] - [6]: Table No. MJV-14; Panel's A - H, [u].
[7]: { [2] + [3] + [4] + [5] + [6] } / 5.

Table No. MJV-16

2004 Gas LDC Sample

Combined I/B/E/S and Value Line Estimated Growth Rates

Company	I/B/E/S		Value Line			
	I/B/E/S Long-Term Growth Rate	Number of Estimates	EPS Fiscal Year '06 Estimate	EPS Fiscal Year '08 to '10 Estimate	Annualized Growth Rate	Combined I/B/E/S and Value Line Growth Rate
	[1]	[2]	[3]	[4]	[5]	[6]
Cascade Natural Gas Corp	4.5%	2	$1.25	$1.60	8.6%	5.9%
Keyspan Corp	4.3%	5	$2.50	$3.20	8.6%	5.0%
Laclede Group Inc	4.2%	2	$1.95	$2.25	4.9%	4.4%
Northwest Natural Gas Co	5.5%	3	$2.25	$2.50	3.6%	5.0%
Peoples Energy Corp	4.3%	4	$2.75	$3.00	2.9%	4.0%
South Jersey Industries Inc	5.0%	2	$3.40	$4.00	5.6%	5.2%
Southwest Gas Corp	6.5%	3	$1.90	$2.35	7.3%	6.7%
Wgl Holdings Inc	3.9%	5	$2.05	$2.60	8.2%	4.6%

Sources and Notes:

[1] - [2]: Workpaper #1 to Table No. MJV-16.

[3] - [4]: Workpaper #2 to Table No. MJV-16.

[5]: ([4] / [3]) ^ (1/3) - 1.

[6]: ([1] x [2] + [5]) / ([2] +1).

Workpaper #1 to Table No. MJV-16

2004 Gas LDC Sample

I/B/E/S Earnings Per Share Data

Company	EPS Fiscal Year-End 2004 Observed [1]	EPS Fiscal Year-End 2005 Estimate [2]	EPS Fiscal Year-End 2006 Estimate [3]	EPS Fiscal Year-End 2007 Estimate [4]	Growth Rate Long-Term [5]	Number of Long-Term Growth Rate Estimates [6]
Cascade Natural Gas Corp	$1.19	$1.15	$1.25	n/a	4.5%	2
Keyspan Corp	$2.69	$2.34	$2.44	$2.53	4.3%	5
Laclede Group Inc	$1.90	$1.89	$2.00	n/a	4.2%	2
Northwest Natural Gas Co	$1.88	$2.13	$2.27	n/a	5.5%	3
Peoples Energy Corp	$2.56	$2.74	$2.84	n/a	4.3%	4
South Jersey Industries	$3.02	$3.19	$3.31	n/a	5.0%	2
Southwest Gas Corp	$1.59	$1.58	$1.78	$1.77	6.5%	3
Wgl Holdings Inc	$1.84	$1.88	$1.93	$1.99	3.9%	5

Sources and Notes:
[1] - [6]: I/B/E/S April 1, 2005.

Workpaper #2 to Table No. MJV-16

2004 Gas LDC Sample

Value Line Earnings Per Share Data

Company	EPS Fiscal Year 2004 Observed [1]	EPS Fiscal Year 2005 Estimate [2]	EPS Fiscal Year 2006 Estimate [3]	EPS 2008 - 2010 Estimate [4]
Cascade Natural Gas Corp	$1.19	$1.15	$1.25	$1.60
Keyspan Corp	$2.71	$2.35	$2.50	$3.20
Laclede Group Inc	$1.82	$1.85	$1.95	$2.25
Northwest Natural Gas Co	$1.86	$2.10	$2.25	$2.50
Peoples Energy Corp	$2.18	$2.65	$2.75	$3.00
South Jersey Industries Inc	$3.11	$3.25	$3.40	$4.00
Southwest Gas Corp	$1.55	$1.70	$1.90	$2.35
Wgl Holdings Inc	$1.98	$1.90	$2.05	$2.60

Sources and Notes:

[1] - [4]: Value Line Investment Survey; March 18, 2005.

Workpaper #3 to Table No. MJV-16

Estimated Growth Rates of the 2004 Gas LDC Sample

Panel A: Using I/B/E/S Forecasts

Company	Growth Rate: FY 04 - 05 [1]	Growth Rate: FY 05 - 06 [2]	Growth Rate: FY 06 - 07 [3]	Growth Rate: FY 07 - 08 [4]	Growth Rate: FY 08 - 09 [5]	Growth Rate Long-Term [6]	Number of Long-Term Growth Rate Estimates [7]
Cascade Natural Gas Corp	-3.4%	8.7%	5.9%	5.9%	5.9%	4.5%	2
Keyspan Corp	-13.0%	4.3%	3.7%	14.6%	14.6%	4.3%	5
Laclede Group Inc	-0.5%	5.8%	5.3%	5.3%	5.3%	4.2%	2
Northwest Natural Gas Co	13.3%	6.6%	2.7%	2.7%	2.7%	5.5%	3
Peoples Energy Corp	7.0%	3.6%	3.6%	3.6%	3.6%	4.3%	4
South Jersey Industries	5.6%	3.8%	5.2%	5.2%	5.2%	5.0%	2
Southwest Gas Corp	-0.6%	12.7%	-0.6%	10.9%	10.9%	6.5%	3
Wgl Holdings Inc	2.2%	2.7%	3.1%	5.8%	5.8%	3.9%	5

Sources and Notes:

[1]: From Workpaper #1 to Table No. MJV-16: ([2] - [1]) / [1].

[2]: From Workpaper #1 to Table No. MJV-16: ([3] - [2]) / [2].

[3]: From Workpaper #1 to Table No. MJV-16:

If [4] is n/a then {([1] x ((1 + [5]) ^ 5) / [3]) ^ (1/3)} - 1; otherwise, ([4] - [3]) / [3].

[4]: From Workpaper #1 to Table No. MJV-16:

If [4] is n/a then Workpaper #3 to Table No. MJV-16, Panel A, [3]; otherwise {([1] x ((1 + [5]) ^ 5) / [4]) ^ (1/2)} - 1.

[5]: [4].

[6], [7]: Workpaper #1 to Table No. MJV-16, [5] and [6].

Workpaper #3 to Table No. MJV-16

Estimated Growth Rates of the 2004 Gas LDC Sample

Panel B: Using Value Line Forecasts

Company	Growth Rate: FY 04 - 05 [1]	Growth Rate: FY 05 - 06 [2]	Growth Rate: FY 06 - 07 [3]	Growth Rate: FY 07 - 08 [4]	Growth Rate: FY 08 - 09 [5]	Growth Rate Long-Term [6]
Cascade Natural Gas Corp	-3.4%	8.7%	8.6%	8.6%	8.6%	8.6%
Keyspan Corp	-13.3%	6.4%	8.6%	8.6%	8.6%	8.6%
Laclede Group Inc	1.6%	5.4%	4.9%	4.9%	4.9%	4.9%
Northwest Natural Gas Co	12.9%	7.1%	3.6%	3.6%	3.6%	3.6%
Peoples Energy Corp	21.6%	3.8%	2.9%	2.9%	2.9%	2.9%
South Jersey Industries Inc	4.5%	4.6%	5.6%	5.6%	5.6%	5.6%
Southwest Gas Corp	9.7%	11.8%	7.3%	7.3%	7.3%	7.3%
Wgl Holdings Inc	-4.0%	7.9%	8.2%	8.2%	8.2%	8.2%

Sources and Notes:
[1]: From Workpaper #2 to Table No. MJV-16: ([2] - [1]) / [1].
[2]: From Workpaper #2 to Table No. MJV-16: ([3] - [2]) / [2].
[3] - [5]: From Workpaper #2 to Table No. MJV-16: ([4] / [3])^(1/3) - 1.
[6]: [5].

Workpaper #3 to Table No. MJV-16

Estimated Growth Rates of the 2004 Gas LDC Sample

Panel C: Combined I/B/E/S and Value Line Forecasts

Company	Combined Growth Rate: FY 04 - 05 [1]	Combined Growth Rate: FY 05 - 06 [2]	Combined Growth Rate: FY 06 - 07 [3]	Combined Growth Rate: FY 07 - 08 [4]	Combined Growth Rate: FY 08 - 09 [5]	Combined Growth Rate: Long-Term [6]	Number of Estimates [7]
Cascade Natural Gas Corp	-3.4%	8.7%	6.8%	6.8%	6.8%	5.9%	3
Keyspan Corp	-13.1%	4.6%	4.5%	13.6%	13.6%	5.0%	6
Laclede Group Inc	0.2%	5.7%	5.1%	5.1%	5.1%	4.4%	3
Northwest Natural Gas Co	13.2%	6.7%	2.9%	2.9%	2.9%	5.0%	4
Peoples Energy Corp	9.9%	3.7%	3.5%	3.5%	3.5%	4.0%	5
South Jersey Industries Inc	5.3%	4.0%	5.3%	5.3%	5.3%	5.2%	3
Southwest Gas Corp	1.9%	12.4%	1.4%	10.0%	10.0%	6.7%	4
Wgl Holdings Inc	1.1%	3.5%	4.0%	6.2%	6.2%	4.6%	6

Sources and Notes:
I/B/E/S forecasts are weighted by the number of I/B/E/S long-term growth rate estimates, and Value Line estimates are weighted by one.
[1] - [6]: Weighted average of I/B/E/S and Value Line forecasts.
(The I/B/E/S Estimate from Workpaper #3 to Table No. MJV-16; Panel A x the number of I/B/E/S estimates + the Value Line Estimate from Workpaper #3 to Table No. MJV-16; Panel B) / [7].
[7]: The Number of I/B/E/S long-term growth rate estimates plus one for the Value Line estimate.

Table No. MJV-17

DCF Cost of Equity of the 2004 Gas LDC Sample

Panel A: Simple DCF Method (Quarterly)

Company	Stock Price [1]	Quarterly Dividend Q1, 2005 [2]	Annualized Dividend Yield [3]	Combined I/B/E/S and Value Line Long-Term Growth Rate [4]	Quarterly Growth Rate [5]	DCF Cost of Equity [6]
Cascade Natural Gas Corp	$20.23	$0.24	5.02%	5.9%	1.4%	11.0%
Keyspan Corp	$39.12	$0.45	4.89%	5.0%	1.2%	10.0%
Laclede Group Inc	$29.80	$0.34	4.84%	4.4%	1.1%	9.3%
Northwest Natural Gas Co	$35.86	$0.32	3.81%	5.0%	1.2%	8.9%
Peoples Energy Corp	$42.72	$0.55	5.31%	4.0%	1.0%	9.4%
South Jersey Industries Inc	$56.20	$0.43	3.18%	5.2%	1.3%	8.4%
Southwest Gas Corp	$24.55	$0.20	3.56%	6.7%	1.6%	10.3%
Wgl Holdings Inc	$31.12	$0.32	4.37%	4.6%	1.1%	9.1%

Sources and Notes:
[1]: Workpaper #1 to Table No. MJV-17.
[2]: Workpaper #2 to Table No. MJV-17.
[3]: [2] x 4 x (1 + [4]) / [1].
[4]: Workpaper #3 to Table No. MJV-16; Panel C.
[5]: {(1 + [4]) ^ (1/4)} - 1.
[6]: {((([2] / [1]) x (1 + [5]) + [5] + 1) ^ 4} - 1.

Table No. MJV-17

DCF Cost of Equity of the 2004 Gas LDC Sample

Panel B: Multi-Stage DCF (Using the Blue-Chip Long-Term GDP Growth Forecast as the Perpetual Rate)

Company	Stock Price [1]	Quarterly Dividend Q1, 2005 [2]	Combined Growth Rate: FY 04 - 05 [3]	Combined Growth Rate: FY 05 - 06 [4]	Combined Growth Rate: FY 06 - 07 [5]	Combined Growth Rate: FY 07 - 08 [6]	Combined Growth Rate: FY 08 - 09 [7]	Combined Growth Rate: FY 09 - 10 [8]	Combined Growth Rate: FY 10 - 11 [9]	Combined Growth Rate: FY 11 - 12 [10]	Combined Growth Rate: FY 12 - 13 [11]	Combined Growth Rate: FY 13 - 14 [12]	GDP Long-Term Growth Rate [13]	DCF Cost of Equity [14]
Cascade Natural Gas Corp	$20.23	$0.24	-3.4%	8.7%	6.8%	6.8%	6.8%	5.8%	5.7%	5.6%	5.5%	5.4%	5.3%	10.4%
Keyspan Corp	$39.12	$0.45	-13.1%	4.6%	4.5%	13.6%	13.6%	5.1%	5.1%	5.2%	5.2%	5.3%	5.3%	10.1%
Laclede Group Inc	$29.80	$0.34	0.2%	5.7%	5.1%	5.1%	5.1%	4.6%	4.7%	4.9%	5.0%	5.2%	5.3%	9.9%
Northwest Natural Gas Co	$35.86	$0.32	13.2%	6.7%	2.9%	2.9%	2.9%	5.1%	5.1%	5.2%	5.2%	5.3%	5.3%	9.1%
Peoples Energy Corp	$42.72	$0.55	9.9%	3.7%	3.5%	3.5%	3.5%	4.2%	4.5%	4.7%	4.9%	5.1%	5.3%	10.4%
South Jersey Industries Inc	$56.20	$0.43	5.3%	4.0%	5.3%	5.3%	5.3%	5.2%	5.2%	5.2%	5.3%	5.3%	5.3%	8.4%
Southwest Gas Corp	$24.55	$0.20	1.9%	12.4%	1.4%	10.0%	10.0%	6.5%	6.2%	6.0%	5.8%	5.5%	5.3%	9.2%
Wgl Holdings Inc	$31.12	$0.32	1.1%	3.5%	4.0%	6.2%	6.2%	4.7%	4.8%	5.0%	5.1%	5.2%	5.3%	9.5%

Sources and Notes:

[1]: Workpaper #1 to Table No. MJV-17.

[2]: Workpaper #2 to Table No. MJV-17.

[3] - [7]: Workpaper #3 to Table No. MJV-16; Panel C.

The Combined I/B/E/S and ValueLine Long-Term Growth Rate (Combined Rate) is from Workpaper #3 to Table No. MJV-16; Panel C, [6].

[8]: (Combined Rate - (Combined Rate - [13])) / 6.

[9]: ([8] - (Combined Rate - [13])) / 6.

[10]: ([9] - (Combined Rate - [13])) / 6.

[11]: ([10] - (Combined Rate - [13])) / 6.

[12]: ([11] - (Combined Rate - [13])) / 6.

[13]: Blue Chip Economic Indicators, March 10, 2005, page 15. This number is assumed to be the perpetual growth rate.

[14]: Workpaper #3 to Table No. MJV-17.

Workpaper #1 to Table No. MJV-17

2004 Gas LDC Sample

Common Stock Prices from March 11, 2005 to April 1, 2005

Company	01-Apr-05	31-Mar-05	30-Mar-05	29-Mar-05	28-Mar-05	25-Mar-05	24-Mar-05	23-Mar-05	22-Mar-05	21-Mar-05	18-Mar-05	17-Mar-05	16-Mar-05	15-Mar-05	14-Mar-05	11-Mar-05	Average
Cascade Natural Gas Corp	$19.70	$19.96	$20.22	$19.81	$20.09	-	$20.36	$20.11	$20.27	$20.40	$20.38	$20.43	$20.24	$20.50	$20.50	$20.44	$20.23
Keyspan Corp	$38.98	$38.97	$38.68	$38.35	$38.68	-	$38.52	$38.36	$38.57	$39.38	$39.55	$39.84	$39.67	$39.97	$39.99	$39.30	$39.12
Laclede Group Inc	$28.92	$29.20	$29.63	$29.00	$29.95	-	$29.60	$29.40	$29.75	$29.96	$30.18	$29.99	$30.13	$30.32	$30.76	$30.20	$29.80
Northwest Natural Gas Co	$35.94	$36.17	$35.93	$35.46	$35.61	-	$35.33	$35.07	$35.75	$36.20	$36.30	$36.04	$35.83	$36.15	$36.28	$35.90	$35.86
Peoples Energy Corp	$41.94	$41.92	$41.81	$41.18	$41.68	-	$41.63	$41.62	$41.84	$42.96	$43.28	$44.30	$44.10	$44.20	$44.64	$43.75	$42.72
South Jersey Industries Inc	$56.80	$56.40	$56.23	$55.45	$55.24	-	$55.04	$54.48	$55.36	$55.98	$56.80	$56.80	$56.98	$57.01	$57.68	$56.70	$56.20
Southwest Gas Corp	$24.54	$24.16	$24.40	$23.70	$24.02	-	$23.96	$24.10	$24.34	$24.68	$24.81	$25.01	$25.03	$25.19	$25.18	$25.10	$24.55
Wgl Holdings Inc	$30.93	$30.96	$30.62	$30.13	$30.75	-	$30.66	$30.68	$31.11	$31.58	$31.67	$31.71	$31.55	$31.67	$31.55	$31.28	$31.12

Sources and Notes:
Compustat as of April 2005.
The prices chosen are the daily closing prices from Compustat starting from I/B/E/S forecast date and ending fifteen trading days before.

Workpaper #2 to Table No. MJV-17

2004 Gas LDC Sample

1st Quarter 2005 Dividend Payments

Company	Q1, 2005
Cascade Natural Gas Corp	$0.24
Keyspan Corp	$0.45
Laclede Group Inc	$0.34
Northwest Natural Gas Co	$0.32
Peoples Energy Corp	$0.55
South Jersey Industries Inc	$0.43
Southwest Gas Corp	$0.20
Wgl Holdings Inc	$0.32

Sources and Notes:
Compustat as of April 2005.

Workpaper #3 to Table No. MJV-17

DCF Cost of Equity of the 2004 Gas LDC Sample

Multi - Stage DCF (using the Blue Chip Indicators Long-Term GDP Growth Rate Forecast as the Perpetual Growth Rate)

Year	Company	Cascade Natural Gas Corp	Keyspan Corp	Laclede Group Inc	Northwest Natural Gas Co	Peoples Energy Corp	South Jersey Industries Inc	Southwest Gas Corp	Wgl Holdings Inc
	Current Stock Price	($20.23)	($39.12)	($29.80)	($35.86)	($42.72)	($56.20)	($24.55)	($31.12)
YEAR 2005	Dividend Q2 Estimate	$0.24	$0.44	$0.35	$0.34	$0.56	$0.43	$0.21	$0.33
YEAR 2005	Dividend Q3 Estimate	$0.24	$0.42	$0.35	$0.35	$0.57	$0.44	$0.21	$0.33
YEAR 2005	Dividend Q4 Estimate	$0.23	$0.41	$0.35	$0.36	$0.59	$0.44	$0.21	$0.33
YEAR 2006	Dividend Q1 Estimate	$0.24	$0.41	$0.35	$0.36	$0.59	$0.45	$0.21	$0.33
YEAR 2006	Dividend Q2 Estimate	$0.24	$0.42	$0.36	$0.37	$0.60	$0.45	$0.22	$0.33
YEAR 2006	Dividend Q3 Estimate	$0.25	$0.42	$0.36	$0.37	$0.60	$0.45	$0.23	$0.34
YEAR 2006	Dividend Q4 Estimate	$0.25	$0.43	$0.37	$0.38	$0.61	$0.46	$0.23	$0.34
YEAR 2007	Dividend Q1 Estimate	$0.26	$0.43	$0.37	$0.38	$0.61	$0.47	$0.23	$0.34
YEAR 2007	Dividend Q2 Estimate	$0.26	$0.44	$0.37	$0.39	$0.62	$0.47	$0.24	$0.35
YEAR 2007	Dividend Q3 Estimate	$0.27	$0.44	$0.38	$0.39	$0.62	$0.48	$0.24	$0.35
YEAR 2007	Dividend Q4 Estimate	$0.27	$0.45	$0.38	$0.39	$0.63	$0.48	$0.24	$0.35
YEAR 2008	Dividend Q1 Estimate	$0.28	$0.46	$0.39	$0.39	$0.63	$0.49	$0.24	$0.36
YEAR 2008	Dividend Q2 Estimate	$0.28	$0.48	$0.39	$0.40	$0.64	$0.50	$0.25	$0.36
YEAR 2008	Dividend Q3 Estimate	$0.29	$0.49	$0.40	$0.40	$0.64	$0.50	$0.25	$0.37
YEAR 2008	Dividend Q4 Estimate	$0.29	$0.51	$0.40	$0.40	$0.65	$0.51	$0.26	$0.37
YEAR 2009	Dividend Q1 Estimate	$0.29	$0.53	$0.41	$0.41	$0.66	$0.52	$0.27	$0.38
YEAR 2009	Dividend Q2 Estimate	$0.30	$0.54	$0.41	$0.41	$0.66	$0.52	$0.27	$0.39
YEAR 2009	Dividend Q3 Estimate	$0.30	$0.56	$0.42	$0.41	$0.67	$0.53	$0.28	$0.39
YEAR 2009	Dividend Q4 Estimate	$0.31	$0.58	$0.42	$0.41	$0.67	$0.54	$0.29	$0.40
YEAR 2010	Dividend Q1 Estimate	$0.31	$0.58	$0.43	$0.42	$0.68	$0.54	$0.29	$0.40
YEAR 2010	Dividend Q2 Estimate	$0.32	$0.59	$0.43	$0.43	$0.69	$0.55	$0.30	$0.41
YEAR 2010	Dividend Q3 Estimate	$0.32	$0.60	$0.44	$0.43	$0.69	$0.56	$0.30	$0.41
YEAR 2010	Dividend Q4 Estimate	$0.33	$0.61	$0.44	$0.44	$0.70	$0.56	$0.31	$0.42
YEAR 2011	Dividend Q1 Estimate	$0.33	$0.61	$0.45	$0.44	$0.71	$0.57	$0.31	$0.42
YEAR 2011	Dividend Q2 Estimate	$0.34	$0.62	$0.45	$0.45	$0.72	$0.58	$0.32	$0.43
YEAR 2011	Dividend Q3 Estimate	$0.34	$0.63	$0.46	$0.45	$0.72	$0.59	$0.32	$0.43
YEAR 2011	Dividend Q4 Estimate	$0.35	$0.64	$0.46	$0.46	$0.73	$0.59	$0.32	$0.44
YEAR 2012	Dividend Q1 Estimate	$0.35	$0.65	$0.47	$0.46	$0.74	$0.60	$0.33	$0.44
YEAR 2012	Dividend Q2 Estimate	$0.36	$0.65	$0.48	$0.47	$0.75	$0.61	$0.33	$0.45
YEAR 2012	Dividend Q3 Estimate	$0.36	$0.66	$0.48	$0.48	$0.76	$0.62	$0.34	$0.45
YEAR 2012	Dividend Q4 Estimate	$0.37	$0.67	$0.49	$0.48	$0.77	$0.63	$0.34	$0.46
YEAR 2013	Dividend Q1 Estimate	$0.37	$0.68	$0.49	$0.49	$0.78	$0.63	$0.35	$0.46
YEAR 2013	Dividend Q2 Estimate	$0.38	$0.69	$0.50	$0.49	$0.78	$0.64	$0.35	$0.47
YEAR 2013	Dividend Q3 Estimate	$0.38	$0.70	$0.51	$0.50	$0.79	$0.65	$0.36	$0.48
YEAR 2013	Dividend Q4 Estimate	$0.39	$0.71	$0.51	$0.51	$0.80	$0.66	$0.36	$0.48
YEAR 2014	Dividend Q1 Estimate	$0.39	$0.71	$0.52	$0.51	$0.81	$0.67	$0.37	$0.49
YEAR 2014	Dividend Q2 Estimate	$0.40	$0.72	$0.52	$0.52	$0.82	$0.68	$0.37	$0.49
YEAR 2014	Dividend Q3 Estimate	$0.40	$0.73	$0.53	$0.53	$0.83	$0.68	$0.38	$0.50
YEAR 2014	Dividend Q4 Estimate	$0.41	$0.74	$0.54	$0.53	$0.84	$0.69	$0.38	$0.51
YEAR 2015	Dividend Q1 Estimate	$0.41	$0.75	$0.55	$0.54	$0.86	$0.70	$0.39	$0.51
YEAR 2015	Dividend Q2 Estimate	$0.42	$0.76	$0.55	$0.55	$0.87	$0.71	$0.39	$0.52
YEAR 2015 Q2	Year 10 Stock Price	$35.21	$68.62	$51.06	$61.33	$72.46	$96.76	$43.04	$53.46
	Trial COE - Quarterly Rate	2.5%	2.4%	2.4%	2.2%	2.5%	2.0%	2.2%	2.3%
	Trial COE - Annual Rate	10.4%	10.1%	9.9%	9.1%	10.4%	8.4%	9.2%	9.5%
	Cost of Equity	10.4%	10.1%	9.9%	9.1%	10.4%	8.4%	9.2%	9.5%
	(Trial COE - COE) x 100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Sources and Notes:
All Growth Rate Estimates: Table No. MJV-17; Panel B.
Stock Prices and Dividends are from Compustat as of April 2005.

1. See Workpaper #1 to Table No. MJV-17 for the average closing stock price obtained from Compustat.
2. See Workpaper #2 to Table No. MJV-17 for the for the quarterly dividend obtained from Compustat.
3. The Blue Chip Long-Term GDP Growth Rate is used to calculate the Year 10 Stock Price.
   [(the Dividend Year 2015 Q2 Estimate) x ((1 + the Perpetual Growth Rate) ^ (1/4))] /
   [(Trial COE - Quarterly Rate) - ((1 + the Perpetual Growth Rate) ^ (1/4) -1)].

Table No. MJV-18

Overall Cost of Capital of the 2004 Gas LDC Sample

Panel A: Simple DCF Method (Quarterly)

Company		1st Quarter, 2005 Bond Rating [1]	1st Quarter, 2005 Preferred Equity Rating [2]	DCF Cost of Equity [3]	DCF Common Equity to Market Value Ratio [4]	Cost of Preferred Equity [5]	DCF Preferred Equity to Market Value Ratio [6]	Cost of Debt [7]	DCF Debt to Market Value Ratio [8]	Arizona-American Water Company's Income Tax Rate [9]	Overall After-Tax Cost of Capital [10]
Cascade Natural Gas Corp	*	Baa	n/a	11.0%	0.59	n/a	-	5.8%	0.41	39.5%	7.9%
Keyspan Corp		A	Baa	10.0%	0.59	6.4%	0.00	5.6%	0.41	39.5%	7.3%
Laclede Group Inc	*	Baa	Ba	9.3%	0.61	6.4%	0.00	5.8%	0.39	39.5%	7.0%
Northwest Natural Gas Co	*	A	n/a	8.9%	0.66	n/a	-	5.6%	0.34	39.5%	7.0%
Peoples Energy Corp		A	n/a	9.4%	0.64	n/a	-	5.6%	0.36	39.5%	7.3%
South Jersey Industries Inc	*	Baa	Baa	8.4%	0.70	6.4%	0.00	5.8%	0.30	39.5%	6.9%
Southwest Gas Corp	*	Baa	n/a	10.3%	0.41	n/a	-	5.8%	0.59	39.5%	6.3%
Wgl Holdings Inc		A	Baa	9.1%	0.70	6.4%	0.01	5.6%	0.29	39.5%	7.4%
Average [a]				9.6%	0.61	6.4%	0.00	5.7%	0.39	39.5%	7.1%
Average [b]				9.6%	0.59	6.4%	0.00	5.7%	0.41	39.5%	7.0%

Sources and Notes:

[1] - [2]: www.moodys.com as of April 2005.
South Jersey Industries Inc's preferred equity rating is assumed equal to its debt rating.
[3]: Table No. MJV-17; Panel A, [6].
[4]: Table No. MJV-15, [1].
[5]: Mergent Bond Record, March 2005.
[6]: Table No. MJV-15, [2].
[7]: Mergent Bond Record, March 2005.
[8]: Table No, MJV-15, [3].
[9]: Federal Tax Rate + (1-Federal Tax Rate) x Arizona State Tax Rate {35% + (1-35%) x 6.968%}.
Arizona State Tax Rate from http://www.taxadmin.org/fta/rate/corp_inc.html.
[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}.
[a]: Average over all companies.
[b]: Average for companies marked with an asterisk.
* Companies marked with an asterisk represent the companies with 2004 revenues from regulated activities greater than 70%.

Table No. MJV-18

Overall Cost of Capital of the 2004 Gas LDC Sample

Panel B: Multi-Stage DCF (Using the Blue-Chip Long-Term GDP Growth Forecast as the Perpetual Rate)

Company		1st Quarter, 2005 Bond Rating [1]	1st Quarter, 2005 Preferred Equity Rating [2]	DCF Cost of Equity [3]	DCF Common Equity to Market Value Ratio [4]	Cost of Preferred Equity [5]	DCF Preferred Equity to Market Value Ratio [6]	Cost of Debt [7]	DCF Debt to Market Value Ratio [8]	Arizona-American Water Company's Income Tax Rate [9]	Overall After-Tax Cost of Capital [10]
Cascade Natural Gas Corp	*	Baa	n/a	10.4%	0.59	n/a	-	5.8%	0.41	39.5%	7.5%
Keyspan Corp		A	Baa	10.1%	0.59	6.4%	0.00	5.6%	0.41	39.5%	7.3%
Laclede Group Inc	*	Baa	Ba	9.9%	0.61	6.4%	0.00	5.8%	0.39	39.5%	7.4%
Northwest Natural Gas Co	*	A	n/a	9.1%	0.66	n/a	-	5.6%	0.34	39.5%	7.2%
Peoples Energy Corp		A	n/a	10.4%	0.64	n/a	-	5.6%	0.36	39.5%	7.9%
South Jersey Industries Inc	*	Baa	Baa	8.4%	0.70	6.4%	0.00	5.8%	0.30	39.5%	6.9%
Southwest Gas Corp	*	Baa	n/a	9.2%	0.41	n/a	-	5.8%	0.59	39.5%	5.8%
Wgl Holdings Inc		A	Baa	9.5%	0.70	6.4%	0.01	5.6%	0.29	39.5%	7.7%
Average [a]				9.6%	0.61	6.4%	0.00	5.7%	0.39	39.5%	7.2%
Average [b]				9.4%	0.59	6.4%	0.00	5.7%	0.41	39.5%	7.0%

Sources and Notes:

[1] - [2]: www.moodys.com as of April 2005.
South Jersey Industries Inc's preferred equity rating is assumed equal to its debt rating.
[3]: Table No. MJV-17; Panel B, [14].
[4]: Table No. MJV-15, [1].
[5]: Mergent Bond Record, March 2005.
[6]: Table No. MJV-15, [2].
[7]: Mergent Bond Record, March 2005.
[8]: Table No. MJV-15, [3].
[9]: Federal Tax Rate + (1-Federal Tax Rate) x Arizona State Tax Rate {35% + (1-35%) x 6.968%}.
Arizona State Tax Rate from http://www.taxadmin.org/fta/rate/corp_inc.html.
[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}.
[a]: Average over all companies.
[b]: Average for companies marked with an asterisk.
* Companies marked with an asterisk represent the companies with 2004 revenues from regulated activities greater than 70%.

Table No. MJV-19

DCF Cost of Equity at Paradise Valley Water Company's Capital Structure

2004 Gas LDC Sample Return on Equity

	Overall Cost of Capital [1]	Paradise Valley Water Company's Regulatory % Debt [2]	Paradise Valley Water Company's Cost of Debt [3]	Arizona-American Water Company's Income Tax [4]	Paradise Valley Water Company's Regulatory % Equity [5]	Estimated Return on Equity [6]
Using All Companies						
Simple DCF Quarterly	7.1%	0.63	5.6%	39.5%	0.37	13.6%
Multi-Stage DCF - Using the Blue-Chip Long-Term GDP Growth Forecast as the Perpetual Rate	7.2%	0.63	5.6%	39.5%	0.37	13.8%
Using Companies that have 2004 revenues from regulated activities greater than 70%.						
Simple DCF Quarterly	7.0%	0.63	5.6%	39.5%	0.37	13.3%
Multi-Stage DCF - Using the Blue-Chip Long-Term GDP Growth Forecast as the Perpetual Rate	7.0%	0.63	5.6%	39.5%	0.37	13.1%

Sources and Notes:
[1]: Table No. MJV-18; Panels A-B, [10].
[2]: Paradise Valley Water Company.
[3]: Mergent Bond Record, March 2005. Based on an A rating.
[4]: Federal Tax Rate + (1-Federal Tax Rate) x Arizona State Tax Rate {35% + (1-35%) x 6.968%}.
Arizona State Tax Rate from http://www.taxadmin.org/fta/rate/corp_inc.html.
[5]: Paradise Valley Water Company.
[6]: {[1] - [2] x [3] x (1 - [4])} / [5].

Table No. MJV-20

Risk Positioning Cost of Equity of the 2004 Gas LDC Sample

Panel A: Using Unadjusted ValueLine Betas and the Long-Term Risk-Free Rate

Company		Long-Term Risk-Free Rate [1]	Unadjusted ValueLine Beta on Market [2]	Long-Term Market Risk Premium [3]	CAPM Cost of Equity [4]	ECAPM (0.5%) Cost of Equity [5]	ECAPM (1.5%) Cost of Equity [6]
Cascade Natural Gas Corp	*	5.0%	0.60	6.5%	8.9%	9.1%	9.5%
Keyspan Corp		5.0%	0.67	6.5%	9.4%	9.5%	9.9%
Laclede Group Inc	*	5.0%	0.60	6.5%	8.9%	9.1%	9.5%
Northwest Natural Gas Co	*	5.0%	0.45	6.5%	7.9%	8.2%	8.7%
Peoples Energy Corp	*	5.0%	0.67	6.5%	9.4%	9.5%	9.9%
South Jersey Industries Inc	*	5.0%	0.30	6.5%	6.9%	7.3%	8.0%
Southwest Gas Corp	*	5.0%	0.60	6.5%	8.9%	9.1%	9.5%
Wgl Holdings Inc		5.0%	0.60	6.5%	8.9%	9.1%	9.5%
Average [a]		5.0%	0.56	6.5%	8.6%	8.9%	9.3%
Average [b]		5.0%	0.53	6.5%	8.5%	8.7%	9.2%

Sources and Notes:
[1]: Table No. MJV - 12; Panel A.
[2]: Workpaper # 1 to Table No. MJV-20.
[3]: MJV Testimony, Appendix B.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 0.5%) + [2] x ([3] - 0.5%).
[6]: ([1] + 1.5%) + [2] x ([3] - 1.5%).
[a]: Average over all companies.
[b]: Average for companies marked with an asterisk.
* Companies marked with an asterisk represent the companies with 5-year average revenues from regulated activities greater than 70%.

Table No. MJV-20

Risk Positioning Cost of Equity of the 2004 Gas LDC Sample

Panel B: Using Unadjusted ValueLine Betas and the Short-Term Risk-Free Rate

Company		Short-Term Risk-Free Rate [1]	Unadjusted ValueLine Beta on Market [2]	Short-Term Market Risk Premium [3]	CAPM Cost of Equity [4]	ECAPM (1%) Cost of Equity [5]	ECAPM (2%) Cost of Equity [6]	ECAPM (3%) Cost of Equity [7]
Cascade Natural Gas Corp	*	3.0%	0.60	8.0%	7.8%	8.2%	8.6%	9.0%
Keyspan Corp		3.0%	0.67	8.0%	8.4%	8.7%	9.0%	9.4%
Laclede Group Inc	*	3.0%	0.60	8.0%	7.8%	8.2%	8.6%	9.0%
Northwest Natural Gas Co	*	3.0%	0.45	8.0%	6.6%	7.1%	7.7%	8.2%
Peoples Energy Corp	*	3.0%	0.67	8.0%	8.4%	8.7%	9.0%	9.4%
South Jersey Industries Inc	*	3.0%	0.30	8.0%	5.4%	6.1%	6.8%	7.5%
Southwest Gas Corp	*	3.0%	0.60	8.0%	7.8%	8.2%	8.6%	9.0%
Wgl Holdings Inc		3.0%	0.60	8.0%	7.8%	8.2%	8.6%	9.0%
Average [a]		3.0%	0.56	8.0%	7.5%	7.9%	8.4%	8.8%
Average [b]		3.0%	0.58	8.0%	7.7%	8.1%	8.5%	8.9%

Sources and Notes:
[1]: Table No. MJV - 12; Panel A.
[2]: Workpaper # 1 to Table No. MJV-20.
[3]: MJV Testimony, Appendix B.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1%) + [2] x ([3] - 1%).
[6]: ([1] + 2%) + [2] x ([3] - 2%).
[7]: ([1] + 3%) + [2] x ([3] - 3%).
[a]: Average over all companies.
[b]: Average for companies whose short-term CAPM cost of equity exceeds their cost of debt plus 25 basis points and that have an asterix.

* Companies marked with an asterisk represent the companies with 5-year average revenues from regulated activities greater than 70%.

Workpaper # 1 to Table No. MJV-20

2004 Gas LDC Sample

ValueLine Betas

Company	Beta as of March 18, 2005 [1]	Unadjusted Beta [2]	Beta as of December 19, 2003 [3]
Cascade Natural Gas Corp	0.75	0.60	0.70
Keyspan Corp	0.80	0.67	0.75
Laclede Group Inc	0.75	0.60	0.70
Northwest Natural Gas Co	0.65	0.45	0.60
Peoples Energy Corp	0.80	0.67	0.75
South Jersey Industries Inc	0.55	0.30	0.55
Southwest Gas Corp	0.75	0.60	0.75
Wgl Holdings Inc	0.75	0.60	0.70

Sources and Notes:

[1]: Value Line beta, as of March 18, 2005.

[2]: The reported beta in [1] by Value Line is unadjusted using the formula: ([1] - .35) / .67.

[3]: Value Line beta as of December 19, 2003.

Workpaper # 2 to Table No. MJV-20

2004 Gas LDC Sample

52-Week Regression Statistics for Week Ending on 4/13/2005

Company	Cascade Natural Gas Corp	Keyspan Corp	Laclede Group Inc	Northwest Natural Gas Co	Peoples Energy Corp	South Jersey Industries Inc	Southwest Gas Corp	Wgl Holdings Inc	Average	Gas Ldc Portfolio
Beta	0.84	0.84	1.16	1.05	1.05	1.13	0.90	1.01	**1.00**	1.00
St. Dev	0.26	0.18	0.21	0.16	0.17	0.21	0.18	0.17	**0.19**	0.13
T-Stat	3.24	4.75	5.38	6.36	6.33	5.48	4.98	5.81	**5.17**	7.61

Sources and Notes:
Compustat as of April 2005.
Risk-free rate taken from the St. Louis Federal Reserve Bank.
Regression in Question:
(Company Returns - Risk-Free Rate) = Intercept + Beta (S&P 500 Returns - Risk-Free Rate).
Weekly data set is constructed using closing prices as of Wednesday, if available. If not available, Tuesday's closing price was taken.
The week including September 11, 2001 was excluded from this analysis.

Table No. MJV-21

Overall Cost of Capital of the 2004 Gas LDC Sample

Panel A: CAPM Cost of Equity Based on Unadjusted ValueLine Betas and a Long-Term Risk-Free Rate

Company		CAPM Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	Weighted - Average Cost of Preferred Equity [3]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted - Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	Arizona-American Water Company's Income Tax Rate [7]	Overall After- Tax Cost o Capital [8]
Cascade Natural Gas Corp	*	8.9%	0.60	n/a	-	5.8%	0.40	39.5%	6.7%
Keyspan Corp		9.4%	0.52	6.3%	0.01	5.6%	0.47	39.5%	6.5%
Laclede Group Inc	*	8.9%	0.60	6.3%	0.00	5.7%	0.39	39.5%	6.7%
Northwest Natural Gas Co	*	7.9%	0.60	6.4%	0.01	5.6%	0.38	39.5%	6.2%
Peoples Energy Corp	*	9.4%	0.63	n/a	-	5.6%	0.37	39.5%	7.2%
South Jersey Industries Inc	*	6.9%	0.57	6.4%	0.00	5.8%	0.43	39.5%	5.5%
Southwest Gas Corp	*	8.9%	0.40	n/a	-	5.8%	0.60	39.5%	5.6%
Wgl Holdings Inc		8.9%	0.67	6.3%	0.01	5.6%	0.31	39.5%	7.1%
Average [a]		8.6%	0.57	6.3%	0.00	5.7%	0.42	39.5%	6.4%
Average [b]		8.5%	0.57	6.3%	0.00	5.7%	0.43	39.5%	6.3%

Sources and Notes:

[1]: Table No. MJV-20; Panel A, [4].

[2]: Table No. MJV-15, [4].

[3]: Workpaper #2 to Table No. MJV-21 ; Panel B, [10].

[4]: Table No. MJV-15, [5].

[5]: Workpaper #2 to Table No. MJV-21 ; Panel A, [8].

[6]: Table No. MJV-15, [6].

[7]: Federal Tax Rate + (1-Federal Tax Rate) x Arizona State Tax Rate {35% + (1-35%) x 6.968%}.
Arizona State Tax Rate from http://www.taxadmin.org/fta/rate/corp_inc.html.

[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

[a]: Average over all companies.

[b]: Average for companies marked with an asterisk.

* Companies marked with an asterisk represent the companies with 5-year average revenues from regulated activities greater than 70%.

Table No. MJV-21

Overall Cost of Capital of the 2004 Gas LDC Sample

Panel B: ECAPM (0.5%) Cost of Equity Based on Unadjusted ValueLine Betas and a Long-Term Risk-Free Rate

Company		ECAPM (0.5%) Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	Weighted - Average Cost of Preferred Equity [3]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted - Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	Arizona-American Water Company's Income Tax Rate [7]	Overall After- Tax Cost o Capital [8]
Cascade Natural Gas Corp	*	9.1%	0.60	n/a	-	5.8%	0.40	39.5%	6.8%
Keyspan Corp		9.5%	0.52	6.3%	0.01	5.6%	0.47	39.5%	6.6%
Laclede Group Inc	*	9.1%	0.60	6.3%	0.00	5.7%	0.39	39.5%	6.9%
Northwest Natural Gas Co	*	8.2%	0.60	6.4%	0.01	5.6%	0.38	39.5%	6.3%
Peoples Energy Corp	*	9.5%	0.63	n/a	-	5.6%	0.37	39.5%	7.3%
South Jersey Industries Inc	*	7.3%	0.57	6.4%	0.00	5.8%	0.43	39.5%	5.7%
Southwest Gas Corp	*	9.1%	0.40	n/a	-	5.8%	0.60	39.5%	5.7%
Wgl Holdings Inc		9.1%	0.67	6.3%	0.01	5.6%	0.31	39.5%	7.3%
Average [a]		8.9%	0.57	6.3%	0.00	5.7%	0.42	39.5%	6.6%
Average [b]		8.7%	0.57	6.3%	0.00	5.7%	0.43	39.5%	6.4%

Sources and Notes:

[1]: Table No. MJV-20; Panel A, [5].
[2]: Table No. MJV-15, [4].
[3]: Workpaper #2 to Table No. MJV-21 ; Panel B, [10].
[4]: Table No. MJV-15, [5].
[5]: Workpaper #2 to Table No. MJV-21 ; Panel A, [8].
[6]: Table No. MJV-15, [6].
[7]: Federal Tax Rate + (1-Federal Tax Rate) x Arizona State Tax Rate {35% + (1-35%) x 6.968%}.
Arizona State Tax Rate from http://www.taxadmin.org/fta/rate/corp_inc.html.
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

[a]: Average over all companies.
[b]: Average for companies marked with an asterisk.
* Companies marked with an asterisk represent the companies
with 5-year average revenues from regulated activities greater than 70%.

Table No. MJV-21

Overall Cost of Capital of the 2004 Gas LDC Sample

Panel C: ECAPM (1.5%) Cost of Equity Based on Unadjusted ValueLine Betas and a Long-Term Risk-Free Rate

Company		ECAPM (1.5%) Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	Weighted - Average Cost of Preferred Equity [3]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted - Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	Arizona-American Water Company's Income Tax Rate [7]	Overall After- Tax Cost o Capital [8]
Cascade Natural Gas Corp	*	9.5%	0.60	n/a	-	5.8%	0.40	39.5%	7.1%
Keyspan Corp		9.9%	0.52	6.3%	0.01	5.6%	0.47	39.5%	6.8%
Laclede Group Inc	*	9.5%	0.60	6.3%	0.00	5.7%	0.39	39.5%	7.1%
Northwest Natural Gas Co	*	8.7%	0.60	6.4%	0.01	5.6%	0.38	39.5%	6.7%
Peoples Energy Corp	*	9.9%	0.63	n/a	-	5.6%	0.37	39.5%	7.5%
South Jersey Industries Inc	*	8.0%	0.57	6.4%	0.00	5.8%	0.43	39.5%	6.1%
Southwest Gas Corp	*	9.5%	0.40	n/a	-	5.8%	0.60	39.5%	5.9%
Wgl Holdings Inc		9.5%	0.67	6.3%	0.01	5.6%	0.31	39.5%	7.5%
Average [a]		9.3%	0.57	6.3%	0.00	5.7%	0.42	39.5%	6.8%
Average [b]		9.2%	0.57	6.3%	0.00	5.7%	0.43	39.5%	6.7%

Sources and Notes:
[1]: Table No. MJV-20; Panel A, [6].
[2]: Table No. MJV-15, [4].
[3]: Workpaper #2 to Table No. MJV-21 ; Panel B, [10].
[4]: Table No. MJV-15, [5].
[5]: Workpaper #2 to Table No. MJV-21 ; Panel A, [8].
[6]: Table No. MJV-15, [6].
[7]: Federal Tax Rate + (1-Federal Tax Rate) x Arizona State Tax Rate {35% + (1-35%) x 6.968%}.
Arizona State Tax Rate from http://www.taxadmin.org/fta/rate/corp_inc.html.
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

[a]: Average over all companies.
[b]: Average for companies marked with an asterisk.
* Companies marked with an asterisk represent the companies with 5-year average revenues from regulated activities greater than 70%.

Table No. MJV-21

Overall Cost of Capital of the 2004 Gas LDC Sample

Panel D: CAPM Cost of Equity Based on Unadjusted ValueLine Betas and a Short-Term Risk-Free Rate

Company		CAPM Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	Weighted - Average Cost of Preferred Equity [3]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted - Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	Arizona-American Water Company's Income Tax Rate [7]	Overall After- Tax Cost o Capital [8]
Cascade Natural Gas Corp	*	7.8%	0.60	n/a	-	5.8%	0.40	39.5%	6.1%
Keyspan Corp		8.4%	0.52	6.3%	0.01	5.6%	0.47	39.5%	6.0%
Laclede Group Inc	*	7.8%	0.60	6.3%	0.00	5.7%	0.39	39.5%	6.1%
Northwest Natural Gas Co	*	6.6%	0.60	6.4%	0.01	5.6%	0.38	39.5%	5.4%
Peoples Energy Corp	*	8.4%	0.63	n/a	-	5.6%	0.37	39.5%	6.5%
South Jersey Industries Inc	*	5.4%	0.57	6.4%	0.00	5.8%	0.43	39.5%	4.6%
Southwest Gas Corp	*	7.8%	0.40	n/a	-	5.8%	0.60	39.5%	5.2%
Wgl Holdings Inc		7.8%	0.67	6.3%	0.01	5.6%	0.31	39.5%	6.4%
Average [a]		7.5%	0.57	6.3%	0.00	5.7%	0.42	39.5%	5.8%
Average [b]		7.7%	0.57	6.3%	0.00	5.7%	0.43	39.5%	5.8%

Sources and Notes:
[1]: Table No. MJV-20; Panel B, [4].
[2]: Table No. MJV-15, [4].
[3]: Workpaper #2 to Table No. MJV-21 ; Panel B, [10].
[4]: Table No. MJV-15, [5].
[5]: Workpaper #2 to Table No. MJV-21 ; Panel A, [8].
[6]: Table No. MJV-15, [6].
[7]: Federal Tax Rate + (1-Federal Tax Rate) x Arizona State Tax Rate {35% + (1-35%) x 6.968%}.
Arizona State Tax Rate from http://www.taxadmin.org/fta/rate/corp_inc.html.
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

[a]: Average over all companies.
[b]: Average for companies whose short-term CAPM cost of equity exceeds their cost of debt plus 25 basis p

* Companies marked with an asterisk represent the companies
with 5-year average revenues from regulated activities greater than 70%.

Table No. MJV-21

Overall Cost of Capital of the 2004 Gas LDC Sample

Panel E: ECAPM (1%) Cost of Equity Based on Unadjusted ValueLine Betas and a Short-Term Risk-Free Rate

Company		ECAPM (1%) Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	Weighted - Average Cost of Preferred Equity [3]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted - Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	Arizona-American Water Company's Income Tax Rate [7]	Overall After- Tax Cost o Capital [8]
Cascade Natural Gas Corp	*	8.2%	0.60	n/a	-	5.8%	0.40	39.5%	6.3%
Keyspan Corp		8.7%	0.52	6.3%	0.01	5.6%	0.47	39.5%	6.2%
Laclede Group Inc	*	8.2%	0.60	6.3%	0.00	5.7%	0.39	39.5%	6.3%
Northwest Natural Gas Co	*	7.1%	0.60	6.4%	0.01	5.6%	0.38	39.5%	5.7%
Peoples Energy Corp	*	8.7%	0.63	n/a	-	5.6%	0.37	39.5%	6.7%
South Jersey Industries Inc	*	6.1%	0.57	6.4%	0.00	5.8%	0.43	39.5%	5.0%
Southwest Gas Corp	*	8.2%	0.40	n/a	-	5.8%	0.60	39.5%	5.3%
Wgl Holdings Inc		8.2%	0.67	6.3%	0.01	5.6%	0.31	39.5%	6.6%
Average [a]		7.9%	0.57	6.3%	0.00	5.7%	0.42	39.5%	6.0%
Average [b]		8.1%	0.57	6.3%	0.00	5.7%	0.43	39.5%	6.1%

Sources and Notes:
[1]: Table No. MJV-20; Panel B, [5].
[2]: Table No. MJV-15, [4].
[3]: Workpaper #2 to Table No. MJV-21 ; Panel B, [10].
[4]: Table No. MJV-15, [5].
[5]: Workpaper #2 to Table No. MJV-21 ; Panel A, [8].
[6]: Table No. MJV-15, [6].
[7]: Federal Tax Rate + (1-Federal Tax Rate) x Arizona State Tax Rate {35% + (1-35%) x 6.968%}.
Arizona State Tax Rate from http://www.taxadmin.org/fta/rate/corp_inc.html.
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

[a]: Average over all companies.
[b]: Average for companies whose short-term CAPM cost of equity exceeds their cost of debt plus 25 basis p

* Companies marked with an asterisk represent the companies
with 5-year average revenues from regulated activities greater than 70%.

Table No. MJV-21

Overall Cost of Capital of the 2004 Gas LDC Sample

Panel F: ECAPM (2%) Cost of Equity Based on Unadjusted ValueLine Betas and a Short-Term Risk-Free Rate

Company		ECAPM (2%) Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	Weighted - Average Cost of Preferred Equity [3]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted - Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	Arizona-American Water Company's Income Tax Rate [7]	Overall After- Tax Cost o Capital [8]
Cascade Natural Gas Corp	*	8.6%	0.60	n/a	-	5.8%	0.40	39.5%	6.5%
Keyspan Corp		9.0%	0.52	6.3%	0.01	5.6%	0.47	39.5%	6.3%
Laclede Group Inc	*	8.6%.	0.60	6.3%	0.00	5.7%	0.39	39.5%	6.6%
Northwest Natural Gas Co	*	7.7%	0.60	6.4%	0.01	5.6%	0.38	39.5%	6.0%
Peoples Energy Corp	*	9.0%	0.63	n/a	-	5.6%	0.37	39.5%	7.0%
South Jersey Industries Inc	*	6.8%	0.57	6.4%	0.00	5.8%	0.43	39.5%	5.4%
Southwest Gas Corp	*	8.6%	0.40	n/a	-	5.8%	0.60	39.5%	5.5%
Wgl Holdings Inc		8.6%	0.67	6.3%	0.01	5.6%	0.31	39.5%	6.9%
Average [a]		8.4%	0.57	6.3%	0.00	5.7%	0.42	39.5%	6.3%
Average [b]		8.5%	0.57	6.3%	0.00	5.7%	0.43	39.5%	6.3%

Sources and Notes:
[1]: Table No. MJV-20; Panel B, [6].
[2]: Table No. MJV-15, [4].
[3]: Workpaper #2 to Table No. MJV-21 ; Panel B, [10].
[4]: Table No. MJV-15, [5].
[5]: Workpaper #2 to Table No. MJV-21 ; Panel A, [8].
[6]: Table No. MJV-15, [6].
[7]: Federal Tax Rate + (1-Federal Tax Rate) x Arizona State Tax Rate {35% + (1-35%) x 6.968%}.
Arizona State Tax Rate from http://www.taxadmin.org/fta/rate/corp_inc.html.
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

[a]: Average over all companies.
[b]: Average for companies whose short-term CAPM cost of equity exceeds their cost of debt plus 25 basis p

* Companies marked with an asterisk represent the companies with 5-year average revenues from regulated activities greater than 70%.

Table No. MJV-21

Overall Cost of Capital of the 2004 Gas LDC Sample

Panel G: ECAPM (3%) Cost of Equity Based on Unadjusted ValueLine Betas and a Short-Term Risk-Free Rate

Company		ECAPM (3%) Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	Weighted - Average Cost of Preferred Equity [3]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted - Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	Arizona-American Water Company's Income Tax Rate [7]	Overall After- Tax Cost o Capital [8]
Cascade Natural Gas Corp	*	9.0%	0.60	n/a	-	5.8%	0.40	39.5%	6.8%
Keyspan Corp		9.4%	0.52	6.3%	0.01	5.6%	0.47	39.5%	6.5%
Laclede Group Inc	*	9.0%	0.60	6.3%	0.00	5.7%	0.39	39.5%	6.8%
Northwest Natural Gas Co	*	8.2%	0.60	6.4%	0.01	5.6%	0.38	39.5%	6.4%
Peoples Energy Corp	*	9.4%	0.63	n/a	-	5.6%	0.37	39.5%	7.2%
South Jersey Industries Inc	*	7.5%	0.57	6.4%	0.00	5.8%	0.43	39.5%	5.8%
Southwest Gas Corp	*	9.0%	0.40	n/a	-	5.8%	0.60	39.5%	5.7%
Wgl Holdings Inc		9.0%	0.67	6.3%	0.01	5.6%	0.31	39.5%	7.2%
Average [a]		8.8%	0.57	6.3%	0.00	5.7%	0.42	39.5%	6.5%
Average [b]		8.9%	0.57	6.3%	0.00	5.7%	0.43	39.5%	6.6%

Sources and Notes:
[1]: Table No. MJV-20; Panel B, [7].
[2]: Table No. MJV-15, [4].
[3]: Workpaper #2 to Table No. MJV-21 ; Panel B, [10].
[4]: Table No. MJV-15, [5].
[5]: Workpaper #2 to Table No. MJV-21 ; Panel A, [8].
[6]: Table No. MJV-15, [6].
[7]: Federal Tax Rate + (1-Federal Tax Rate) x Arizona State Tax Rate {35% + (1-35%) x 6.968%}.
Arizona State Tax Rate from http://www.taxadmin.org/fta/rate/corp_inc.html.
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

[a]: Average over all companies.
[b]: Average for companies whose short-term CAPM cost of equity exceeds their cost of debt plus 25 basis p

* Companies marked with an asterisk represent the companies with 5-year average revenues from regulated activities greater than 70%.

Workpaper #1 to Table No. MJV-21

2004 Gas LDC Sample

Panel A: Bond Rating Summary from 2000 to 2004

Company	Year-End 2004	Year-End 2003	Year-End 2002	Year-End 2001	Year-End 2000	Days of Rating			Total Days
						Aa	A	Baa	
Cascade Natural Gas Corp	Baa	Baa	Baa	Baa	Baa	0	0	1827	1827
Keyspan Corp	A	A	A	A	A	0	1827	0	1827
Laclede Group Inc	Baa	Baa	Baa	A	A	0	948	879	1827
Northwest Natural Gas Co	A	A	A	A	A	0	1827	0	1827
Peoples Energy Corp	A	A	A	A	A	0	1827	0	1827
South Jersey Industries Inc	Baa	Baa	Baa	Baa	Baa	0	0	1827	1827
Southwest Gas Corp	Baa	Baa	Baa	Baa	Baa	0	0	1827	1827
Wgl Holdings Inc	A	A	A	Aa	Aa	1077	750	0	1827

Sources and Notes:
Ratings from Moody's (www.moodys.com).
The ratings for Cascade Natural Gas Corp, Northwest Natural Gas Co, Peoples Energy Corp, South Jersey Industries Inc, Southwest Gas Corp and WGL Holdings are for senior unsecured securities.
The ratings for Keyspan Corp are LT Issuer ratings and for Laclede Group Inc are senior unsecured shelf.
The ratings for Laclede Group Inc are for Laclede Gas Company.
The ratings for WGL Holdings Inc. are for its subsidiary Washington Gas and Light Company.

Workpaper #1 to Table No. MJV-21

2004 Gas LDC Sample

Panel B: Preferred Equity Rating Summary from 2000 to 2004

Company	Year-End 2004	Year-End 2003	Year-End 2002	Year-End 2001	Year-End 2000	Days of Rating				Total Days
						Aa	A	Baa	Ba	
Cascade Natural Gas Corp	n/a	n/a	n/a	n/a	n/a	0	0	0	0	0
Keyspan Corp	Baa	Baa	Baa	A	A	0	815	1012	0	1827
Laclede Group Inc	Ba	Ba	Ba	A	A	0	948	0	0	948
Northwest Natural Gas Co	n/a	n/a	n/a	Baa	Baa	0	0	731	0	731
Peoples Energy Corp	n/a	n/a	n/a	n/a	n/a	0	0	0	0	0
South Jersey Industries Inc	Baa	Baa	Baa	Baa	Baa	0	0	1827	0	1827
Southwest Gas Corp	n/a	n/a	n/a	n/a	n/a	0	0	0	0	0
Wgl Holdings Inc	Baa	Baa	Baa	A	Aa	573	504	750	0	1827

Sources and Notes:
Ratings from Moody's (www.moodys.com).
Moody's did not report preferred ratings for KeySpan Corp. The preferred ratings are assumed equal to debt until 3/26/2002. Then, they are the preferred shelf ratings.
Moody's did not report preferred ratings for Laclede Group Inc. The preferred ratings are assumed equal to debt until 8/6/2002. Then, they are preferred shelf ratings.
The ratings for Northwest Natural Gas Co are for preference stocks.
Moody's did not report preferred ratings for South Jersey Industries Inc. Preferred ratings are assumed to be equal to bond ratings.

Workpaper #2 to Table No. MJV-21

2004 Gas LDC Sample

Panel A: Bond Yield Summary, 2000 to 2004

	% Days at Rating				Bond Yields			
Company	Aa [1]	A [2]	Baa [3]	Total [4]	Aa [5]	A [6]	Baa [7]	5-Year Weighted Average Bond Yield [8]
Cascade Natural Gas Corp	0%	0%	100%	100%	5.55%	5.61%	5.76%	5.76%
Keyspan Corp	0%	100%	0%	100%	5.55%	5.61%	5.76%	5.61%
Laclede Group Inc	0%	52%	48%	100%	5.55%	5.61%	5.76%	5.68%
Northwest Natural Gas Co	0%	100%	0%	100%	5.55%	5.61%	5.76%	5.61%
Peoples Energy Corp	0%	100%	0%	100%	5.55%	5.61%	5.76%	5.61%
South Jersey Industries Inc	0%	0%	100%	100%	5.55%	5.61%	5.76%	5.76%
Southwest Gas Corp	0%	0%	100%	100%	5.55%	5.61%	5.76%	5.76%
Wgl Holdings Inc	59%	41%	0%	100%	5.55%	5.61%	5.76%	5.57%

Sources and Notes:
[1] - [3]: Calculated from Workpaper #1 to Table No. MJV-21; Panel A.
[4]: [1] + [2] + [3].
[5] - [7]: Mergent Bond Record, March 2005.
[8]: [1] x [5] + [2] x [6] + [3] x [7].

Workpaper #2 to Table No. MJV-21

2004 Gas LDC Sample

Panel B: Preferred Equity Yield Summary, 2000 to 2004

Company	% Days at Rating					Preferred Debt Yields				
	Aa [1]	A [2]	Baa [3]	Ba [4]	Total [5]	Aa [6]	A [7]	Baa [8]	Ba [9]	5-Year Weighted Average Preferred Yield [10]
Cascade Natural Gas Corp	n/a	n/a	n/a	n/a	n/a	6.22%	6.29%	6.36%	6.43%	n/a
Keyspan Corp	0%	45%	55%	0%	100%	6.22%	6.29%	6.36%	6.43%	6.33%
Laclede Group Inc	0%	100%	0%	0%	100%	6.22%	6.29%	6.36%	6.43%	6.29%
Northwest Natural Gas Co	0%	0%	100%	0%	100%	6.22%	6.29%	6.36%	6.43%	6.36%
Peoples Energy Corp	n/a	n/a	n/a	n/a	n/a	6.22%	6.29%	6.36%	6.43%	n/a
South Jersey Industries Inc	0%	0%	100%	0%	100%	6.22%	6.29%	6.36%	6.43%	6.36%
Southwest Gas Corp	n/a	n/a	n/a	n/a	n/a	6.22%	6.29%	6.36%	6.43%	n/a
Wgl Holdings Inc	31%	28%	41%	0%	100%	6.22%	6.29%	6.36%	6.43%	6.30%

Sources and Notes:

[1] - [4]: Calculated from Workpaper #1 to Table No. MJV-21; Panel B.

[5]: [1] + [2] + [3] + [4].

[6]: [7] - ([8] - [7]).

[7] - [8]: Mergent Bond Record, March 2005.

[9]: [8] + ([8] - [7]).

[12]: [1] x [6] + [2] x [7] + [3] x [8] + [4] x [9].

Table No. MJV-22

Risk Positioning Cost of Equity at Paradise Valley Water Company's Capital Structure

Panel A: 2004 Gas LDC Sample
Using All Companies

	Overall Cost of Capital [1]	Paradise Valley Water Company's Regulatory % Debt [2]	Paradise Valley Water Company's Cost of Debt [3]	Arizona-American Water Company's Income Tax Rate [4]	Paradise Valley Water Company's Regulatory % Equity [5]	Estimated Return on Equity [6]
Using Long-Term Risk-Free rates:						
CAPM using Unadjusted ValueLine Betas	6.4%	0.63	5.6%	39.5%	0.37	11.7%
ECAPM (0.5 %) using Undjusted ValueLine Betas	6.6%	0.63	5.6%	39.5%	0.37	12.0%
ECAPM (1.5%) using Undjusted ValueLine Betas	6.8%	0.63	5.6%	39.5%	0.37	12.7%
Using Short-Term Risk-Free rates:						
CAPM using Unadjusted ValueLine Betas	5.8%	0.63	5.6%	39.5%	0.37	9.9%
ECAPM (1%) using Unadjusted ValueLine Betas	6.0%	0.63	5.6%	39.5%	0.37	10.6%
ECAPM (2%) using Unadjusted ValueLine Betas	6.3%	0.63	5.6%	39.5%	0.37	11.3%
ECAPM (3%) using Unadjusted ValueLine Betas	6.5%	0.63	5.6%	39.5%	0.37	11.9%

Sources and Notes:
[1]: Table No. MJV-21; Panels A - G, [8].
[2]: Paradise Valley Water Company.
[3]: Mergent Bond Record, March 2005. Based on an A rating.
[4]: Federal Tax Rate + (1-Federal Tax Rate) x Arizona State Tax Rate {35% + (1-35%) x 6.968%}.
Arizona State Tax Rate from http://www.taxadmin.org/fta/rate/corp_inc.html.
[5]: Paradise Valley Water Company.
[6]: {[1] - [2] x [3] x (1 - [4])} / [5].

Table No. MJV-22

Risk Positioning Cost of Equity at Paradise Valley Water Company's Capital Structure

Panel B: 2004 Gas LDC Sample

Using companies with CAPM cost of equity greater than cost of debt plus 25 basis points and with 5-year average revenues from regulated activities greater than 70%.

	Overall Cost of Capital [1]	Paradise Valley Water Company's Regulatory % Debt [2]	Paradise Valley Water Company's Cost of Debt [3]	Paradise Valley Water Company's Tax Rate [4]	Arizona-American Water Company's Income Tax Rate [5]	Estimated Return on Equity [6]
Using Long-Term Risk-Free rates:						
CAPM using Unadjusted ValueLine Betas	6.3%	0.63	5.6%	39.5%	0.37	11.3%
ECAPM (0.5 %) using Undjusted ValueLine Betas	6.4%	0.63	5.6%	39.5%	0.37	11.7%
ECAPM (1.5%) using Undjusted ValueLine Betas	6.7%	0.63	5.6%	39.5%	0.37	12.4%
Using Short-Term Risk-Free rates:						
CAPM using Unadjusted ValueLine Betas	5.8%	0.63	5.6%	39.5%	0.37	10.1%
ECAPM (1%) using Unadjusted ValueLine Betas	6.1%	0.63	5.6%	39.5%	0.37	10.7%
ECAPM (2%) using Unadjusted ValueLine Betas	6.3%	0.63	5.6%	39.5%	0.37	11.4%
ECAPM (3%) using Unadjusted ValueLine Betas	6.6%	0.63	5.6%	39.5%	0.37	12.0%

Sources and Notes:

[1]: Table No. MJV-21; Panels A - G, [8].

[2]: Paradise Valley Water Company.

[3]: Mergent Bond Record, March 2005. Based on an A rating.

[4]: Federal Tax Rate + (1-Federal Tax Rate) x Arizona State Tax Rate {35% + (1-35%) x 6.968%}.
Arizona State Tax Rate from http://www.taxadmin.org/fta/rate/corp_inc.html.

[5]: Paradise Valley Water Company.

[6]: {[1] - [2] x [3] x (1 - [4])} / [5].

BEFORE THE ARIZONA CORPORATION COMMISSION

EXHIBIT
A-10
admitted

COMMISSIONERS

JEFF HATCH-MILLER, Chairman
WILLIAM A. MUNDELL
MARC SPITZER
MIKE GLEASON
KRISTIN K. MAYES

IN THE MATTER OF THE APPLICATION OF ARIZONA-AMERICAN WATER COMPANY, INC., AN ARIZONA CORPORATION, FOR A DETERMINATION OF THE CURRENT FAIR VALUE OF ITS UTILITY PLANT AND PROPERTY AND FOR INCREASES IN ITS RATES AND CHARGES BASED THEREON FOR UTILITY SERVICE BY ITS PARADISE VALLEY WATER DISTRICT.	DOCKET NO. W-01303A-05-

DIRECT TESTIMONY
OF
A. LAWRENCE KOLBE
ON BEHALF OF
ARIZONA AMERICAN WATER COMPANY
JUNE 3, 2005

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I. INTRODUCTION AND SUMMARY

Q1. Please state your name and address for the record.

A1. My name is A. Lawrence Kolbe. My business address is The Brattle Group, 44 Brattle Street, Cambridge, Massachusetts, 02138.

Q2. Please describe your job and your educational experience.

A2. I am a Principal of The Brattle Group, an economic, environmental and management consulting firm with offices in Cambridge, Washington, London and San Francisco. My work concentrates on financial and regulatory economics. I hold a B.S. from the U.S. Air Force Academy and a Ph.D. from the Massachusetts Institute of Technology, both in economics.

Q3. What is the purpose of your testimony in this proceeding?

A3. I have been asked by Arizona-American Water Company ("Arizona-American" or the "Company") to present economic principles that govern selection of an appropriate rate of return on equity for a privately owned, rate-regulated company. I have also been asked to estimate the cost of equity capital for Arizona-American's Paradise Valley Water Company ("Paradise Valley") at its current 36.7 percent equity ratio. For the latter task, I draw in part on the findings in the companion testimony of my Brattle colleague, Dr. Michael J. Vilbert ("Vilbert Testimony").

Q4. Please summarize any parts of your background and experience that are particularly relevant to your testimony on these matters.

A4. I have been a student of rate regulation for more than 25 years. Among other publications, I am a co-author of two books[1] and dozens of papers and articles that focus on various aspects of rate regulation, as well as a third book that addresses capital investment and valuation generally.[2] One of my papers appears in a law journal and addresses the economics of the U.S. Supreme Court's risk-return standards for rate-regulated companies,[3] and other papers in various economics journals address aspects of the same set of issues.[4]

I have testified on financial and regulatory issues in many forums. These include international arbitrations in The Hague, London and Melbourne, Australia; lawsuits in U.S. courts; U.S. arbitrations, and U.S. and Canadian regulatory proceedings. In particular, I have provided expert testimony in regulatory proceedings before seven U.S. and Canadian federal regulatory bodies and one or more regulatory bodies in 17 states or provinces. These proceedings have concerned a variety of rate-regulated companies or industries, including integrated electric utilities, electric power transmission, electric power distribution, electric power generation, gas transmission, gas distribution, oil pipelines, a privately owned toll road, local telephone service, long-distance telephone service, cable television service, automobile insurance, workers

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1 A. Lawrence Kolbe and James A. Read, Jr., with George R. Hall, *The Cost of Capital: Estimating the Rate of Return for Public Utilities*, Cambridge, MA: The MIT Press (1984), and A. Lawrence Kolbe, William B. Tye and Stewart C. Myers, *Regulatory Risk: Economic Principles and Applications to Natural Gas Pipelines and Other Industries*, Boston: Kluwer Academic Publishers (1993).

2 Richard A. Brealey and Stewart C. Myers, with The Brattle Group, *Capital Investment and Valuation* (Brattle author A. Lawrence Kolbe), New York: McGraw-Hill/Irwin (2003).

3 A. Lawrence Kolbe and William B. Tye, "The *Duquesne* Opinion: How Much '*Hope*' Is There for Investors in Regulated Firms?" *Yale Journal on Regulation* 8:113-157 (1991).

4 A. Lawrence Kolbe and William B. Tye, "The Fair Allowed Rate of Return with Regulatory Risk," *Research in Law and Economics* 15:129-169 (1992); A. Lawrence Kolbe and William B. Tye, "Compensation for the Risk of Stranded Costs," *Energy Policy* 24:1025-1050 (1996); and A. Lawrence Kolbe and Lynda S. Borucki, "The Impact of Stranded-Cost Risk on Required Rates of Return for Electric Utilities: Theory and An Example" (with Lynda S. Borucki). *Journal of Regulatory Economics* 13:255-275 (1998).

compensation insurance, postal service, ocean shipping, and water. I have also testified in an international arbitration in The Hague on regulatory issues that arose under a treaty dispute between the U.K. and the U.S. concerning landing charges at London's Heathrow Airport, and I am a co-author of reports filed with Australian regulatory bodies. I have worked on matters involving rate regulation of trucking and of railroads, but I have not testified in proceedings involving these industries. Additionally, I have applied some of the economic principles that underlie rate regulation in royalty arbitrations concerning coal, oil and gas in the U.S. and Australia. Appendix A contains more information on my professional qualifications.

I have not previously testified before the Arizona Corporation Commission ("Commission").

Q5. Please summarize your testimony's main points:

A5. My testimony covers five topics: the nature of the investment process, investors' interpretation of the allowed rate of return, the market-to-book ratio test, the effect of debt on the cost of equity, and the cost of equity for Paradise Valley. The main points in each of these five areas, numbered accordingly, are:

1. Nature of the Investment Process

1a. Investment is a voluntary activity. Investment will only occur if the expected rate of return justifies the risks involved. The plain language of the U.S. Supreme Court's opinions on return standards for utilities is consistent with this principle. These opinions focus on (1) the returns investors could earn if they put their money elsewhere at a comparable level of risk, and (2) the company's financial integrity. Whatever the legal reasons for these standards (which I understand to arise out of the Constitutional prohibition against the uncompensated taking of property), they recognize basic economic reality: **you can't push on a rope**, and you can't force investors to throw good money after bad.[5]

[5] Phrases in boldface in this introduction are titles to later sections.

1b. Therefore, policies that systematically deny utility investors a fair opportunity to earn the cost of capital achieve a short-run gain for today's customers, but at a material long-run cost to future customers and possibly to the economy of the jurisdiction involved. Once the long-run costs emerge, they cannot be overcome in a hurry. Investors, once burned, will be loath to trust that the regulatory jurisdiction won't repeat the same pattern should it ask for quick investments to shore up a system that the previous policies let decay. The safest way for once-burned investors to avoid inadequate returns on future major investments is to keep the system capital-starved. Research shows that nations around the world that do not protect investor rights have less investment and more costly conditions imposed on the investment that is made, to the detriment of their economies. States that make investment unattractive or unremunerative risk the same fate.

2. *Interpretation of the Allowed Rate of Return*

The return investors actually expect to earn is what matters. If a regulatory mechanism claims to allow one rate of return but actually allows a lower one on average, the lower one is what must pass the comparable return standard. If I promise to pay someone $10 to wash my car but s/he has learned I always actually pay 10 percent less than I promise, that person will assume the actual payment will only be $9, and s/he will wash my car only if $9 is enough. The phantom dollar in my stated payment is irrelevant, because **empty promises buy nothing**. (The same problem arises if I pay the $10 most of the time but welsh and pay nothing 10 percent of the time. In that case, the expected payment would again be $9, not $10.)

3. *The Market-to-Book Ratio Test*

At one time, it was reasonable to believe that a market-to-book ratio above (below) one signaled an expected rate of return on book value above (below) the utility's cost of capital. That time has passed. The 1987 stock market crash and the recent "tech bubble" are inconsistent with the model on which the market-to-book test relies. This conclusion is reinforced by the high market-to-book ratios currently observed for rate-regulated companies. If the market-to-book ratio test were valid yet such market-to-book ratios existed, the implied true costs of equity for the rate-regulated companies would be unreasonably low. How low depends on the precise assumptions, but in many cases they would be below the cost of long-term government debt. The implied true costs of equity can even be negative. Therefore, **the market-to-book ratio test cannot be right**. In practice, the forces driving market prices are more complicated than the simple model that underlies the market-to-book ratio test assumes.

4. *The Effect of Debt on the Cost of Equity*

4a. To understand fully the effect of capital structure on the cost of equity, it is useful to start from first principles. As Figure 1 illustrates, companies raise money for investment by issuing securities.[6] Different securities have different claims on the firm's earnings, and if necessary, on its assets. Debt has a senior claim on a specified portion of the earnings. Common equity, the most junior security, gets what's left after everyone else has been paid. Since equity bears more risk, investors require a higher rate of return on equity than on debt. Except at extreme debt levels, the overall level of risk of the firm does not change materially due to the addition of debt. The various securities just divvy that risk up.

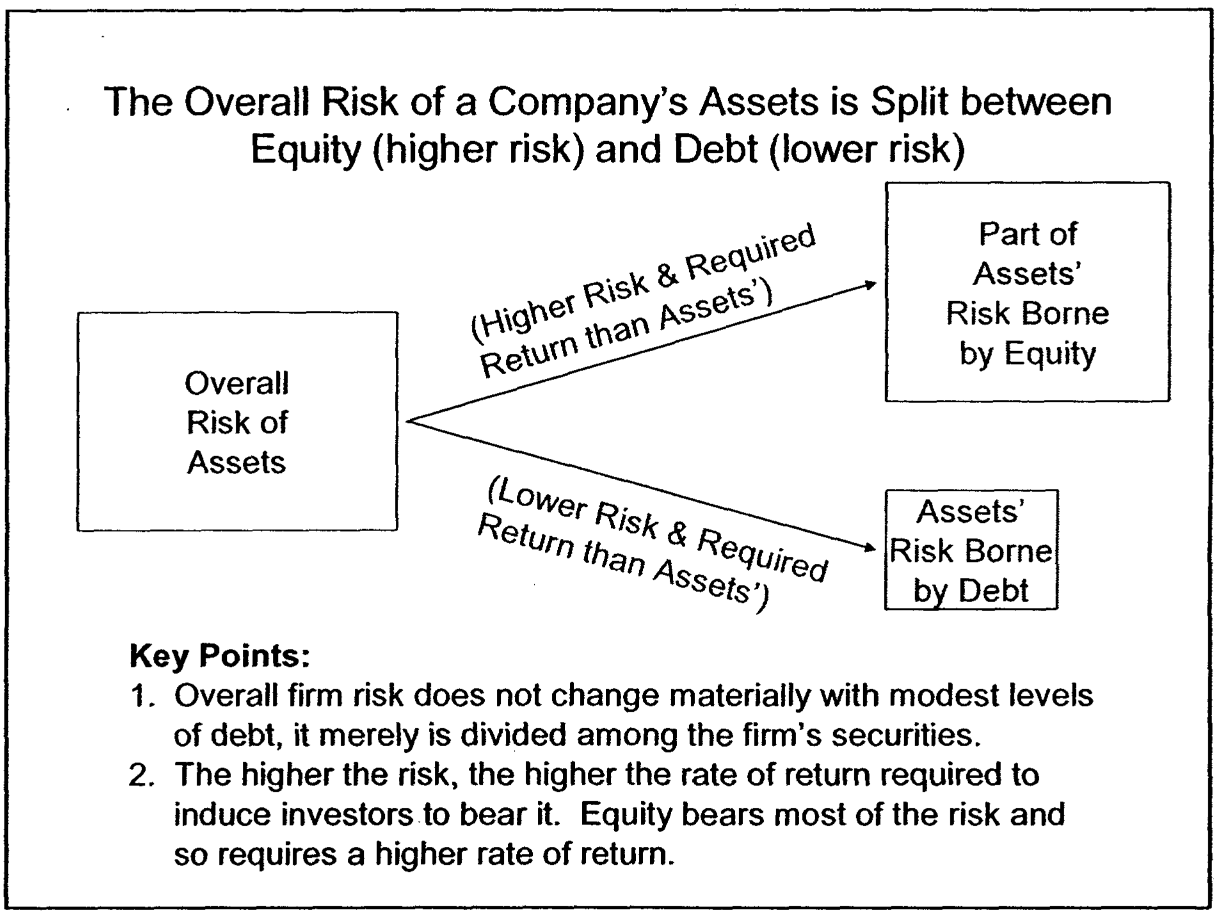

Figure 1

4b. When a company uses modest amounts of debt, the overall risk of the company's assets falls on a fraction of its capital, the equity. The required return per dollar of equity goes up. Suppose changes in some market-wide economic factor normally produce fluctuations within a band of plus or minus ("+/-") 2 percent of the market value of a company's assets. At 100 percent equity, these changes produce fluctuations of +/- 2 percent of the market value of the company's equity, too. But at a 50-50 market-value debt-equity ratio, the

[6] For those viewing this document in color, the convention in Figures 1, 2, 7 to 9 and 11 in this testimony is that blue represents equity, red represents debt, green represents increases in value, and yellow represents decreases in value.

same asset value fluctuations produce equity value fluctuations of +/- 4 percent. At a 75-25 market-value debt-equity ratio, these fluctuations become +/- 8 percent of the market value of the company's equity. Figure 2 illustrates this point for debt-equity ratios of 0-100, 25-75, 50-50, and 75-25. Higher risk means a higher required rate of return, so *the cost of equity goes up at an ever increasing rate as a company adds debt*, which offsets the cheaper cost of debt. In short, **there is no magic in financial leverage**.

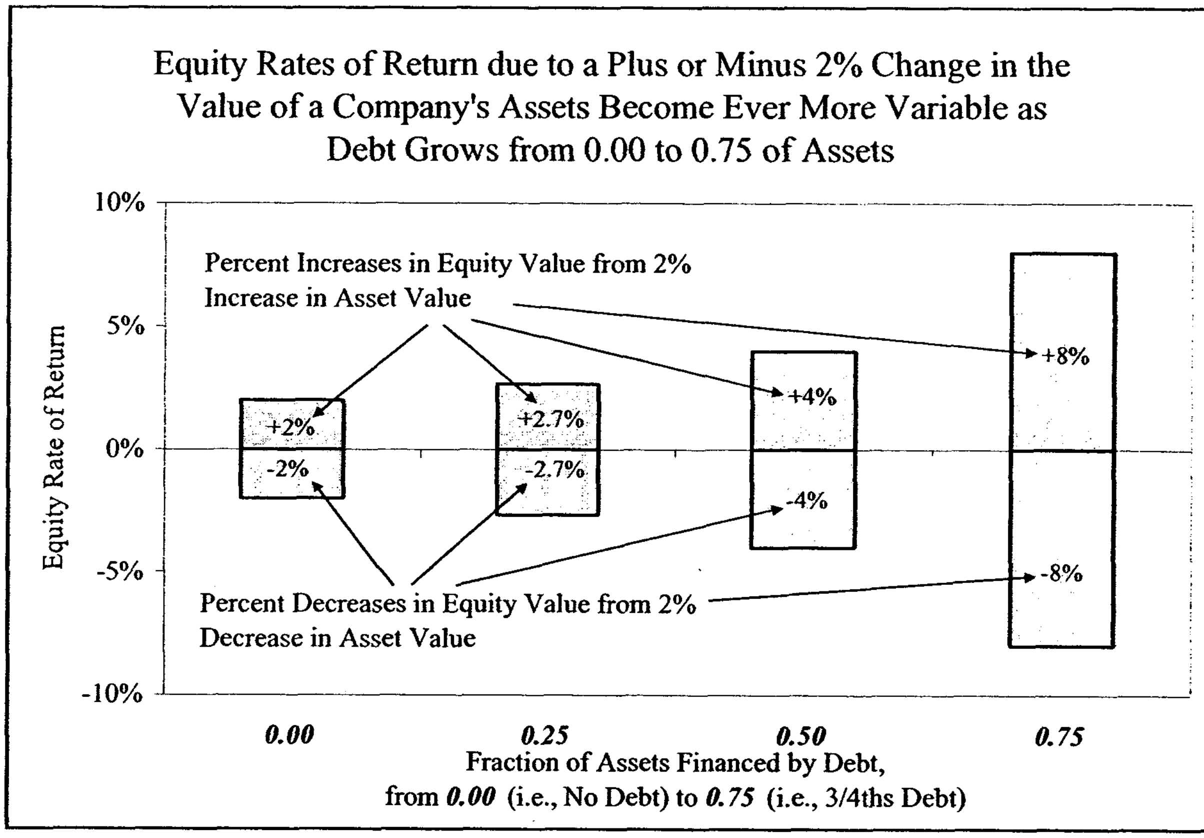

Figure 2

4c. An accurate estimate of the cost of equity for a rate-regulated company needs to consider (1) the levels of financial risk in the sample companies used to estimate the cost of equity and (2) how those levels compare to the level implied by the company's regulatory capital structure. The associated capital structure affects the estimated cost of equity estimate just as a life insurance applicant's age affects the required life insurance premium. An insurance agent wouldn't measure the required insurance premium for one person and charge the same premium to an otherwise identical person who was much older. Neither should a cost of equity analyst measure the cost of equity at one capital structure and apply the same cost of equity to a regulated capital structure with much more debt.

4d. As noted, the sample company's *market-value* capital structure determines the level of risk that a cost of equity analyst measures from market data, because market values determine the level of risk that equity bears due to debt. Example: suppose you buy a home for \$50,000 with a mortgage of \$40,000. Ten years later your home is worth \$100,000 and the mortgage is down to \$35,000. Your equity in the home is now \$65,000. If home prices then drop 10 percent, or \$10,000, your \$65,000 equity falls by that amount, and the resulting rate of return on your equity is -15 percent (= -\$10,000/\$65,000), versus -10 percent if you had no mortgage. The 15 percent loss would affect the measured risk of your home if it were represented by a publicly traded stock (e.g., the "beta" risk measure).[7] The "discounted cash flow" approach starts from the publicly traded price of your home, too, and that price reflects the level of risk borne in the market. The risk that underlies every cost of equity estimate based on market data *automatically* depends on the market-value capital structure of that company.

5. *Paradise Valley's Cost of Equity*

5a. These capital structure principles are particularly important for Paradise Valley. Figure 3 compares Paradise Valley's capital structure to that of water companies in recent Commission decisions. Paradise Valley has less equity than any of them. In fact, it has less than half as much equity than the average value for the six other companies in the figure. For reasons just explained, that means that for the same level of *business* risk, Paradise Valley's cost of equity will be higher than that of any of the other companies, and much higher than that of all but one of them, because **Paradise Valley's equity bears much more *financial* risk.**

[7] If you kept books on the house, the book equity would be \$15,000 (the original \$50,000 less the current \$35,000 mortgage), or less if you were depreciating your investment. But a publicly traded stock for your house would not fall by \$10,000/\$15,000, or 67%, if housing prices fell 10 percent.

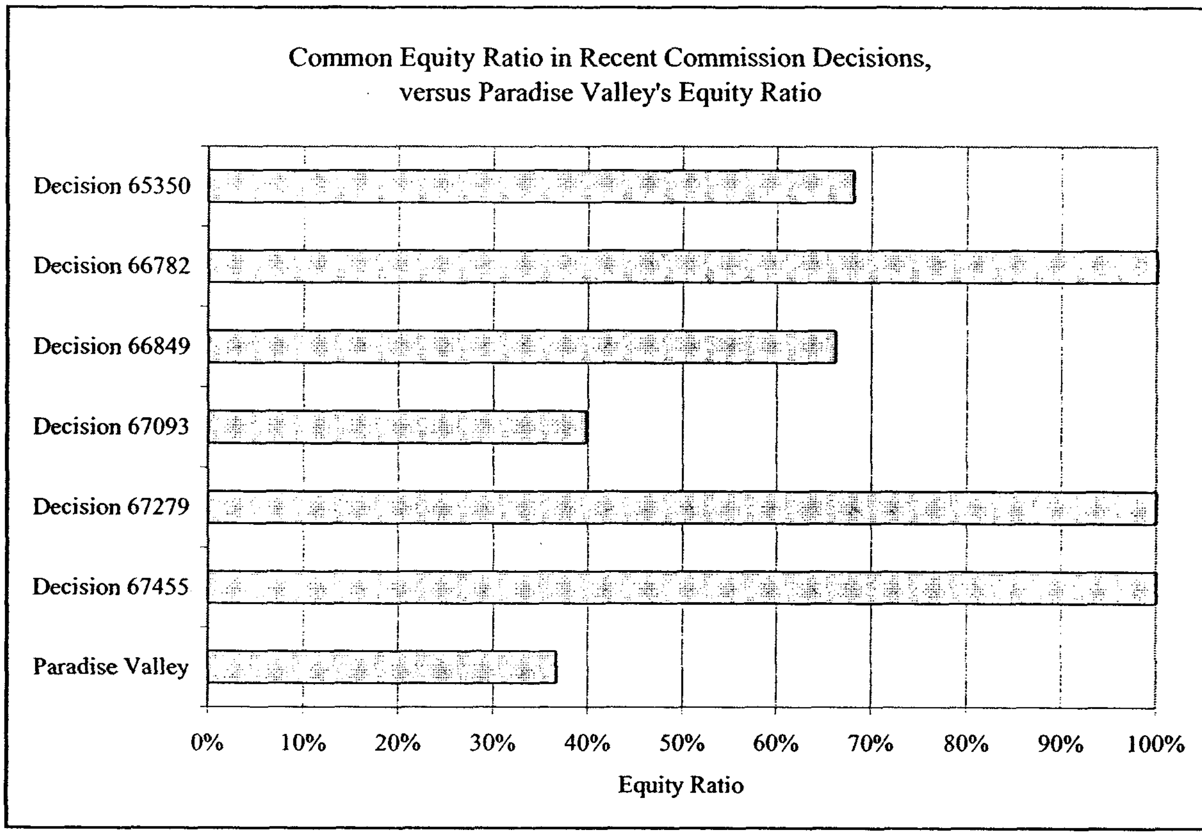

Figure 3

5b. Another way to state this point is to recognize that a given cost of equity for the other companies will cost their customers far more than the same cost of equity for Paradise Valley. A way to see this is to calculate the overall after-tax weighted-average cost of capital implied by these decisions (using current rather than embedded interest rates, to ensure an apples-to-apples comparison), and then to examine what cost of equity Paradise Valley would have to have at its capital structure to produce the same cost to its customers. Figure 4 shows the results of these calculations. Except for Decision 67093, the *lowest* cost of equity that would make Paradise Valley's overall return on capital as high for its customers as that approved in these other cases is nearly 14 percent. The highest is nearly 19 percent (for Decision 66782).

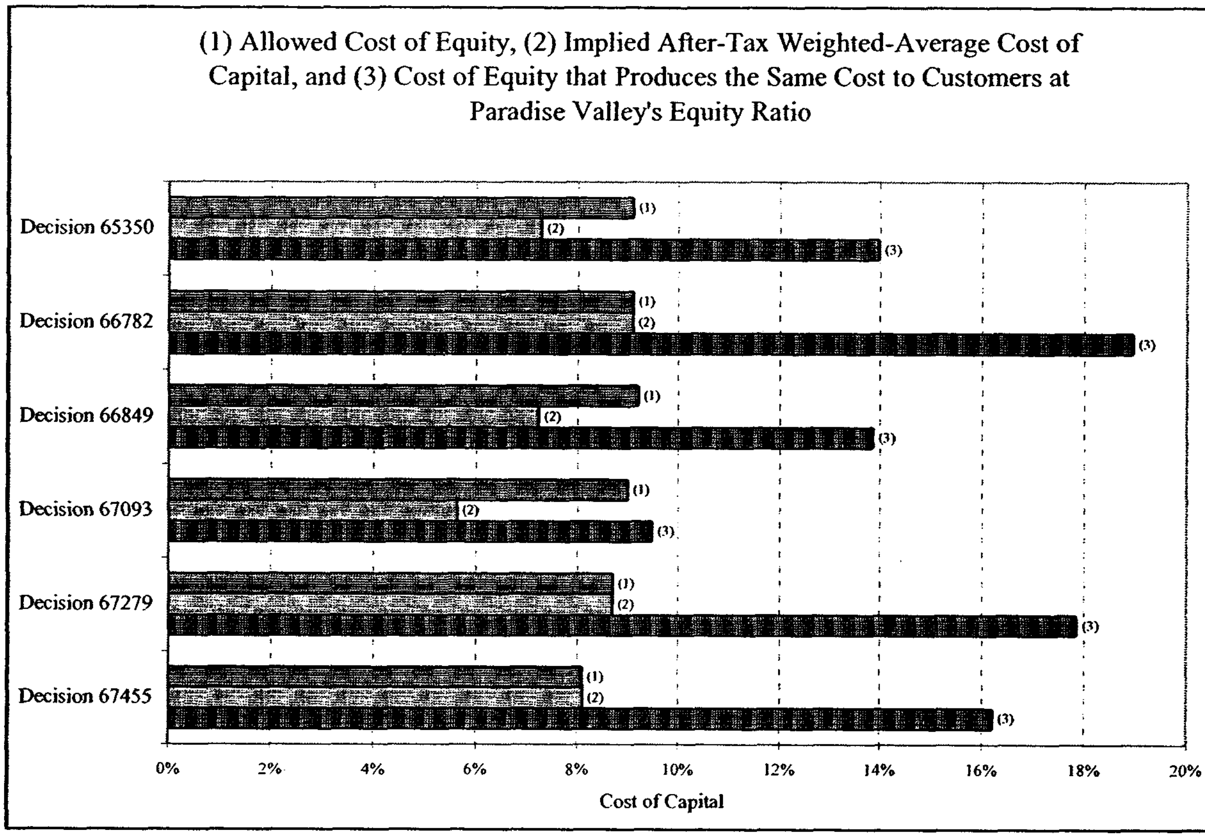

Figure 4

5c. I have reviewed Dr. Vilbert's analyses of the cost of equity of his sample groups. These analyses explicitly recognize the capital structure principles described above. Based on these analyses, I find Paradise Valley's cost of equity lies between 12 percent and 13 percent, given it's very low equity ratio. I believe the midpoint of this range 12½ percent, is the best point estimate of Paradise Valley's cost of equity. Figure 5 shows the resulting annual pre-tax cost to customers per $100 of rate base for the six Commission decisions and my recommendation (using Paradise Valley's current cost of debt and statutory tax rate to produce an apples-to-apples comparison). My recommendation produces costs to customers that (1) fairly reflect Paradise Valley's high financial risk, yet (2) are well below all but one of costs implied by the Commission's recent decisions.

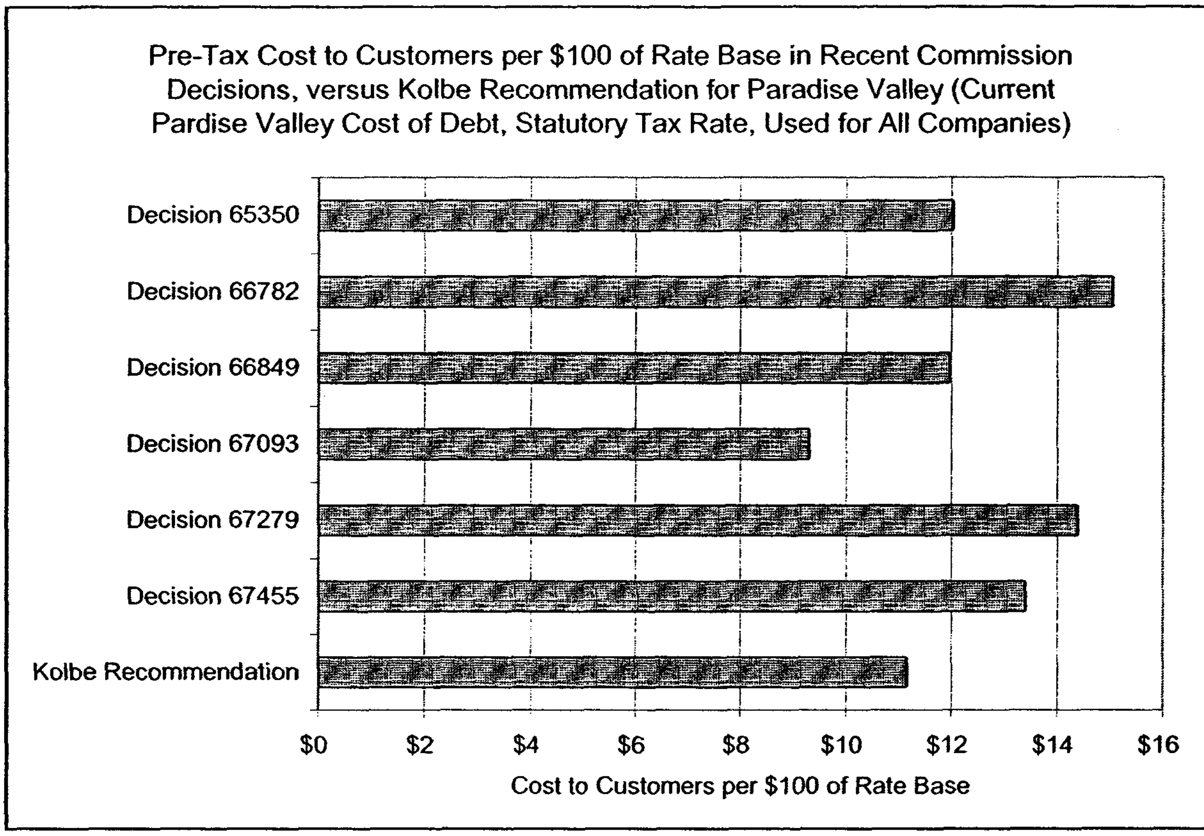

Figure 5

Q6. How is the remainder of your testimony organized?

A6. *Section II* addresses the conditions necessary for voluntary investment, point one above. *Section III* addresses the distinction between the allowed rate of return and the return investors require, point two above. *Section IV* addresses the market-to-book ratio test, point three above. *Section V* discusses the effect of capital structure on the cost of equity, point four above. (Appendix B provides additional information on this topic.) Finally, *Section VI* describes the basis of my recommended cost of equity range for Paradise Valley, point five above.

II. "YOU CAN'T PUSH ON A ROPE"

Q7. What is the purpose of the testimony in this section?

A7. The section discusses what is needed to induce investment by corporations in a market economy.

Q8. What is the nature of the corporate investment process?

A8. Investment by ordinary (i.e., non-financial) corporations is the process of turning a fungible and very liquid asset -- money -- into other assets that have at least as much value, but which are much less fungible and liquid. Examples of such other assets include automobile factories, water treatment plants, and research and development programs that companies hope will produce valuable patents.

Q9. How do corporations get money to invest?

A9. They must induce investors to provide it.

Q10. How do they do that?

A10. The inducement comes in the form of an expected return on the investors' money. The level of return investors require depends on the risk involved, which varies from industry to industry *because* some of the assets in which corporations invest are riskier than others.

That is, the expected rate of return investors can get if they keep their money in the bank or money-market funds is predictable and carries little or no risk. It also is low. The expected rate of return on the assets corporations build or buy with investors' money is less predictable and carries more risk, and sometimes much more. It also is higher, because investors require a higher expected rate of return to bear more risk. To attract capital, corporations must identify investments with an expected rate of return at least equal to that available to investors on alternative investments of equivalent risk.

Q11. How does all this relate to the legal standards for rates of return for rate-regulated companies?

A11. I am not an attorney, but the plain English of the U.S. Supreme Court's opinions appears to be in line with these economic principles. For example,

> A public utility is entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public . . . equal to that generally being made . . . on investments in other business undertakings which are attended by corresponding risks and uncertainties. ... The return should be reasonably sufficient to assure confidence in the financial soundness of the utility and should be adequate, under efficient and economical management, to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties.[8]

and

> From the investor or company point of view it is important that there be enough revenue not only for operating expenses but also for the capital costs of the business. These include service on the debt and dividends on the stock. [Citation omitted.] By that standard, the return to the equity owner should be commensurate with return on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital.[9]

I read these passages as establishing a two-part standard. First, the expected rate of return for investors in a rate-regulated company should equal that available in other investments of equivalent risk. Second, the return should be adequate to maintain the financial integrity of the

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[8] *Bluefield Waterworks & Improvement Co. v. Public Service Commission*, 262 U.S. 679 (1923) at 692-693.

[9] *Federal Power Commission v. Hope Natural Gas*, 320 U.S. 591 ("*Hope*") at 603.

company. Both parts of this standard make good economic sense, since you can't force investors to put their money into a venture. The very fact that such legal standards exist makes good economic sense, too.

Q12. Please explain the last statement.

A12. There is presently an active corporate finance literature that documents the impact of international differences in enforceable legal rights on the health of a nation's financial markets and the level of investment. Two quotations from that literature summarize some of the relevant findings:

> Recent research reveals that a number of important differences in financial systems among countries are shaped by the extent of legal protection afforded outside investors from expropriation by the controlling shareholders or managers. The findings show that better legal protection of outside shareholders is associated with: (1) more valuable stock markets ... ; (2) a higher number of listed firms ... ; (3) larger listed firms in terms of their sales or assets ... ; (4) higher valuation of listed firms relative to their assets ... ; (5) greater dividend payouts ... ; (6) lower concentration of ownership and control ... ; (7) lower private benefits of control ... ; and (8) higher correlation between investment opportunities and actual investments .... [Omitted citations indicated by ellipses.][10]

Also,

> Recent research suggests that the extent of legal protection of investors in a country is an important determinant of the development of its financial markets. Where laws are protective of outside investors and well enforced, investors are willing to finance firms, and financial markets are both broader and more valuable. In contrast, where laws are unprotective of investors, the development of financial markets is stunted. Moreover, systematic differences among countries in the structure of laws and their enforcement, such as the historical origin of their laws, account for the differences in financial development .... [Omitted citations indicated by ellipses.][11]

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[10] Andrei Shleifer and Daniel Wolfenzon, "Investor Protection and Equity Markets," *Journal of Financial Economics* 66: 3-27 (October 2002), pp. 3-4.

[11] Rafael La Porta, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny, "Investor Protection and Corporate Valuation", *The Journal of Finance* 57: 1147:1170 (June 2002), p. 1147.

This literature focuses on the possibility of expropriation by a country's citizens of minority investments made by outsiders, typically foreigners. The issue the Supreme Court addresses is the possibility of uncompensated takings by acts of government. But the key question is whether the investment is or is not at risk of being taken, not who the taker is. Investors are understandably reluctant to commit funds when such takings are possible, leading to less investment and to more costly terms for the investments that are made.

Q13. What do you mean by "takings" in this context?

A13. The answer to this question requires a bit of background on how an asset's risk may be allocated among different groups of customers.

Q14. All right, please go ahead.

A14. Investments in industry-specific corporate assets can be hostages to fortune. To sink fungible money into a non-fungible asset with few or no alternative uses, particularly one with a long life, is to assume a great deal of intrinsic risk. Companies sometimes choose to bear all of this risk and sometimes try to lay some or all of it off on other parties.

An example is a commercial building that might be used for office space or as a hotel. (Some buildings have both uses at the same time.) Commercial office space normally is rented out under long-term leases. The owner of the building gets a secure payment from the office space lessee, who thereby removes the owner's risk that the office space might lease at a much different rate or lie empty in a few years. Hotel space, in contrast, rents night to night. On hotel space, the owner bears the risk of bad times, in which fewer rooms will be booked and those that are booked will go for less money. The owner hopes to more than make up for such losses in good times, when more rooms are full and daily rates are higher.

The owner of a building with both office space and hotel space thus lays off some of his or her risk on office space lessees, but keeps the risk for the hotel space. The rents charged to office space lessees are lower than they would otherwise be precisely because the lessees are bearing this risk. Put differently, the cost of capital for office space is lower than the cost of capital for hotel space, and in a competitive market, the average rates for office and hotel space would reflect this difference.

Q15. How does this relate to investments by rate-regulated firms?

A15. Rate regulation often involves companies with long-lived assets with little or no alternative uses, and it therefore involves a great deal of intrinsic risk. The institutions of rate regulation pass much of this risk through to customers, in exchange for lower prices than they would otherwise have to pay. Investors' risk-bearing under rate regulation normally lies somewhere between the office-space and hotel-space extremes. Regulation denies regulated companies the right to make extra-high profits by charging premium prices in good times, and in exchange is supposed to protect the company from having to suffer from extra-low prices in bad times. It also is supposed to assure the investor a fair opportunity to recover all of the money sunk into the company's assets, through depreciation or amortization charges. Yet the company normally retains some risks, too. An example is gains or losses due to variations of sales from forecasted levels, which typically fall on the company between rate hearings, at which time new forecasts can be made.

Rate-regulated companies invest under the expectation that they will earn a return equal to the cost of their capital on average, i.e., that investors will have a fair opportunity to earn exactly the rate of return they could get on alternative investments of equivalent risk. That cost of capital is lower than in most industries precisely because of the constraints imposed by rate regulation. Nonetheless, it is higher than office space lessees command, because rate-regulated companies bear more risk than a building owner does from an office lease.

Q16. With that background, would you now explain what you mean by "takings"?

A16. Yes. First, I will note again that I am not an attorney, and I am not attempting a legal definition of the term. Economically, however, a "taking" of regulatory property in the sense used above would occur when the terms of regulation were changed so as systematically to deny to investors a fair opportunity to earn the cost of capital *after* the investors have sunk their money in non-fungible rate-regulated assets.

If it were known in advance that regulators would mark regulated rates down to unremunerative levels right after major investments had been made, for example, investors would invest less than if they believed the returns would be adequate; possibly they would not invest at all. If the policy of unremunerative returns were known in advance, the company's service quality would be lower, and service would be less available and/or more expensive than it would otherwise have to be. Therefore, a change to the terms of regulation to deny a fair opportunity to earn the cost of capital after the fact would get higher service levels without paying for them, and that would constitute a taking from an economic perspective.[12] Whether legal or not, such an act would achieve a short-run benefit for today's customers at a material long-run cost to future

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[12] From an economic perspective, there is little to distinguish between changing the terms on which capital was invested after the fact and notifying the laborers finishing up on a construction project that they weren't going to receive their final paycheck, or that they would get it but at a much lower wage. The cost of capital is as much a real cost as wages.

customers. The research cited above suggests the long-run cost could be material for the state's economy, too.

Q17. But would not a commission's need to balance customer and investor interests mean that the rate of return on equity should be lowered, especially if overall rates are high due to new investments?

A17. No, not if the result is an expected rate of return on equity that is below the cost of capital. As noted in the footnote to the last answer, the cost of capital is as much a real cost as workers' wages. From an economic perspective, cutting the return on equity because new investment makes costs high is no different from cutting the wages of a utility's workers because costs are high. Workers who were satisfied with the wage before the cut would look for better opportunities after the cut, and some would find such opportunities and quit. The deeper the cut, the larger the proportion of workers who would quit. Investors would have an even easier time finding better opportunities, because the stock market is full of investments that offer an expected rate of return equal to the cost of capital (which varies with the risks of the particular stock). With an allowed rate of return below the cost of capital, managers who act in their shareholders' interests would try to avoid putting any more capital into the now unremunerative line of business, with material long-run consequences. That would not be in the best interest of customers, any more than would a utility's being unable to operate or to maintain its service quality because it could not attract workers at the wages it was allowed to offer.

Q18. If the gain is now and the cost is in the long-run, why worry about it? Is not that a problem for the future?

A18. It is always possible for one generation to live well and leave future generations to pick up the tab, and economists have no particular claim to expertise with the ethical questions generated by such decisions. However, we can try to help make sure the questions are resolved with a complete understanding of the tradeoffs involved.

In my experience, rate-regulated companies, like the institutions of regulation itself, have a great deal of inertia. They are like oil supertankers, which take a great deal of time to turn if trouble looms, but which then take at least as much time to get back on the original course.

Regulated companies' managers tend to want to provide service when it's requested, trusting to the regulatory process to perform acceptably for their investors on average. Therefore, they may not react immediately to the full extent possible if the regulatory process stops doing so. They certainly react less quickly than competitive firms to signals that a previously remunerative market no longer is generating an adequate return.[13] And even after managers do react and slow or stop new investment, the long-lived nature of regulatory assets can mean existing services take a long time to decay. Therefore, the adverse impacts of a regulatory policy that systematically denies investors a fair opportunity to earn the cost of capital are likely to take awhile to become material, which can lead to the mistaken impression that they will not do so.

Once the adverse impacts are manifest, however, they cannot be overcome in a hurry, any more than a supertanker can immediately resume its previous course. Not only would remedial investment take time, but also it would take longer to get started and/or be more expensive.

[13] This is one reason that regulated firms can have so much trouble adapting to competition if it appears. See A. Lawrence Kolbe and Richard W. Hodges, "EPRI PRISM Interim Report: Parcel/Message Delivery Services," report prepared for the Electric Power Research Institute, RP-2801-2 (June 1989), reprinted in S. Oren and S. Smith, eds., *Service Opportunities for Electric Utilities: Creating Differentiated Products*. Boston: Kluwer Academic Publishers (1993).

Q19. Why is that?

A19. Investors, once burned, will be loath to trust that the regulatory jurisdiction in question won't repeat the same pattern if regulators subsequently ask for quick investments to shore up a system that the previous policy let decay, or to extend service to new customers. The safest way for investors to avoid inadequate returns on future major investments in such a jurisdiction is to keep the system capital-starved. For example, the company might not invest unless regulators were willing to negotiate *ex ante* terms that assured a fair return on incremental investment, at least. Such negotiations at least take time and cost extra money. They also lead to a higher rate of return and/or to a shift of more risk to customers than could have been achieved by a policy of allowing the company a fair opportunity to earn its cost of capital all along.

Q20. But do not rate-regulated companies have obligations to invest to maintain service?

A20. I understand there can be such obligations, but I also know of the Supreme Court's interpretation of the prohibition against uncompensated takings. I am not an attorney, so I cannot say how fast or by what mechanism investors will be able to slow the rate of investment if they become convinced that the return will not be remunerative. I can say confidently, however, that if a rate-regulated company becomes convinced that its returns in a particular jurisdiction will systematically be inadequate in the future, the best thing it can do for its shareholders is to devise an optimal exit strategy from that jurisdiction. Moreover, whatever the legal form of that strategy, and whatever the direct costs to both investors and customers of its execution, it will also constitute a very negative signal to all companies considering investing in that jurisdiction in the future.

Additionally, even if the company in question stops short of an exit strategy, those most likely to pay attention to inadequate returns for one rate-regulated company are investors in and managers of other rate-regulated industries in the jurisdiction. They may grow cautions about new investment, also, even if they have not yet been affected directly. Rate-regulated industries tend to provide basic services, so a reluctance to invest in these industries, whether solely in the one directly affected or in all of them, is very likely to spill over to the rest of the jurisdiction's economy.

Q21. Please sum up.

A21. A decision to take systematically from today's investors to give service below cost to today's customers will create material problems for tomorrow's customers and very probably for the state's economy. The optimal strategy for investors in such a company is to keep it capital-starved, and possibly even to exit the jurisdiction. You can't force investors to throw good money after bad, any more than you can push on a rope. As time passes, that will lead to less reliable (and less extensive) service. Unfortunately, while systems consisting of long-lived assets take a long time to "break," once "broken" they also take a long time to fix. Moreover, tomorrow's investors will not put up new money to fix such systems on the old terms. Even after such a system is restored, it will cost tomorrow's customers more than it would have without the initial decision to take from today's investors.

III. "EMPTY PROMISES BUY NOTHING"

Q22. What is the purpose of this section?

A22. At heart, it addresses the difference between the cost of capital and the allowed rate of return.

Q23. What is the difference?

A23. The "opportunity cost of capital," or "cost of capital" for short, is defined as the expected rate of return in capital markets on alternative investments of equivalent risk. The cost of capital is the bare minimum rate of return necessary to attract capital and to compensate investors for a given level of risk, since that is what they could earn elsewhere without bearing any more risk. That is, it is the competitive market price for capital exposed to a given level of risk. To treat both investors and customers fairly, regulatory procedures should operate so the company expects to earn the cost of capital on the assets its investors' money has bought.[14]

The "allowed rate of return" is a regulatory parameter used to determine the revenue requirement. Typically, the allowed rate of return is set equal to regulators' estimate of the cost of capital. The issue for this section is whether the mere setting of the allowed rate of return equal to the cost of capital actually permits investors to expect to earn the cost of capital, even if all parties were to agree that regulators had estimated the cost of capital perfectly.

Q24. Why wouldn't it?

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[14] A potential exception to this rule is "incentive regulation." Under incentive regulation, the company may be able to expect to earn more than the cost of capital for a period of time *if* its managers are able to find innovative ways to cut costs. Customers benefit after this period ends (or sometimes right away, according to a predetermined sharing formula) when costs are lower than they would otherwise have been.

A24. An allowed rate of return equal to the cost of capital lets the company expect to earn the cost of capital if and only if the company expects to earn the allowed rate of return. If the jurisdiction's regulatory procedures are designed so the company actually expects to earn less than the allowed rate of return, then it expects to earn less than the cost of capital, too.

Q25. You keep referring to the "expected" rate of return or the return the company "expects" to earn. Precisely what do you mean by "expect"?

A25. I mean the average value. The term "expected" is from statistics, and denotes the mean of the distribution of possible returns or rates of return.[15]

Q26. Why do you raise this topic?

A26. I understand Paradise Valley has not earned its allowed rate of return in quite some time. The testimony of David Stephenson addresses the specific reasons for this shortfall, but the mere fact of its existence raises the possibility that investors will not expect to earn the allowed rate of return under the current regulatory arrangements. Fair treatment of both investors and customers means that rate-regulated companies should expect to earn the cost of capital on average. If a company

[15] My testimony uses "expect" and "expected" only in the statistical sense:

> . . .the idea of expectation of a random variable is closely connected with the origin of statistics in games of chance. Gamblers were interested in how much they could "expect" to win in the long run in a game, and in how much they should wager in certain games if the game was to be "fair." Thus, expected value originally meant the expected long-run winnings (or losings) over repeated play; this term has been retained in mathematical statistics to mean the long-run average value for any random variable over an indefinite number of samples. This holds whether a large number of samples will actually be conducted or whether the situation is a one-trial affair and we consider hypothetical repetitions of the situation. Over a long series of trials, we can "expect" to observe the expected value. At any *single* trial, we in general cannot "expect" the expected value; usually the expected value is not even a possible value of the random variable for any single trial. . . .
>
> W. L. Hayes, and R. L. Winkler, *Statistics*, Vol. I, New York: Holt Rinehart & Winston (1970) at 136-137.

does not expect to earn its allowed rate of return, than setting the allowed rate of return equal merely to the cost of capital shortchanges its investors, because the supposed opportunity to earn the allowed rate of return on average is actually an empty promise. Fair treatment of investors in such a case requires either changes to the regulatory mechanism so the company does expect to earn its allowed rate of return on average, or an allowed rate of return set enough above the cost of capital to make up for the expected shortfall between the cost of capital and the rate of return the company actually expects to earn.

IV. "THE MARKET-TO-BOOK RATIO TEST CANNOT BE RIGHT"

Q27. What is the market-to-book ratio test?

A27. The market-to-book ratio is supposed to indicate whether a utility expects to earn more or less than its cost of capital. In particular, for a utility regulated on a book-value rate base, a market-to-book ratio of 1.0 is supposed to indicate an expected rate of return on the book rate base equal to the utility's cost of capital. The test is based on the assumption that the value of a utility's stock equals the present value of the returns on (i.e., earnings) and of (i.e., depreciation) a rate base equal to the net book value of the utility's equity.[16]

Q28. That assumption does not sound very controversial. Is the market-to-book test valid?

A28. No, it turns out not to be valid, although I believed it was when writing a book published in 1984.[17] And even in 1984 there were a number of caveats concerning use of the market-to-book ratio to

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16 See, for example, Kolbe, Read and Hall, *op. cit.*, pp. 25-33, 85-91.

17 *Ibid.*

test utility rates.[18] Since that time, however, the market has behaved in ways that are plainly inconsistent with the simple pricing model on which the market-to-book ratio test rests. It is now clear that the market-to-book ratio test does not work.

Q29. Before you address the changes since your book was published, please identify the "caveats" concerning use of the market-to-book ratio test that existed even in 1984.

A29. First, even when we were able to believe in the validity of the market-to-book ratio test, we knew that the test could work only for companies that consisted entirely of regulated businesses with a rate base equal to net book value. The test never was believed to work for unregulated businesses. The pattern of cash flows over the life of an unregulated investment is quite different from that of an investment regulated on a net book-value rate base.[19] In a competitive equilibrium with inflation, that means market values will generally exceed book values for unregulated firms. The deviations may be even greater in the actual world.

Second, even for (1) a pure-play utility with a rate base equal to net book value, with (2) a true market asset pricing model that would yield a market-to-book ratio of one for such a utility in equilibrium, the regulatory process may act with a lag that leaves market-to-book ratios substantially different from one for long periods of time.

Third, even for (1) a pure-play utility with a rate base equal to net book value, with (2) a true market asset pricing model that would yield a market-to-book ratio of one for such a utility in equilibrium, regulators could not try consciously to target a market-to-book ratio of one in setting the allowed rate of return. The reason is that once investors discovered this policy (whether

[18] *Ibid.*

[19] See, for example, Stewart C. Myers, A. Lawrence Kolbe and William B. Tye, "Inflation and Rate of Return Regulation," *Research in Transportation Economics*, Volume II. Greenwich, CT: JAI Press, Inc. (1985).

through public pronouncements or analysis of the results of confidential deliberations), investors would take it into account in pricing the stock. That would change the market-to-book ratio, thereby contaminating the information regulators would need to implement the policy. Regulation that consciously tries to set an allowed rate of return that makes the market-to-book ratio equal one is circular. This circularity existed even before the market taught us that we could no longer believe in the market-to-book test, and even for companies in circumstances that we would have believed would make market-to-book test valid.

Q30. Please now identify the actions of the market that have led you to conclude that the market-to-book ratio test "does not work."

A30. The stock market has taught us that the true, unknown, model or models that drive stock prices is (are) more complicated than the simple models that give rise to the market-to-book test. That means we can no longer trust that the market-to-book test would actually work even for a pure-play utility regulated entirely on a rate base equal to net book value, in equilibrium.

Specifically, the stock market forced me to change my view of the value of the market-to-book ratio for a steady-state, pure play utility with a book-value rate base when it crashed in October 1987.[20] The stock market bubble of the late 1990s and 2000 has only reinforced this conclusion.

In an attempt to explain how the market's level could change so much in such a short period, Prof. Stewart C. Myers wrote a paper[21] that argues that the stock market is good at getting relative prices right, because a great deal of money can be made in riskless arbitrage if securities

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20 For the record, I am not claiming an epiphany. It took several years for me to understand the implications of the crash in the context of rate regulation.

21 Stewart C. Myers, "Fuzzy Efficiency," *Institutional Investor*, December 1988.

are mispriced relative to one another. However, the stock market is not able to get absolute prices right, except in a "fuzzy" way.[22]

The market-to-book ratio purports to be a test of absolute value for utilities. If the stock market can get relative prices right, and if any stock has a reliable test for its absolute value, then all stocks will be priced right relative to it, and all stocks will be priced right in absolute value, too. If this were true, the stock market wouldn't have crashed in October 1987, nor would the turn-of-the-century "tech bubble" have happened. Since those events did happen, the supposed test of absolute value for utilities, i.e., the market-to-book ratio test, must not be valid. The unknown "true" model(s) of stock market prices in practice must be richer and more complicated than assumed in the simple derivation of the market-to-book test.

Q31. Can the other potential problems you mentioned explain current market-to-book ratios in ways that preserve the market-to-book test?

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[22] Nobel laureate Paul A. Samuelson expressed a related view in a letter to Profs. Robert Shiller and John Campbell:

> Modern markets show considerable *micro* efficiency (for the reason that the minority who spot aberrations from micro efficiency can make money from those occurrences and, in doing so, they tend to wipe out any persistent inefficiencies). In no contradiction to the previous sentence, I had hypothesized considerable *macro* inefficiencies, in the sense of long waves in the time series of aggregate indexes of security prices below and above various definitions of fundamental values. ... Long swings are long in time but *that* doesn't get them corrected with increasing confidence on the part of observing scientist.
>
> Quoted from Robert J. Shiller, *Irrational Exuberance*, New York: Broadway Books (2001), p. 243, emphases in the original.

More generally, Prof. Shiller and others have produced a growing literature that questions the notion that stock prices are determined in accord with simple models such as the present value formula. Our basic understanding of stock price formation has proven inadequate to explain the actual data we observe.

A31. No. For example, I believe that in recent years there have been companies that are essentially entirely regulated water utilities with market-to-book ratios in the 1.5 to 3.0 range. Those numbers are too high to be the result of regulatory lag in, for example, commissions' adjusting the allowed rate of return on equity in response to declining interest rates.

Q32. Why do you say that, when interest rates have been coming down for quite awhile now? Could not it be that for utilities, at least, the basic model still fully explains stock prices and the market-to-book ratios we observe are simply a result of a slow adjustment of allowed rates of return to interest rate declines?

A32. Unfortunately, such a view is not supportable. Suppose you observe a pure-play utility with a book-value rate base and a market-to-book ratio equal to 2.0. Then investors are paying $2 now for stock value that will be brought down to $1 as soon as regulators catch up with the interest rate declines. That amounts to a −50 percent return on the initial investment, which under this assumption must be recovered through the excess of the allowed rate of return over the cost of capital during the years before regulators catch up. Put this way, the notion seems implausible on its face. But we can be more quantitative about why the explanation of regulatory lag is unsupportable.

Q33. How?

A33. Assume that the market-to-book test worked, that a cost of capital analyst estimated the cost of equity is 10 percent, and that the relevant commission accepted the estimate and set the allowed rate of return at 10 percent. However, suppose the utility's market-to-book ratio is 2, which if the market-to-book test were valid would signal that 10 percent is above the cost of equity. Suppose also that the book value of the utility is expected to grow at a long-term annual rate of 5.3 percent. Lastly, suppose that investors expected an extreme form of regulatory lag: regulators will leave allowed rates of return at the current 10 percent level for X years. On the last day of the Xth year, regulators will readjust the allowed rate of return down to the cost of equity, so the market-to-book ratio goes down to 1.0 on that day. In short, the assumptions are that (1) investors put up $2 now for every $1 of book equity rate base, (2) earn an allowed rate of return of 10 percent (which by hypothesis is above the cost of capital) on the equity rate base (which grows at 5.3 percent per year) for X years, and (3) then end up with a stock value equal to only to the book-value rate base. Thus, they lose 50 percent of their original investment after X years.

If the market-to-book test is assumed valid, the discount rate that makes the present value of these hypothesized returns equal to twice the book value of the stock is the utility's true cost of equity. Figure 6 plots the implied true cost of equity associated with values of "X" running out to 20 years. As benchmarks, it adds the hypothesized 10 percent allowed rate of return on equity and Dr. Vilbert's long-term Treasury bond rate, 5 percent.

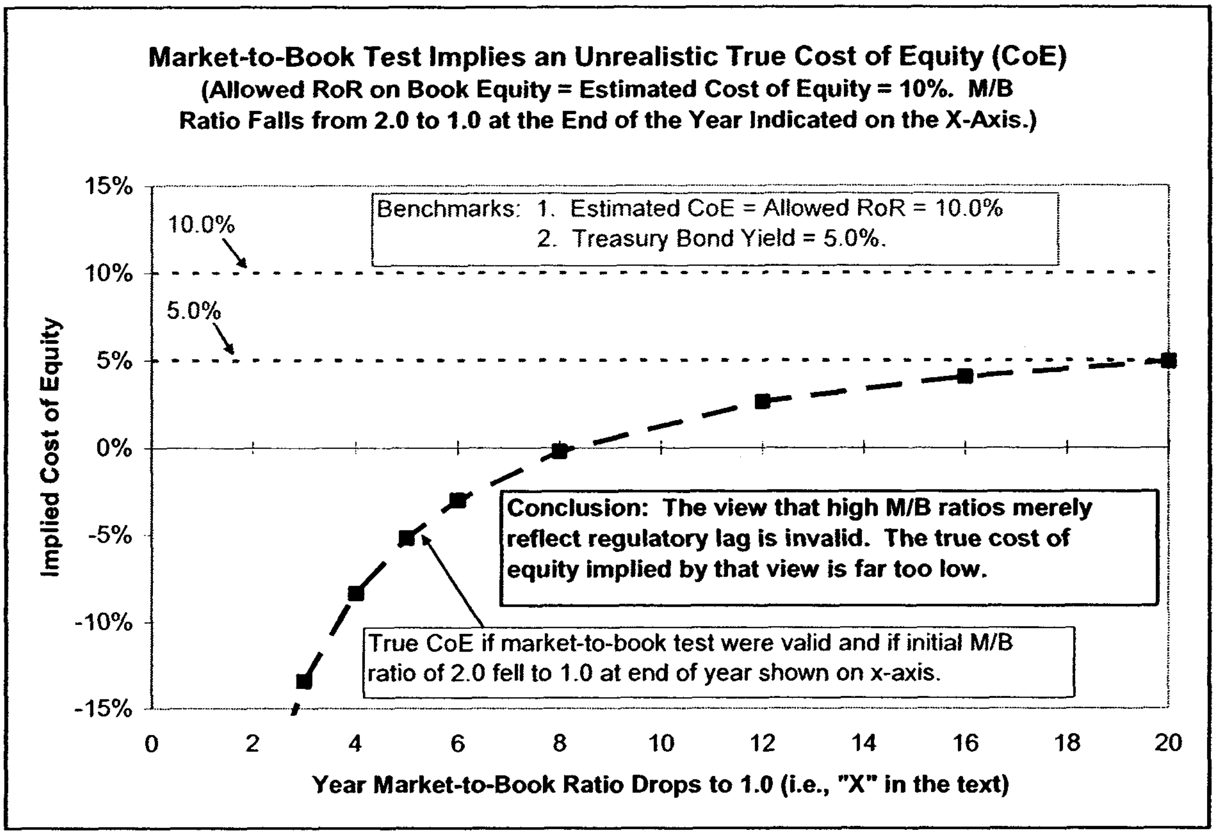

Figure 6

Q34. Please discuss Figure 6.

A34. The curving line indicated by long dashes with boxes (which is blue in color copies of this testimony) plots the true cost of capital as the length of regulatory lag (i.e., "X") grows from three years (the first value shown) to 20 years. With a loss of 50 percent of the original investment due to the end of regulatory lag, X must exceed 8 years for the true cost of equity even to be *positive*. It takes the full 20 years plotted in Figure 6 before the true cost of equity even equals the long-term Treasury bond rate, 5 percent.[23] Since the actual cost of equity must be well above the Treasury rate, regulatory lag cannot be the explanation for the market-to-book ratios we actually observe.

[23] The top two lines in the figure, with small dashes (in green in color copies of this testimony), are the allowed rate of return on equity of 10 percent and the Treasury bond rate of 5 percent.

Q35. But suppose investors expect that regulators would never adjust allowed rates of return for the fall in interest rates in recent years. That is, suppose they believe the regulatory lag you just discussed is many decades long. Does that save the market-to-book test?

A35. If investors expected regulators to ignore falling interest rates for many decades, the implied true cost of equity would keep climbing as X gets further into the future, although it always would remain materially below the hypothesized 10 percent estimate of the cost of equity. It would be 6.9 percent with an X of 50 years, for example. But "saving" the market-to-book test by assuming that regulators effectively *never* react to the fall in interest rates is a cure that is worse than the disease. Nor is such an assumption supported by experience. Allowed rates of return for rate regulated companies were far higher in the 1980s, when interest rates were so high, than they are today. Yet the 1980s are a "mere" two decades ago. I would submit that it is far more plausible, after the experience of recent years, to believe that we do not understand the way stock prices are set than to believe that (1) we can model the stock price process exactly, but (2) investors today believe that regulators will ignore the implications of falling interest rates forever.[24]

Q36. Please sum up.

A36. It turns out that stock prices are more complicated than our simple models can encompass. As a result, the market-to-book ratio test lacks a firm conceptual foundation. Moreover, the levels of utility market-to-book ratios observed in recent years are simply too high to be the result of rational pricing based on the present value formula that underlies the market-to-book test.

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[24] Reportedly, even Professor Eugene Fama has reached the conclusion that stocks can sometimes be irrationally priced. See "As Two Economists Debate Markets, The Tide Shifts; Belief in Efficient Valuation Yields Ground to Role Of Irrational Investors" *The Wall Street Journal*, October 18, 2004, p. A-1. Of course, we cannot be sure whether (1) the market is priced irrationally or (2) the market is priced rationally but is in accord with some model or set of models we do not yet understand. Either way, however, we can no longer rely on the market-to-book test.

Q37. What do you believe regulators should do about the market-to-book ratio?

A37. I believe regulators should focus on setting the allowed return according to the best evidence available and leave the market-to-book ratio to whatever (currently incompletely understood) forces drive the stock prices of the individual sample companies and the market as a whole.

V. "THERE'S NO MAGIC IN FINANCIAL LEVERAGE"

Q38. What is this section about?

A38. It addresses the effect of a company's use of debt on its cost of equity. As noted at the outset (recall Figure 1), when companies use debt they divide the risk of the assets up among the various types of security they issue. Equity bears the bulk of the risk, so the cost of equity goes up as debt is added to the capital structure.[25] Therefore, to compare validly the costs of equity from a sample of companies and the cost of equity of a regulated company, analysts must consider any differences among the equity risks generated by the various capital structures. This section explains this issue in more detail, using an everyday example.

Q39. Why do you address this topic?

A39. Proper interpretation of sample evidence on the cost of equity to set a regulated company's allowed rate of return on equity must control for differences (1) among the sample companies' market-value capital structures and (2) between those market-value capital structures and the capital structure used to set the revenue requirement. Otherwise, the cost of equity used to set the allowed rate of return on equity will not reflect the proper level of financial risk. This section of

[25] Preferred equity acts much like debt in magnifying common equity's risk. However, it simplifies the discussion to focus on debt and common equity alone.

my testimony provides procedures to make these adjustments and explains their foundation in detail. Appendix B provides additional detail and a summary of the associated economic literature.

A. EXAMPLE OF WHY DEBT ADDS RISK TO EQUITY

Q40. Why does more debt mean more risk for equityholders?

A40. Debt magnifies the variability of the equity return. Let's consider a simple example. Most people who participate in regulatory hearings do own or will own a home at some point in their lives. Suppose someday you decide to take money out of your savings and buy a dwelling for $100,000. The dwelling's future value is uncertain. If housing prices go up, you win. If housing prices go down, you lose. Figure 7 depicts the outcome of a 10 percent fluctuation in the dwelling's price.[26]

[26] As noted at the start of my testimony, for those viewing this document in color, the convention in Figures 1, 2, 7 to 9 and 11 is that blue represents equity, red represents debt, green represents increases in value, and yellow represents decreases in value.

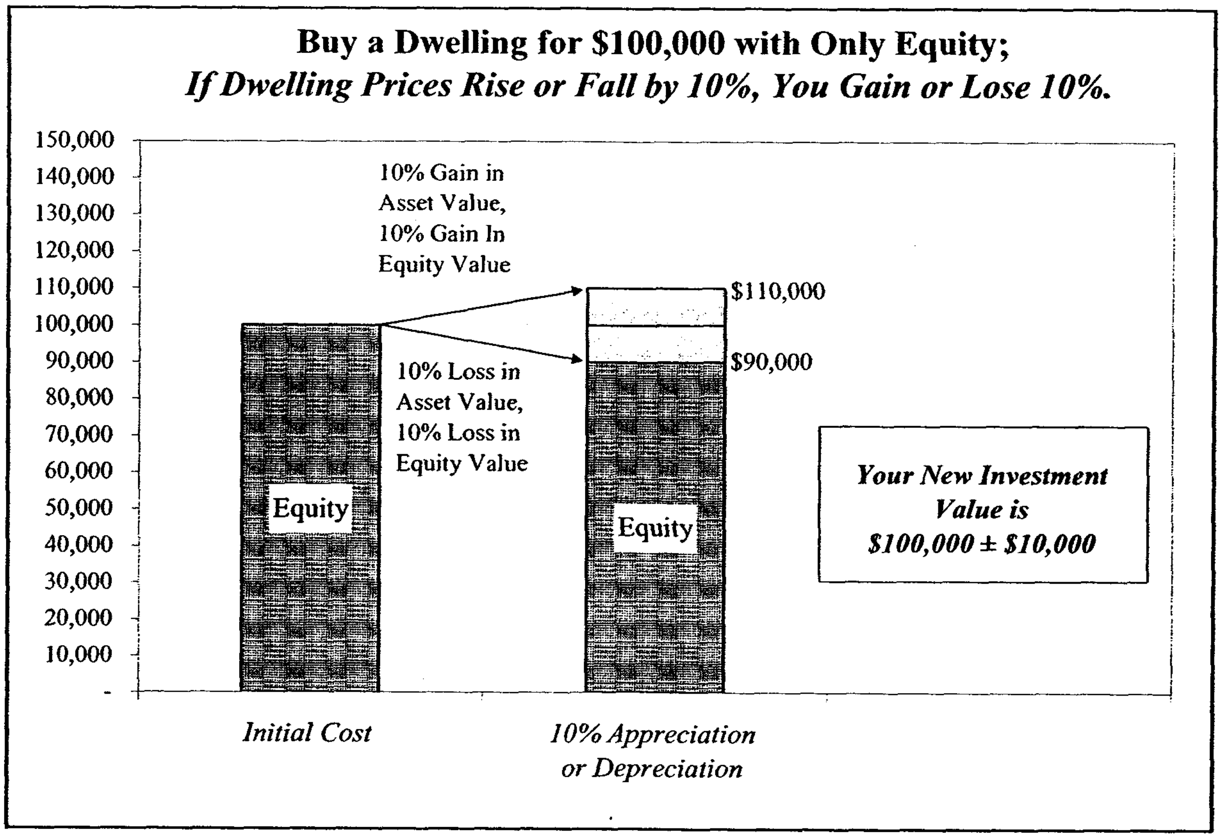

Figure 7

Now suppose you don't want to take the full $100,000 out of your savings, or you don't have that much saved, so you take out a mortgage for half the money you need to buy the dwelling. Your mortgage lender does not expect to share in the benefits of rising housing prices, nor to bear the pain of falling ones. You owe your lender the $50,000 you borrow either way. That means your equity investment bears the entire risk of changing housing prices. Figure 8 illustrates this effect.

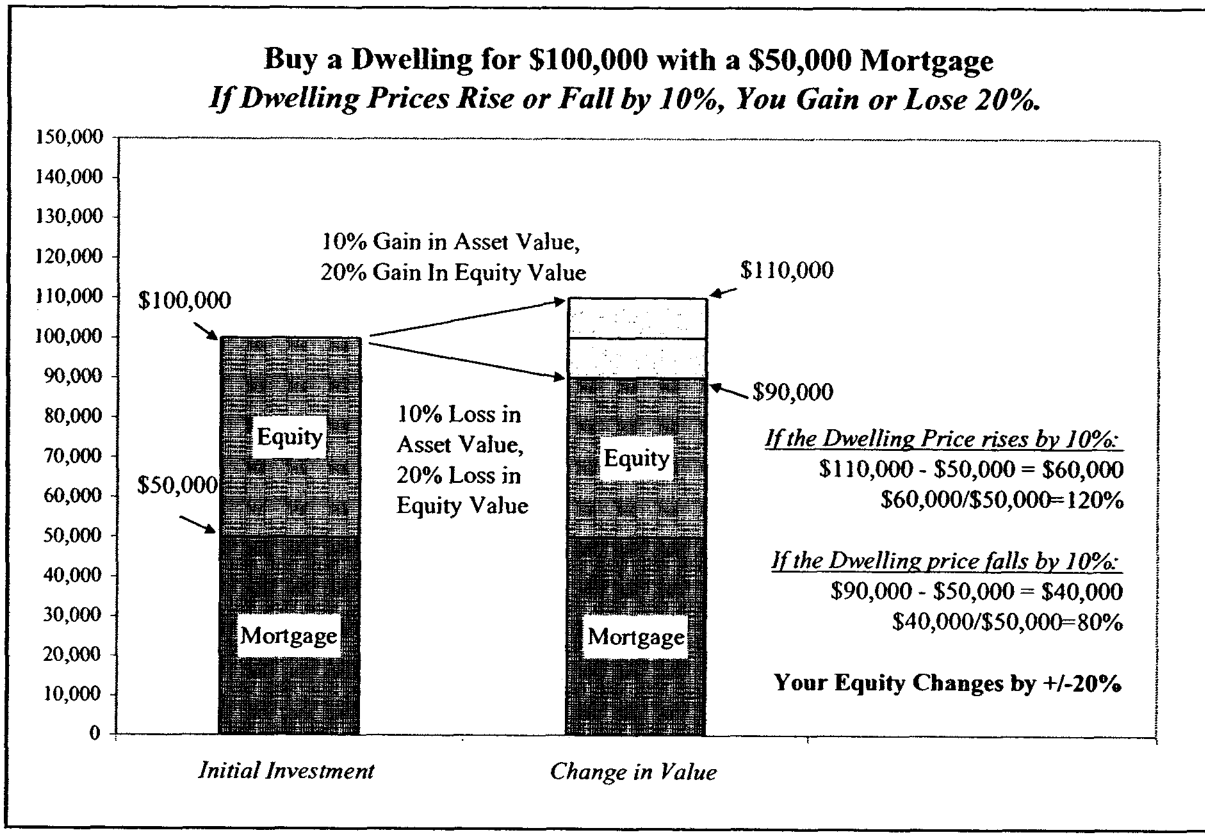

Figure 8

Now the variability of your equity return due to the dwelling's price fluctuations doubles. The entire variability of a 10 percent increase in housing prices now falls on the $50,000 in original equity.

Q41. Please show these calculations.

A41. All right. In Figure 7, if the price falls to $90,000, the rate of return on your equity due to the decrease was:

Figure 7: Rate of return on equity $= \dfrac{\text{(New Dwelling Value - Old Dwelling Value)}}{\text{Old } \textit{Dwelling} \text{ Value}}$

$$= \frac{(\$90{,}000 - \$100{,}000)}{\$100{,}000}$$

$$= \frac{-\$10{,}000}{\$100{,}000} = -10\%$$

But in the Figure 8 case, where you've financed half of the purchase price with a mortgage that you have to pay back regardless of the dwelling price change, the rate of return the equity part of the investment is

Figure 8: Rate of return on equity $= \dfrac{\text{(New Dwelling Value - Old Dwelling Value)}}{\text{Old } \textit{Equity} \text{ Value}}$

$$= \frac{(\$90{,}000 - \$100{,}000)}{\$50{,}000}$$

$$= \frac{-\$10{,}000}{\$50{,}000} = -20\%$$

Halving the amount of equity doubles its variability.

Q42. What happens if the mortgage is a different proportion of the initial dwelling price?

A42. The equity return gets ever more variable as the mortgage proportion grows. Figure 9 shows the outcome for mortgages that are 0 percent, 20 percent, 50 percent and 80 percent of the initial dwelling purchase price.

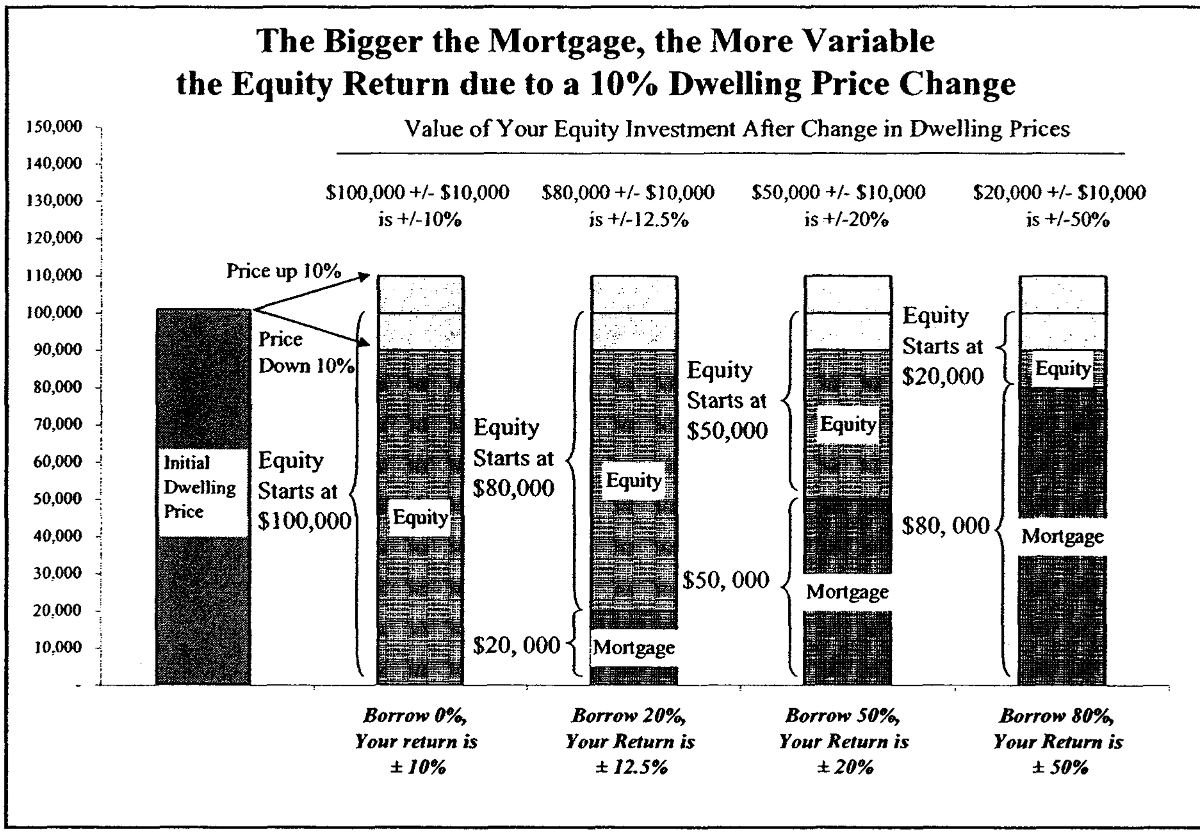

Figure 9

Figure 10 depicts the same point in a different way. It shows the growing variability of the equity return as the mortgage proportion increases for a more nearly continuous set of cases. The basic message is the same either way: a higher mortgage (more debt) means ever more risk for equity.

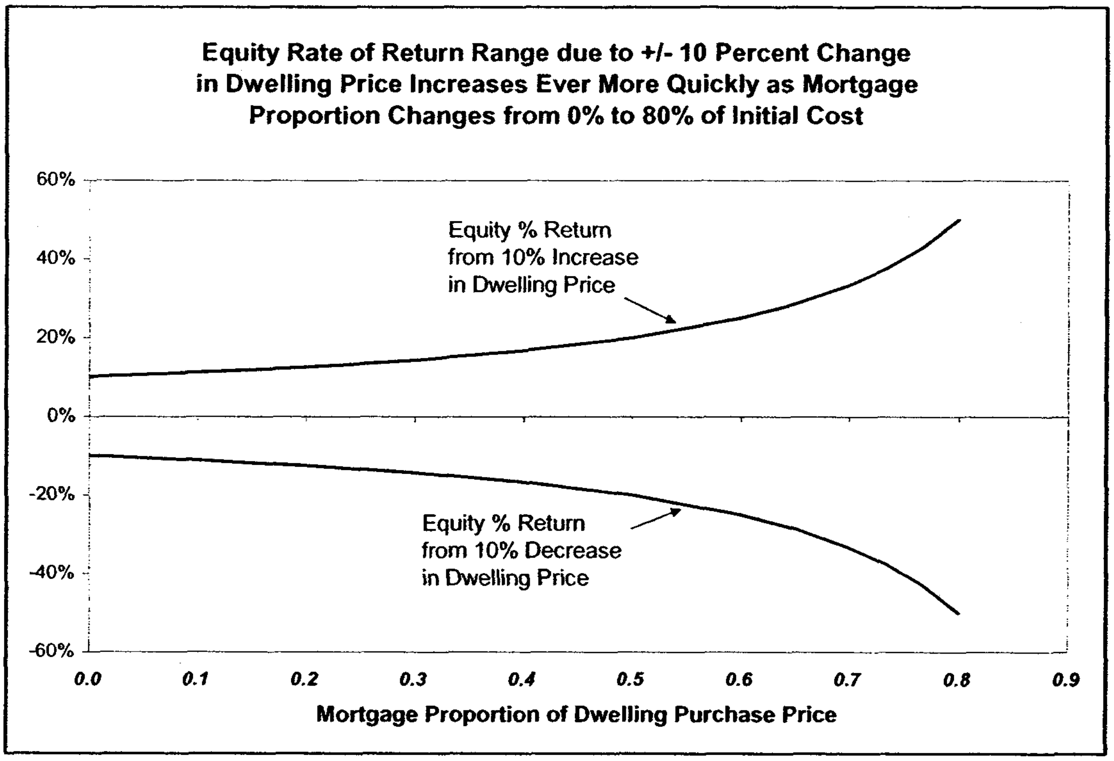

Figure 10

B. IMPACT ON THE COST OF EQUITY

Q43. What does all this mean for the cost of equity?

A43. Investors do not like risk. For the same expected rate of return on equity, rational investors would choose to be on the left edge of Figure 10, not somewhere to the right. No investor would choose an investment with an expected return of, say, 10 percent plus or minus 50 percent over one with an expected return of 10 percent plus or minus 5 percent. Investors demand a higher rate of return to bear more risk.

The messages of this example are simple:

1. ***Debt magnifies equity's risk.***
2. Debt magnifies equity's risk ***at an ever increasing rate.*** Therefore,
3. ***The required rate of return on equity goes up at an ever increasing rate as you add more and more debt.***

This is not only basic finance theory, it is the everyday experience of anyone who buys a home. The bigger your mortgage, the more percentage risk your equity faces from changes in housing prices. (Look again at Figures 8 and 9.) If you're willing to bear such financial risk without compensation, unlike other investors, there are millions of investors who would like to strike a deal with you to bear their risk for no reward. (I give an example in Appendix B.)

Q44. You've left a lot out of your example. How do rent, interest on the mortgage and taxes affect your three "messages"?

A44. *Not one word* of these three messages needs be changed to accommodate such factors. Such factors do affect the precise magnitude of the cost of equity and the precise way in which it changes as additional debt is added, but all three messages remain completely correct as stated regardless of these details. I show why in Appendix B.

Q45. Should you use market-value or book-value capital structures to assess the degree to which financial risk that affects the cost of equity?

A45. The market-value capital structure is the relevant quantity for analyzing the cost of equity evidence, not the book-value capital structure.[27] The variability of the equity in the dwelling

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[27] The need to use market-value capital structures to analyze the effect of debt on the cost of equity has been recognized from the beginning of the financial literature on the topic. For example, the initial reconciliation of the Modigliani-Miller theories of capital structure with the Capital Asset Pricing Model, in Robert S. (continued...)

example depends on the market-value shares of the mortgage and the equity, not the book-value shares.

Q46. Please elaborate.

A46. All right. Suppose you bought your dwelling 10 years ago and you've been renting it out. Suppose depreciation has reduced the original book value from $100,000 to $75,000. Suppose also that you've paid off about 20 percent of the original mortgage, leaving 80 percent still owed. Suppose as well that your original mortgage was for 80 percent of the purchase price, or $80,000. That means your mortgage balance is now ($80,000 x 0.80) = $64,000. On a book value basis, you have $75,000 - $64,000 = $11,000 in equity.

What happens now if housing prices increase or decrease 10 percent? You cannot even start to answer this question unless I tell you how housing prices have changed over the last ten years. If I tell you that the market value of the dwelling is now $200,000, you can calculate a 10 percent change as $20,000. A 10 percent decrease in housing prices is therefore almost twice your book equity of $11,000. Does that mean a 10 percent decrease will wipe you out?

Of course not. Your real equity is the market value equity in your dwelling. Suppose interest rates are unchanged, so the market value of the mortgage equals its remaining unpaid balance. The relevant measure of equity for risk-reward calculations is

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27 (...continued)
Hamada, "Portfolio Analysis, Market Equilibrium and Corporation Finance, *The Journal of Finance* 24:13-31 (March 1969), works with market-value capital structures. For a more recent presentation of the concept, see, for example, Richard A. Brealey and Stewart C. Myers, *Principles of Corporate Finance*, New York: McGraw-Hill/Irwin, 7th ed. (2003), at 525-26. Book values may be relevant for some issues, e.g., for covenants on individual bond issues, but as explained in the text, market values are the determinant of the impact of debt on the cost of equity.

$$\text{True Equity in Dwelling} = \text{Market Value of Dwelling} - \text{Market Value of Mortgage}$$

$$= \$200{,}000 - \$64{,}000 = \$136{,}000$$

Therefore, the percentage rate of return on equity due to a 10 percent change in dwelling values is

$$\text{Rate of Return on Equity} = \frac{\text{Change in Dwelling Value}}{\text{Starting Equity Value}}$$

$$= \frac{+/- \$20{,}000}{\$136{,}000}$$

$$= +/- 15\%$$

Figure 11 depicts the actual risk-return tradeoff after 10 years. A 10 percent decline in dwelling values would be painful, but it wouldn't come close to wiping you out, no matter what the books say. Nor would it even show up on the books, despite its still material impact on your actual investment

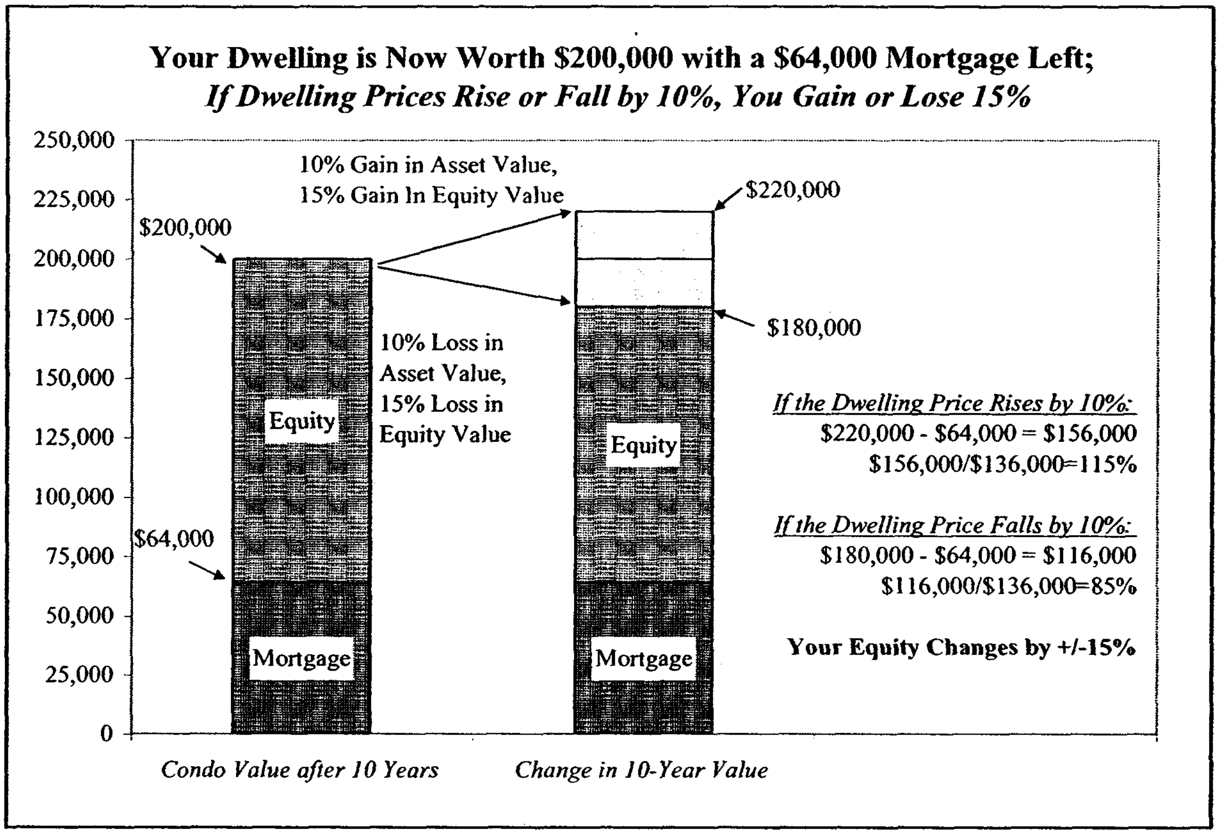

Figure 11

No landlord would assess his or her risk due to a mortgage by comparing fluctuating property values to the remaining book value of the property. The risk that debt imposes on the cost of equity is a function of relative market values, not relative book values.

Q47. Is use of market values to calculate the impact of capital structure on the risk of equity incompatible with use of a book-value rate base for a regulated company?

A47. No, no more than it is incompatible to use market-based cost of equity estimation methods (such as the Discounted Cash Flow method or the Capital Asset Pricing Model) with a book value rate base. That is, the cost of capital is the fair rate of return on regulatory assets for investors and customers alike. Most regulatory jurisdictions in North America measure the rate base using the net book value of assets, not current replacement value or historical cost trended for inflation.[28] But the jurisdictions still apply market-derived measures of the cost of equity to that net book value rate base.

The issue here is, what level of risk is reflected in that cost of equity estimate? That risk level depends on the sample company's market-value capital structure, not its book-value capital structure. *That risk level would be different if the sample company's market-value capital structure exactly equaled its book-value capital structure, so the estimated cost of equity would be different, too.*

Q48. Please explain this last point using the above example.

A48. All right. Suppose that you have refinanced your dwelling. While it still is worth $200,000 ten years after you bought it, your new market-value debt-equity proportions are consistent with the above example's book capital structure. That is, given an undepreciated book value of $75,000 consisting of $11,000 of equity and $64,000 of debt), your post-refinancing capital structure gives you a mortgage of [$200,000 x (64/75)] = $171,667 and equity of [$200,000 x (11/75)] = $29,333. Now a plus or minus 10% swing in housing prices gives you an equity rate of return of:

[28] Some jurisdictions (including, I understand, Arizona) use a "fair value" rate base. However, to my knowledge, standard practice in such jurisdictions is to set the allowed rate of return in a way that produces the same outcome as application of the cost of capital to a net book value rate base. (U.S. oil pipelines and railroads are exceptions to this rule.)

$$\text{Rate of Return on Equity} = \frac{\text{Change in Dwelling Value}}{\text{Refinanced Starting Equity Value}}$$

$$= \frac{+/- \$20{,}000}{\$29{,}333}$$

$$= +/- 68\%$$

Contrast this value with the +/- 15 percent above in Figure 11, in the case where the dwelling's market value had gone up the same amount but there was no refinancing. A cost of equity analyst who estimated the "beta" risk measure on a stock like this would get a much higher value than in the earlier example, because the stock would be much more volatile.[29] Exactly the same thing would happen for a utility. In short,

> ***Market values, not book values, determine the risk impacts of capital structure on the market cost of equity for all companies, even those regulated on a book-value rate base.***

Q49. Please sum up the implications of this section.

A49. The market risk, and therefore the cost, of equity depends directly on the market-value capital structure of the company or asset in question. It therefore is impossible to compare validly the measured costs of equity of different companies without taking capital structure into account. Capital structure and the cost of equity are unbreakably linked, and any effort to treat the two as separate and distinct questions violates both everyday experience (e.g., with home mortgages) and basic financial principles.

Q50. How should an analyst implement this principle?

[29] Technical note: debt magnifies the stock's entire variability, diversifiable and undiversifiable alike. Therefore, the stock's beta (or "betas," if more than one risk factor matters to investors) will in fact be affected by the company's market-value capital structure.

A50. As discussed further in my Appendix B, there has been a great deal of financial research on the effects of capital structure of the value of the firm. One of the key conclusions that result from the research is that no narrowly defined optimal capital structure exists within industries, although the typical range of capital structures does vary among industries.[30] Instead, there is a relatively wide range of capital structures within any industry in which fine-tuning the debt ratio makes little or no difference to the value of the firm, and hence to its overall after-tax cost of capital.

Accordingly, analysts should treat the market-value weighted average of the cost of equity and the after-tax current cost of debt, or the "ATWACC" for short,[31] as constant. Sample evidence should be analyzed to determine the sample's average ATWACC, which can be compared "apples to apples" across different firms or industries. The economically appropriate cost of equity for a regulated firm is the quantity that, when applied to the *regulatory* capital structure, produces the same ATWACC. That value is the cost of equity that the sample would have had, estimation problems aside, if the sample's market-value capital structure had been equal to the regulatory capital structure in question.

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[30] An exception is very high-risk industries that should avoid debt entirely, which makes their optimal capital structure zero percent debt.

[31] This quantity typically is called the "weighted-average cost of capital" or "WACC" in finance textbooks. The textbook WACC equals the *market*-value weighted average of the cost of equity and the *after-tax, current* cost of debt. However, rate regulation in North America has a legacy of working with another weighted-average cost of capital, the *book*-value weighted average of the cost of equity and the *before-tax, embedded* cost of debt. Accordingly, in regulatory settings it's useful to refer to the textbook WACC as the "ATWACC," or "after-tax weighted-average cost of capital." I follow that practice here.

VI. "PARADISE VALLEY'S EQUITY BEARS MUCH MORE *FINANCIAL* RISK"

Q51. What is the purpose of this section of your testimony?

A51. This section explains the basis of my conclusion that Paradise Valley's cost of equity at its 36.7 percent equity ratio lies between 12 percent and 13 percent.

Q52. What are the steps in that process?

A52. Step one is to compare the rates of return on equity and the capital structures in recent water cases in Arizona relative to Paradise Valley's capital structure, as summarized in Figures 3 and 4 at the beginning of my testimony. Step two is to review the evidence in the Vilbert Testimony and reach a conclusion on the cost of equity for Paradise Valley.

A. PARADISE VALLEY RELATIVE TO RECENT COMMISSION DECISIONS

Q53. How did you obtain information on recent Commission decisions?

A53. I asked the company to supply me with the most recent data. Table 1 reports those data.

Table 1

Capital Structure and Allowed Rate of Return on Equity in Recent Arizona Water Decisions

Company	Decision Number	Date	Common Equity Percentage	Rate of Return on Equity
Bella Vista Water Company	65350	11/01/2002	68.1%	9.1%
Clearwater Utilities	66782	02/13/2004	100.0%	9.1%
Arizona Water Company	66849	03/19/2004	66.2%	9.2%
Arizona-American Water Co.	67093	06/30/2004	39.9%	9.0%
Rio Rico Utilities	67279	10/05/2004	100.0%	8.7%
Las Quintas Serenas Water Co.	67455	01/04/2005	100.0%	8.1%

Source: Provided by Arizona American.

Q54. What use do you make of these data?

A54. Paradise Valley has an equity ratio of 36.7 percent, lower than any of those shown in Table 1 and much lower than all but one of them. In fact, Paradise Valley's equity ratio is less than half of the average of the six values shown in Table 1. For reasons explained in the previous section of my testimony, that means Paradise Valley's equity has more financial risk than any of these companies, and much more than five of the six. To illustrate just how much more, I use the data in Table 1 to calculate the allowed rate of return on equity for the companies in the table that would correspond to the indicated decision, but at Paradise Valley's equity ratio.

Q55. Precisely what do you mean by "correspond to" in the previous answer?

A55. Here I focus on the cost of equity, so I want to put aside differences due to differences in the cost of debt. Therefore, my calculation assumes all of these companies had Paradise Valley's current market cost of debt. Then the total percentage amount their customers pay for the return on capital will equal the overall after-tax weighted-average allowed rate of return, grossed up for taxes.

Q56. Why?

A56. A utility's total return on capital is the sum of the rate of return on equity times the equity share of the rate base, plus the cost of debt times the debt share of the rate base, plus taxes on equity.[32] That sum equals the after-tax weighted-average rate of return times the entire rate base, all grossed up for taxes.[33] Therefore, the implied estimate of the cost of equity that corresponds to the amount customers actually pay for the return on capital under the above decisions, but at Paradise Valley's equity ratio, equals the cost of equity that produces the same after-tax weighted-average rate of return, using Paradise Valley's cost of debt.[34]

Q57. What are the results when you perform these calculations?

A57. Table 2 provides the answer.

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[32] Here I assume that rate base equals net book value. I understand that this is not true in Arizona, but that the allowed rate of return on the rate base is calculated in a way that produces the same result as application of the cost of capital to a net book value rate base.

[33] Mathematically, if V is the value of the rate base, E the amount of equity in the rate base, D the amount of debt, r^* the overall after-tax allowed rate of return, r_E the allowed return on equity, r_D the cost of debt, and t_C the corporate tax rate, $(V)r^*/(1-t_C) = (V)[r_E(E/V) + (1-t_C)r_D(D/V)]/(1-t_C) = r_E E + [t_C r_E E/(1-t_C)] + r_D D =$ after-tax income + taxes + interest.

[34] I understand that Paradise Valley tends to have an unusually low cost of debt, so that the other companies' customers actually tend to pay more for the return on capital than assumed in this calculation. However, as noted earlier, here the focus is on return on equity.

Table 2

Rate of Return on Equity that Provides Same Cost to Customers at Paradise Valley's 36.7% Equity Ratio as that Allowed in Recent Arizona Water Decisions

Decision Number	Date	Common Equity Percentage	Allowed Rate of Return on Equity	Implied After-Tax Weighted-Average Cost of Capital	Equivalent-Cost Rate of Return on Equity
65350	11/01/2002	68.1%	9.1%	7.3%	14.0%
66782	02/13/2004	100.0%	9.1%	9.1%	18.9%
66849	03/19/2004	66.2%	9.2%	7.2%	13.9%
67093	06/30/2004	39.9%	9.0%	5.6%	9.5%
67279	10/05/2004	100.0%	8.7%	8.7%	17.9%
67455	01/04/2005	100.0%	8.1%	8.1%	16.2%

Source: First four columns provided by Arizona American. Fifth column calculated using Paradise Valley's current cost of debt and tax rate. Last columnn is the rate of return on equity that gives the indicated after-tax weighted-average cost of of capital.

Q58. What are the implications of Table 2?

A58. Table 2 means that if the Commission believes Paradise Valley's overall business risk is the same as that of the average of the companies in the recent decisions, Paradise Valley's allowed rate of return on equity should be 12.4 percent, excluding the three companies with 100 percent equity. If those companies are included, the average rate of return on equity at Paradise Valley's capital structure is 15.1 percent.

Q59. Why did you initially exclude the companies with 100 percent equity in the previous answer?

A59. As discussed in the last section, for companies that ought to use some debt, the overall after-tax weighted-average cost of capital is higher at 100 percent equity than it is in the middle range of capital structures. I would not recommend an allowed rate of return on equity that high for

Paradise Valley even if the Commission believed its business risk was the same as that of those companies, since it embodies a capital structure that would not be reasonable for Paradise Valley.

B. CONCLUSION ON PARADISE VALLEY'S COST OF EQUITY

Q60. How do you reach a conclusion on Paradise Valley's cost of equity?

A60. The primary evidence is the Vilbert Testimony. That testimony describes its findings and procedures in detail, so I will not review it here. I will note, however, that since the capital structure of Paradise Valley varies so dramatically from both that of Dr. Vilbert's sample companies and most of the companies involved in recent Commission decisions, I think it prudent to focus on the most basic quantity from Dr. Vilbert's analyses, the estimates of the after-tax weighted-average costs of capital.

I believe Dr. Vilbert's risk positioning estimates using the short-term interest rates deserve little or no weight at this time, since short-term interest rates are still anomalously low following the Federal Reserve's efforts to help the economy recover from the economic problems of recent years. I give little weight to the DCF results for Dr. Vilbert's water company sample, for reasons he describes, but the gas distribution company DCF results do not suffer from all of the same problems, and so deserve some weight, in my view. Additionally, I note and agree with Dr. Vilbert's comments on the overall level of interest rates at this time. Lastly, I have reservations about the estimates of beta values for utilities in recent years, which I believe understate the true risks utilities face. Given all of these considerations, I find that the after-tax weighted-average cost of capital for water companies currently is in the range of 6½ to 7 percent, based on Dr. Vilbert's analyses.

Paradise Valley has had consistent difficulty earning its allowed rate of return on equity, which suggests problems in the regulatory process and/or other sources of risk have harmed the company. I also understand that the company is facing material capital investment requirements to comply with new arsenic standards, which ultimately will increase costs without expanding the customer base. Such investments can also increase the risk rate-regulated companies face.

Nonetheless, I do not see a need to recommend a different cost of capital for Paradise Valley than for the industry generally. A 6½ to 7 percent after-tax weighted-average cost of capital implies a cost of equity range of 12 to 13 percent at Paradise Valley's equity ratio. The best point-estimate is the middle of the range, 12.5 percent.

Q61. Are you aware that Paradise Valley is asking for a 12 percent allowed rate of return on equity, not 12.5 percent?

A61. Yes, that is my understanding.

Q62. Does that give you pause about whether your analysis is correct?

A62. No. Although the company is the best evidence on why it is making the request it does, my understanding is that there is some concern that the Commission would have difficulty accepting too high a requested return on equity. I lack the knowledge to assess the Commission's reaction to a higher requested return on equity. My analysis focuses solely on the economic principles and evidence, quite apart from considerations such as the Commission's reaction to it, and I stand by it.

However, if the Commission were concerned purely about the size of the return on equity number, I would respectfully urge it to put such concerns aside in reaching its decision for

Paradise Valley. Figure 4 (at the outset of my testimony) shows just how modest even a 12.5 percent return on equity at Paradise Valley's capital structure is, relative to the allowed rates of return on equity the Commission has recently granted to other water companies with far more equity. Figure 5 shows that the cost to Paradise Valley's customers (per $100 of rate base) of a 12.5 percent return on equity at a 36.7 percent equity ratio is materially lower than the cost implied by five of the six most recent Commission water company decisions. Additionally, Paradise Valley has a history of not earning its allowed rate of return on equity on average, and I understand that it needs material new capital investment. In such circumstances, the principles described in Sections II and III of my testimony imply Paradise Valley's customers would be harmed, and possibly materially harmed, by a decision to reduce Paradise Valley's allowed rate of return on equity merely because it looked to be higher than others recently granted. This would be particularly unfortunate, since, in reality, Paradise Valley's requested 12 percent on equity corresponds to a very modest cost to customers, relative to those in recent Commission decisions.

Q63. Does this conclude your direct testimony?

A63. Yes, it does.

Appendix A: QUALIFICATIONS OF A. LAWRENCE KOLBE

Lawrence Kolbe is a Principal of The Brattle Group ("Brattle"), an economic, environmental and management consulting firm with offices in Cambridge (Massachusetts), Washington, London, and San Francisco. Before co-founding The Brattle Group, he was a Director of Putnam, Hayes & Bartlett, and before that, he was a Vice President of Charles River Associates ("CRA"). Earlier, he was an Air Force officer assigned to the Office of the Secretary of Defense with the job title "Health Economist," and before that, he was assigned to Headquarters, USAF with the job title "Systems Analyst."

His work has included extensive research in financial economics, especially as it applies to rate regulation, project or asset valuation, and the decisions of private firms. Clients for this work include the California Public Utilities Commission, the Consumer Advocate in a Newfoundland proceeding, the Edison Electric Institute, the Electric Power Research Institute, the Interstate Natural Gas Association of America, the Newfoundland Federation of Municipalities, the Nova Scotia Board of Commissioners of Public Utilities, the Town of Labrador City, the U.S. Department of Energy, the U.S. Department of Justice, the U.S. Department of State, and a number of private firms.

He is the coauthor of three books and he has published a number of articles. He is coauthor of a report filed with the British Office of Fair Trading, in London, and he has been an expert witness in: proceedings before the U.S.-U.K. Arbitration Concerning Heathrow Airport Landing Charges (under the auspices of the International Bureau of the Permanent Court of Arbitration) in The Hague, the Iran-United States Claims Tribunal in The Hague, the U.S. Court of Federal Claims, U.S. District Courts in Arizona, Colorado, Florida, New Jersey, Oklahoma, Pennsylvania, Texas and Virginia, the Supreme Court of the State of New Mexico, Colorado District Court, a commercial arbitration tribunal in Australia, a commercial arbitration tribunal held in London concerning a dispute in Australia, the Minerals Management Service of the U.S. Department of the Interior, the Master Settlement Agreement Tobacco Arbitration Panels for the State of Louisiana and the Commonwealth of Massachusetts (which determined fee awards to private counsel assisting the state), and a commercial arbitration in Arizona; federal regulatory proceedings before the Canadian Radio-television and Telecommunications Commission, the [Canadian] National Energy Board, the [U.S.] Postal Rate Commission, the [U.S.] Surface Transportation Board, the U.S. Federal Communications Commission, the U.S. Federal Energy Regulatory Commission and the U.S. Federal Maritime Commission; and state or provincial regulatory proceedings in Alaska, Alberta, Arkansas, California, Connecticut, Illinois, Maine, Massachusetts, Michigan, Montana, Newfoundland, New Mexico, New York, Nova Scotia, Ohio, Virginia and West Virginia.

He holds a B.S. in International Affairs (Economics) from the U.S. Air Force Academy and a Ph.D. in Economics from the Massachusetts Institute of Technology. Additional information on his qualifications follows.

HONORS AND AWARDS

Sears Foundation National Merit Scholarship, 1963 (declined).
Fairchild Award, U.S. Air Force Academy, 1968 (for standing first in his class, academically).
National Science Foundation Graduate Fellowship in economics, MIT, 1968-1971.
Joint Service Commendation Medal, 1975.

PROFESSIONAL AFFILIATIONS

American Economic Association
American Finance Association
The Econometric Society
Served as Referee for *The Rand Journal of Economics*, *Land Economics*, *The Journal of Industrial Economics*

AVAILABLE PAPERS AND PUBLICATIONS

"The Effect of Debt on the Cost of Equity in a Regulatory Setting," (with Michael J. Vilbert and Bente Villadsen, and with "The Brattle Group" listed as author), published by the Edison Electric Institute (dated January 2005, issued April 2005)

Capital Investment and Valuation, (with Richard A. Brealey and Stewart C. Myers, with "The Brattle Group" listed as third author), New York: McGraw-Hill/Irwin (2003).

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"Section 712 Issues: Risk Identification, Allocation and Compensation." Paper presented to National Association of Regulatory Utility Commissioners (July 1993) and published in *Presentations and Papers from the National Seminars on Public Utility Commission Implementation of the Energy Policy Act of 1992*. Columbus, OH: National Regulatory Research Institute, December 1993.

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"Southern California Edison Company Study of Conservation Potential and Goals." December 1983.

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"Methods Used to Estimate the Cost of Equity Capital in Public Utility Rate Cases: A Guide to Theory and Practice." March 1982.

"An Analysis of the Interaction of the Coal and Transportation Industries in 1990." September 1981.

"An Analysis of the Residential Energy Conservation Tax Credits: Concepts and Numerical Estimates." June 1981.

Appendix B: EFFECTS OF DEBT ON THE COST OF EQUITY

Q1. What is the purpose of this appendix?

A1. The body of my testimony illustrates why the use of additional debt increases equity's risk at an ever-increasing rate. This appendix provides additional detail on how debt affects the cost of equity. It first expands the example used in the body of my testimony. Then it illustrates the implications of a large body of financial research. It provides a summary of that research at the end.

I. EXPANDED EXAMPLE

Q2. The mortgage example in your testimony did not address rent, interest expense or taxes. Please do so now.

A2. Okay. Let's start with rent and interest expense, and leave taxes until the next part of the appendix. Rent could affect a dwelling buyer in two ways. First, the buyer could buy the dwelling as an investment or as a future retirement home and rent it out. Second, the dwelling buyer could live there and avoid having to pay rent on an apartment instead. The former seems to be the better analogy for present purposes.

Assume rent on the $100,000 dwelling would net the owner $500 per month on average after all (non-interest) expenses, or $6,000 annually. Suppose also that expected appreciation in housing prices were 4 percent, so its expected value would be $104,000 after the first year. Then the expected rate of return from owning the dwelling if there is no mortgage would be:

$$\text{Expected rate of return @ 0\% Mortgage} = \frac{\text{Expected Net Rent + Expected Value Appreciation}}{\text{Initial } \textit{Dwelling} \text{ Value}}$$

$$= \frac{\$6{,}000 + (\$104{,}000 - \$100{,}000)}{\$100{,}000}$$

$$= \frac{\$6{,}000 + \$4{,}000}{\$100{,}000} = \frac{\$10{,}000}{\$100{,}000}$$

$$= 10\%$$

Suppose also that the mortgage interest rate were 6 percent. Then at a mortgage equal to 50 percent of the purchase price, or $50,000, interest expense would be ($50,000 x 0.06), or $3,000. The expected equity rate of return would be

$$\text{Expected rate of return @ 50\% Mortgage} = \frac{\text{Expected (Net Rent + Value Appreciation) - Interest}}{\text{Initial } \textit{Equity} \text{ Value}}$$

$$= \frac{\$6{,}000 + (\$104{,}000 - \$100{,}000) - \$3000}{\$50{,}000}$$

$$= \frac{\$6{,}000 + \$4{,}000 - \$3{,}000}{\$50{,}000} = \frac{\$7{,}000}{\$50{,}000}$$

$$= 14\%$$

The expected return on equity is higher. However, as illustrated in the figures in my testimony, so is the risk equity bears.

Q3. Can you provide a more general illustration?

A3. Yes. Figure B-1 uses these assumptions at different mortgage levels to plot both (1) the expected rate of return on the equity in the dwelling, and (2) the realized rate of return on that equity in a year if the dwelling value increases by 10 percent more than the expected 4 percent rate (i.e., if the dwelling value increases by 14 percent) or by 10 percent less than expected (i.e., if it decreases by 6 percent).[1]

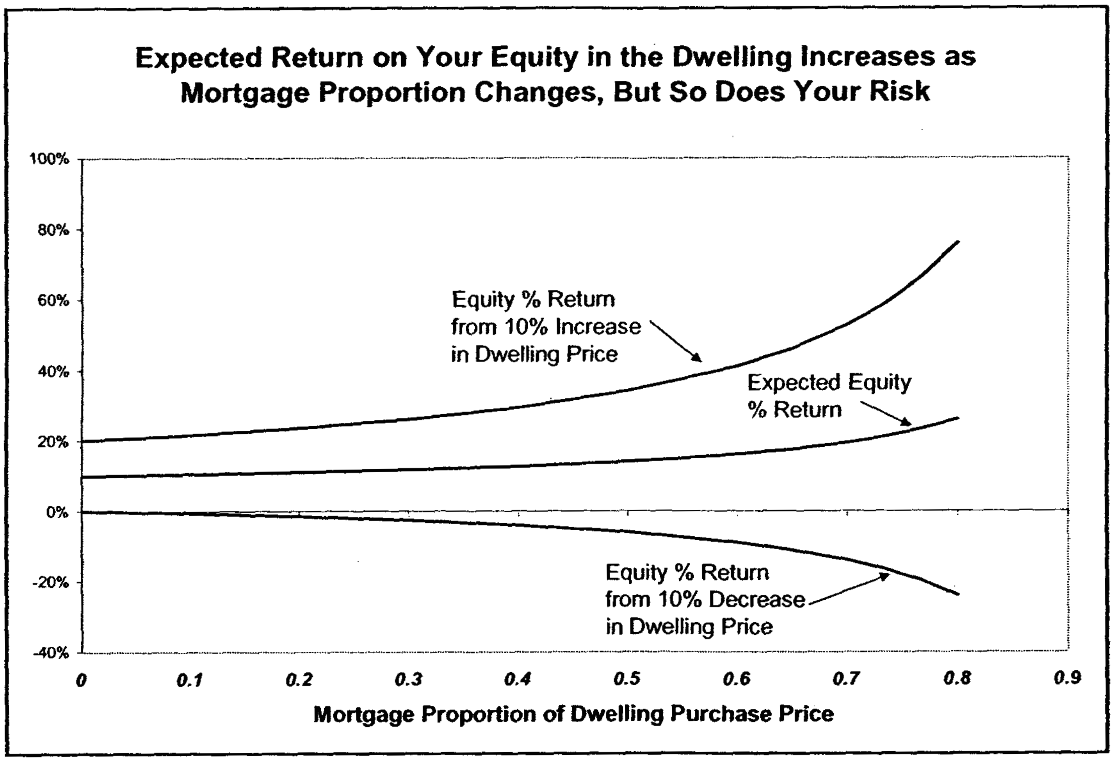

Figure B-1

The expected rate of return on equity increases at an increasing rate as the buyer finances more and more of the dwelling with a mortgage. But since (absent financial distress or bankruptcy) equity bears all of the risk of fluctuations in dwelling values, the amount of risk the

[1] For simplicity, the figure assumes the mortgage interest rate is independent of the mortgage proportion. This might not always be true, and in general would not be true for a corporation that issued debt. However, the same basic picture would emerge if the interest rate varied in a realistic way as the mortgage proportion increased.

buyer bears grows at an ever increasing rate at the mortgage percentage increases, too. (The upper and lower lines in Figure B-1 effectively just add the lines from Figure 10 to the Figure B-1 expected rate of return on equity.) This means the required rate of return on equity must increase, else the buyer would be bearing risk without reward.

Q4. Can you provide an example of a deal that would involve bearing financial risk with no reward?

A4. Suppose someone were to object that they don't think of the equity in their home as requiring a higher expected rate of return just because they use a mortgage, and that they personally would not demand a higher rate of return for this risk. Suppose also that the numbers in the dwelling example above were in front of this person and a potential co-investor in a dwelling. The co-investor would be happy to propose a deal something like the following.

"Why don't we buy the dwelling 50-50. It costs $100,000. We'll finance it 50 percent with a mortgage, so we each put in $25,000 in equity and are individually responsible for $25,000 of the mortgage. We'll rent the dwelling out, sell it in one year, and pay off the mortgage. I say we have a 14 percent required return on equity, or an expected $3,500 each on our $25,000 individual equity investments. But you only require 10 percent, the overall expected rate of return on the dwelling itself, because you don't think use of a mortgage increases your required return on equity. That means you'll be satisfied with an expected return of $2,500. It's easy for us to achieve that outcome: whatever the result of our investment, I'll just pocket an extra $1,000 from your half of the investment as part of my share. You're happy, because you get the 10 percent expected rate of return you require, and so am I, because I earn a superior risk-adjusted rate of return, 18 percent instead of the market 14 percent. In fact, I'd even be willing to split the difference and take only $500 instead of $1,000 from your half. That would give us both a higher expected return than we require, you 12 percent ($3,000/$25,000) and me 16 percent ($4,000/$25,000). It's win-win, given your return requirements. After we cash out the first year's dwelling, let's do it again, but with more money next time."

Anyone willing to bear financial risk without reward can expect many such offers. Anyone who asks someone else to bear financial risk without reward will find few if any takers. That is why the more debt a company adds, the higher its cost of equity.

Q5. Are mortgages the only everyday example of the effect of debt on the risk of equity?

A5. No, any time someone uses debt to finance part an investment, the same risk magnification occurs. For example, if you buy stocks "on margin" -- by borrowing part of the money you use to buy them -- you have a higher expected rate of return, but more risk. You could illustrate this by attaching new labels to Figures 8 and 9 in the body of my testimony, say, so the "dwelling" became your stock portfolio and the "mortgage" became your margin debt. Of course, stocks are a lot more volatile than dwellings, in normal circumstances, so you'd be hard pressed to use 80 percent margin to buy stocks unless you offered additional security. If you did buy on margin, you'd have a higher expected rate of return, as in Figure B-1 (again, with the labels changed), but you'd be bearing a lot more risk, too. Imagine investing your retirement savings in a stock portfolio bought with as much margin as possible. If you were lucky, you could end up living very well in retirement. But you'd be taking a lot of risk of the opposite outcome, since your portfolio could decline by more than 100 percent of your initial investment.

The point is, exactly the same risk-magnifying effects happen when companies borrow to finance part of their investments.

II. TAXES AND OTHER EFFECTS OF DEBT

Q6. What about taxes, which you skipped in Figure B-1?

A6. Analysis of the net effect of taxes in capital structure decisions by corporations is an important part of the financial research. (Other parts of that research address such issues as the risk of financial distress or bankruptcy, and the signals corporations send investors by the choice of how to finance new investments.) The bottom line is that taxes complicate the picture without changing the basic conclusion.

Q7. Nonetheless, please describe the potential impact of taxes. Start with why taxes may affect the appropriate capital structure.

A7. Interest expense is tax-deductible for corporations. That increases the pool of cash the corporation gets to keep out of its operating earnings (i.e., its earnings before interest expense). With no debt, 100 percent of operating income is subject to taxes. With debt, only the equity part of the operating income is subject to taxes.

All else equal, the extra money kept from operating income increases the value of the corporation. The standard way to recognize that increase in value is to use an after-tax weighted-average cost of capital as a discount rate when valuing a company's operating cash flows.[2]

Q8. Do personal taxes affect the value of debt, too?

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[2] As noted in the body of my testimony and discussed in more detail below, the textbook after-tax weighted-average cost of capital used for this purpose equals the *market*-value weighted average of the cost of equity and the *after-tax*, *current* cost of debt.

A8. Yes, but in the other direction. One offset to debt's tax benefits at the corporate level is its higher tax burden at the personal level. Investors care about the money they get to keep after all taxes are paid, and while the corporation saves taxes by opting for debt over equity, individuals pay more taxes on interest than on capital gains from equity (and for now, on dividends as well).

Q9. Does anything else (i.e., other than taxes) matter?

A9. Absolutely. "All else" does not remain equal as more debt is added. The more debt, the more the non-tax effects of debt offset the tax benefits. Other costs include such effects as a loss of flexibility, the possibility of sending negative signals to investors, and a host of costs and risks associated with the danger of financial distress.

Q10. Does the tradeoff between the tax and non-tax effects of debt mean that firms have well-defined, optimal capital structures?

A10. No, this sort of "tradeoff" model does not explain actual corporate behavior. A substantial body of economic research confirms that real-world corporations act as if, after a moderate amount of debt is in place, the tax benefits of debt are not worth debt's other costs. In country after country and in industry after industry, the most profitable corporations in an industry tend to use the least debt. The research on this point is quite thorough, and the finding that the most profitable companies tend to use the least debt in a given industry is robust. Yet these are the companies with the most operating income to shield from taxes, who would benefit most if interest tax shields were truly valuable net of debt's other costs. They also presumptively are the best-managed on average (else why are they the most profitable?).

This means it is unrealistic to suppose that more debt is always better, or that greater tax savings due to higher interest expense always add value to the firm on balance.

Q11. If the tradeoff model doesn't explain capital structure decisions by firms, is there a model that does?

A11. No, not completely. Various alternative models to the tradeoff model exist (e.g., the "pecking order" hypothesis and "agency cost" explanations), but no theory has yet emerged as "the" explanation of capital structure. That very fact, however, has important implications for the overall effect of debt on the value of the firm.

Q12. What does the absence of an agreed theory of capital structure in the financial literature imply about the overall effect of debt on the value of the firm?

A12. The findings of theoretical and empirical research mean that within an industry, there is no well-defined optimal capital structure. Use of some debt does convey some value advantage in most industries, but that advantage is offset by other costs as firms add more debt.[3] The range of capital structures over which the value of the firm in any industry is maximized is wide and should be treated as flat. The location and level of that range, however, does vary from industry to industry, just as the overall cost of capital varies from industry to industry.

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[3] Note that if debt did increase the value of the firm materially, competition would tend to take that value away, since issuing debt is an easy-to-copy competitive strategy. Prices would fall as firms copied the strategy, lowering operating earnings and passing the net tax advantages to debt through to customers (just as happens under rate regulation). Therefore, if also there were a narrow range of optimal capital structures within an industry, competition would drive all firms in the industry to capital structures within that range. This does not happen in practice, which contradicts one or both of the assumptions, i.e., (1) that debt adds material value on balance, and/or (2) that there is a narrow range of optimal capital structures.

Figure B-2 illustrates the picture that emerges from the research. This figure shows the present value of an investment in each of four different industries. For simplicity, the investment is expected to yield $1.00 per year forever. For firms in relatively high-risk industries (Industry 1 in the graph, the lowest line), the $1.00 perpetuity is not worth much and any use of debt decreases firm value. For firms in relatively low-risk industries (Industry 4 in the graph), the perpetuity is worth more and substantial amounts of debt make sense. Industries 2 and 3 are intermediate cases.

The maximum net rate at which taxes can increase value in this figure equals 20 percent of interest expense, representing a balance between the corporate tax advantage to debt and the personal tax disadvantage. The figure plots the maximum possible impact of taxes on value as a separate line, starting at the all-equity value of the lowest-risk industry (Industry 4).

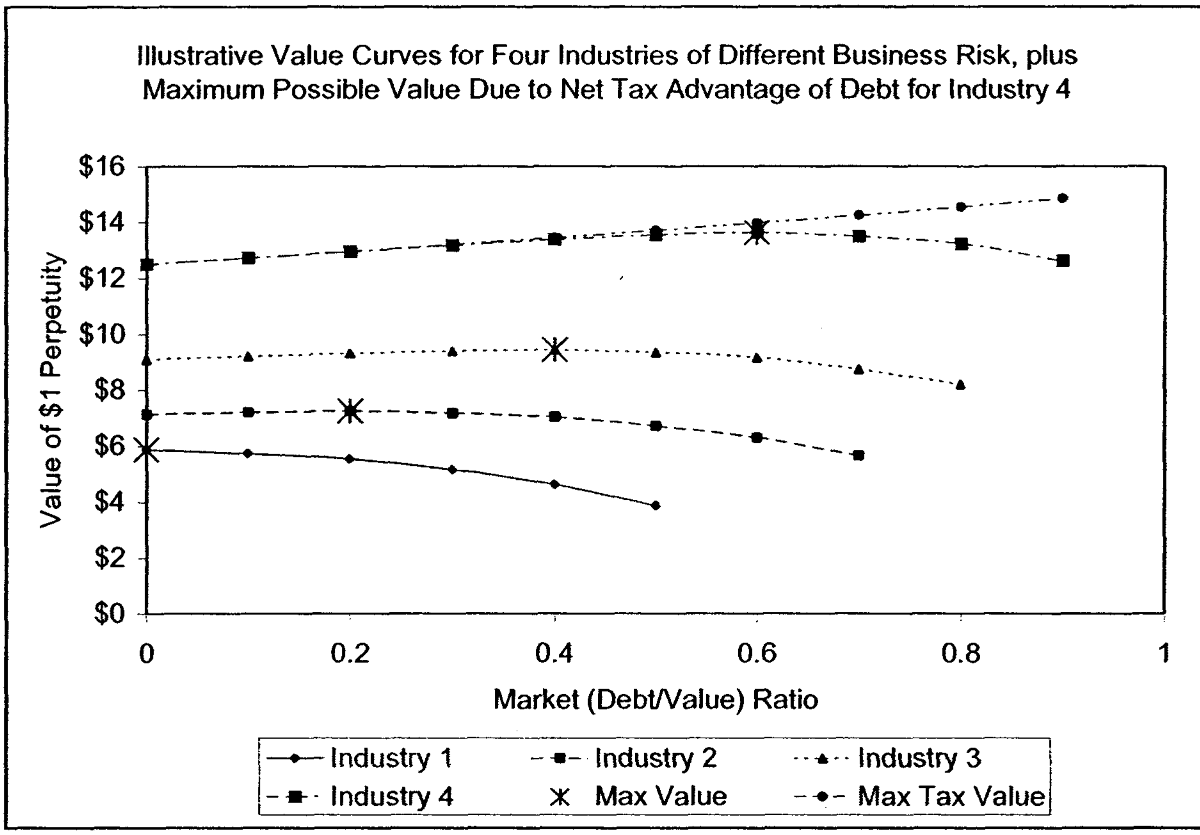

Figure B-2

Figure B-2 identifies a particular point as the maximum value on each of the four curves. However, the research shows that reliable identification of this maximum point, except in the extreme case where no debt should be used, is impossible. In accord with the research, the graph is prepared so that in none of the industries does a change in capital structure make much difference near the top of the curve. Even Industry 4, which increases in value at the maximum rate as quite a lot of debt is added, eventually must reach a broad range where changes in the debt ratio make little difference to firm value, given the research. For Industry 4, debt makes less than a 2 percent difference in the total value of the firm for debt-to-value ratios between 40 and 70 percent. (While these particular values are illustrative, numbers of this order of magnitude are the only ones consistent with the research.)

Q13. What does this imply for the overall cost of capital?

A13. Figure B-3 plots the after-tax weighted-average costs of capital ("ATWACCs") that correspond to the value curves in Figure B-2. This picture just turns Figure B-2 upside down.[4] All the same conclusions remain, except that they are stated in terms of the overall cost of capital instead of the overall firm value. In particular, except for high-risk industries, the overall cost of capital is essentially flat across a broad middle range of capital structures for each industry, which is the only outcome consistent with the research. For Industry 4, for example, the ATWACC changes by less than 15 basis points for debt-to-value ratios between 40 and 70 percent.

[4] Note that the actual estimated ATWACC at higher debt ratios will tend to underestimate the ATWACC that corresponds to the value curves in Figure B-2, which are depicted in Figure B-3, and so will tend to overestimate the value of debt to the firm. The reason is that some of the non-tax effects of excessive debt, such as a loss of financial flexibility, may be hard to detect and not show up in cost of capital measurement. Also, the value of the firm will fall at high debt ratios for reasons that can be entirely independent of the cost of capital, strictly defined. Therefore, the true ATWACC for project valuation purposes, at least at high debt ratios, is higher than the simple average of an industry sample of ATWACCs, but this refinement cannot be made with available estimation techniques. This conclusion carries over to rate regulation, too.

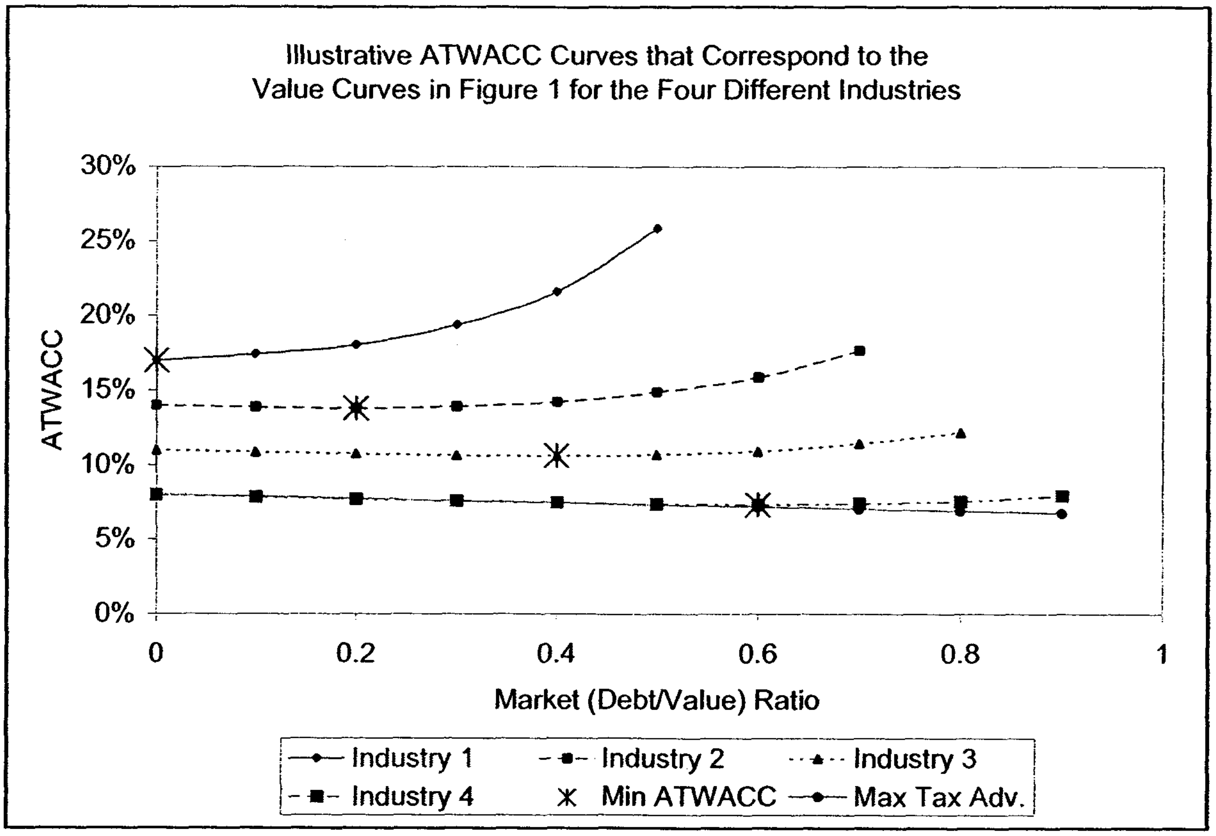

Figure B-3

Q14. How does this discussion relate to estimation of the right cost of equity for ratemaking purposes?

A14. When an analyst estimates the cost of equity for a sample of companies, s/he does so at the sample's actual market-value capital structure. That is, the sample evidence corresponds to ATWACCs that are already out somewhere in the broad middle range in which changes in the debt ratio have little or no impact on the overall value of the firm or the ATWACC.

An analyst therefore should assume the ATWACCs for the sample companies are literally flat. This assumption always provides the exact tradeoff between the cost of equity and capital structure at the literal minimum of the company's ATWACC curve. The research shows that this minimum is actually a broad, flat region, as depicted above. If the company happens to be somewhat to one side or the other of the literal minimum within this region, the recommended procedure may lead to a very small understatement or overstatement of the amount that the cost of equity will change as capital structure changes. The degree of this under- or overstatement, however, is trivial compared to the inherent uncertainty in estimating the cost of equity in the first place. Otherwise, the financial research would have found very different results about the existence of a narrowly defined optimal capital structure.

Q15. Can you provide an overview of this research?

A15. Yes, but I must caution that there are certainly dozens, and perhaps hundreds of scholarly papers on this topic. The next section describes key historical papers in the literature and a good sampling of relevant recent research, but I cannot and do not claim it is comprehensive.

III. AN OVERVIEW OF THE ECONOMIC LITERATURE

Q16. What is the focus of the economic literature on the effects of debt?

A16. The economic literature focuses on the effects of debt on the value of a firm. The standard way to recognize one of these effects, the impact of the fact that interest expense is tax-deductible, is to discount the all-equity after-tax operating cash flows generated by a firm or an investment project at a weighted average cost of capital, typically known in textbooks as the "WACC." The textbook WACC equals the *market*-value weighted average of the cost of equity and the *after-tax*, *current* cost of debt. However, rate regulation in North America has a legacy of working with another weighted-average cost of capital, the *book*-value weighted average of the cost of equity and the *before-tax*, *embedded* cost of debt. Accordingly, in regulatory settings it's useful to refer to the textbook WACC as the "ATWACC," or after-tax weighted-average cost of capital. I follow that practice here.

Q17. What is the implication of the literature's focus in the present context?

A17. Since the literature focuses on the overall effect of debt on the value of the firm, a discussion summarizing that literature must do so, also. The principal goal of the appendix is to translate the literature's findings on debt's effects on firm value into procedures to adjust the cost of equity for capital structure changes.

Q18. How is this section of the appendix organized?

A18. It starts with the tax effects of debt. It then turns to other effects of debt.

A. TAX EFFECTS

Q19. What are the main threads of the literature on the tax effects of debt?

A19. Three seminal papers define the main threads of this literature. The first assumes no taxes and risk-free debt. The second adds corporate income taxes. The third adds personal income taxes.

1. Base Case: No Taxes, No Risk to High Debt Ratios

Q20. Please start by explaining the simplest case of the effect of debt on the value of a firm.

A20. The "base case," no taxes and no costs to excessive debt, was worked out in a classic 1958 paper by Franco Modigliani and Merton Miller, two economists who eventually won Nobel Prizes in part for their body of work on the effects of debt.[5] Their 1958 paper made what is in retrospect a very simple point: if there are no taxes and no risk to the use of excessive debt, use of debt will have no effect on a company's operating cash flows (i.e., the cash flows to investors as a group, debt plus equity combined). If the operating cash flows are the same regardless of whether the company finances mostly with debt or mostly with equity, the value of the firm cannot be affected at all by the debt ratio. In cost of capital terms, this means the overall cost of capital is constant regardless of the debt ratio, too.

In this case, issuing debt merely divides the same set of cash flows into two pools, one for bondholders and one for shareholders. If the divided pools have different priorities in claims on the cash flows, the risks and costs of capital will differ for each pool. But the risk and overall cost of capital of the entire firm, the sum of the two pools, is constant regardless of the debt ratio. That means,

$$r^*_1 = r_{A1} \qquad \text{(B-1a)}$$

where r^*_1 is the overall after-tax cost of capital at any particular capital structure and r_{A1} is the all-equity cost of capital for the firm. (The "1" subscripts distinguish these quantities in the case

[5] Franco Modigliani and Merton H. Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," *American Economic Review*, 48: 261-297 (June 1958).

where there are no taxes from subsequent equations that consider first corporate and then both corporate and personal taxes.) With no taxes and no risk to debt, the overall cost of capital does not change with capital structure.

This implies that the right formula to relate the overall cost of capital to the component costs of debt and equity is

$$r_{E1} \times (E/V) + r_D \times (D/V) = r^*_1 \qquad \text{(B-1b)}$$

with the overall cost of capital (r^*) on the *right* side, as the *independent* variable, and the costs of equity (r_E) and debt (r_D) on the left side, as *dependent* variables determined by the overall cost of capital and by the capital structure (i.e., the shares of equity (E) and debt (D) in overall firm value (V=E+D)) that the firm happens to choose. Note that if equation (B-1a) were correct, the equation that solved it for the cost of equity would be,

$$r_{E1} = r^*_1 + (r^*_1 - r_D) \times (D/E) \qquad \text{(B-1c)}$$

Note also that (D/E) gets exponentially higher in this equation as the debt-to-value ratio increases.[6] Therefore Equation (B-1c) has the property emphasized in the body of my evidence, that the cost of equity grows at an ever-increasing rate as you add more and more debt.

[6] For example, at 20-80, 50-50, and 80-20 debt-equity ratios, (D/E) equals, respectively, (20/80) = 0.25, (50/50) = 1.0, and (80/20) = 4.0. The extra 30 percent of debt going from 20-80 to 50-50 has much less impact on (D/E) [i.e., by moving it from 0.25 to 1.0] than the extra 30 percent of debt going from 50-50 to 80-20 [i.e., by moving it from 1.0 to 4.0]. Since the cost of equity equals a constant risk premium times the debt-equity ratio, the cost of equity grows ever more rapidly as you add more and more debt.

2. Corporate Tax Deduction for Interest Expense

Q21. What happens when you add corporate taxes to the discussion?

A21. If corporate taxes exist with risk-free debt (and if only taxes at the corporate level matter, not taxes at the level of the investor's personal tax return), the initial conclusion changes. Debt at the corporate level reduces the company's tax liability by an amount equal to the marginal tax rate times interest expense. All else equal, this will add value to the company because more of the operating cash flows will end up in the hands of investors as a group. That is, if only corporate taxes mattered, interest would add cash to the firm equal to the corporate tax rate times the interest expense. This increase in cash would increase the value of the firm, all else equal. In cost of capital terms, it would reduce the overall cost of capital.

How much the value of the firm would rise and *how far* the overall cost of capital would fall would depend in part on how often the company adjusts its capital structure, but this is a second-order effect in practice. (The biggest effect would be if companies could issue riskless perpetual debt, an assumption Profs. Modigliani and Miller explored in 1963, in the second seminal paper;[7] this assumption could *not* be true for a real company.) Prof. Robert A. Taggart provides a unified treatment of the main papers in this literature and shows how various cases relate to one another.[8] Perhaps the most useful set of benchmark equations for the case where only corporate taxes matter are:

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7 Franco Modigliani and Merton H. Miller, "Corporate Income Taxes and the Cost of Capital: A Correction," *American Economic Review*, 53: 433-443 (June 1963).

8 Robert A. Taggart, Jr., "Consistent Valuation and Cost of Capital Expressions with Corporate and Personal Taxes," *Financial Management* 20: 8-20 (Autumn 1991)

$$r^*_2 = r_{A2} - r_D \times t_C \times (D/V) \qquad \text{(B-2a)}$$

$$r_{E2} \times (E/V) + r_D \times (D/V) \times (1 - t_C) = r^*_2 \qquad \text{(B-2b)}$$

which imply for the cost of equity,

$$r_{E2} = r_{A2} + (r_{A2} - r_D) \times (D/E) \qquad \text{(B-2c)}$$

where the variables have the same meaning as before but the "2" subscripts indicate the case that considers corporate but not personal taxes.

Note that Equation (B-2a) implies that when only corporate taxes matter, the overall after-tax cost of capital declines steadily as more debt is added, until it reaches a minimum at 100 percent debt (i.e., when D/V = 1.0). Note also that Equation (B-2c) still implies an exponentially increasing cost of equity as more and more debt is added. In fact, except for the subscript, Equation (B-2c) looks just like Equation (B-1c).

However, whether any value is added and whether the cost of capital changes at all also depends on the effect of taxes at the personal level.

3. Personal Tax Burden on Interest Expense

Q22. How do personal taxes affect the results?

A22. Ultimately, the purpose of investment is to provide income for consumption, so personal taxes affect investment returns. For example, in the U.S., municipal bonds have lower interest rates than corporate bonds because their income is taxed less heavily at the personal level. In general, capital appreciation on common stocks is taxed less heavily than interest on corporate bonds because (1) taxes on unrealized capital gains are deferred until the gains are realized, and (2) the capital gains tax rate is lower. Dividends are taxed less heavily than interest, also, under current tax law.[9] The effects of personal taxes on the cost of common equity are hard to measure, however, because common equity is so risky.

Professor Miller, in his Presidential Address to the American Finance Association,[10] explored the issue of how personal taxes affect the overall cost of capital. The paper pointed out that personal tax effects could offset the effect of corporate taxes entirely.

Q23. Is it likely that the effect of personal taxes will completely neutralize the effect of corporate taxes?

A23. I do not believe so, although the likelihood of such a result would be increased if the current federal tax reductions on dividends and capital gains became permanent rather than expiring in 2008. However, personal taxes are important even if they do not make the corporate tax advantage on interest vanish entirely. Capital gains and dividend tax advantages definitely convey some personal tax advantage to equity, and even a partial personal advantage to equity reduces the corporate advantage to debt.

The Taggart paper explores the case of a partial offset, also. With personal taxes, the risk-free rate on the security market line is the after-personal-tax rate, which must be equal for risk-free debt and risk-free equity.[11] Therefore, the pre-personal-tax risk-free rate for equity will generally

[9] This provision is set to expire at the end of 2008.

[10] Merton H. Miller, "Debt and Taxes," *The Journal of Finance*, 32: 261-276 (May 1977), the third of the seminal papers mentioned earlier.

[11] As Prof. Taggart notes (his footnote 9), it is not necessary that a specific, risk-free equity security exist as long as one can be created synthetically, through a combination of long and short sales of traded assets. Such constructs are a common analytical tool in financial economics.

not be equal to the pre-personal-tax risk-free rate for debt. In particular, $r_{fE} = r_{fD} \times [(1-t_D)/(1-t_E)]$, where r_{fE} and r_{fD} are the risk-free costs of equity and debt and t_E and t_D are the personal tax rates for equity and debt, respectively. In terms of the cost of debt, the Taggart paper's results imply that a formal statement of these effects can be written as:[12]

$$r^*_3 = r_{A3} - r_D \times t_N \times (D/V) \qquad \text{(B-3a)}$$

$$r_{E3} \times (E/V) + r_D \times (D/V) \times (1-t_C) = r^*_3 \qquad \text{(B-3b)}$$

which imply

$$r_{E3} = r_{A3} + \{r_{A3} - r_D \times [(1-t_D)/(1-t_E)]\} \times (D/E) \qquad \text{(B-3c)}$$

Suppose, for example, that t_C = 0.35 percent, t_E = 7.7 percent and t_D = 40 percent. Then $[(1-t_D)/(1-t_E)] = 0.65 = (1-t_C)$. That condition corresponds to Miller's 1977 paper, in which the net personal tax advantage of equity fully offsets the net corporate tax advantage of debt. Note also that in that case, $t_N = 0$.[13] Therefore, if the personal tax advantage on equity fully offsets the corporate tax advantage on debt, Equation (B-3a) confirms that the overall after-tax cost of capital is a constant.

However, I believe it is unlikely that the personal tax advantage of equity fully offsets the corporate tax advantage of debt. If not, and if taxes were all that mattered (i.e., if there were no other costs to debt), the overall after-corporate-tax cost of capital would still fall as debt was added, just not as fast. How fast it falls would depend chiefly on the net corporate-over-personal

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[12] The net all-tax effect of debt on the overall cost of capital, t_N, equals $\{[t_C+t_E-t_D-(t_C \times t_E)] / (1-t_E)\}$, where t_D is the personal tax rate on debt, as before. This measure of net tax effect is designed for use with the cost of debt in Equation (B-3a), which seems more useful in the present context. The Taggart paper works with a similar measure, but one which is designed for use with the cost of risk-free equity in the equivalent Taggart equation.

[13] In the above example, $t_N = \{[0.35+0.077-0.4-(0.35 \times 0.077)] / (1.0-0.077)\} = 0.0/0.963 = 0$.

tax advantage of debt (and secondarily on how often the company readjusts its capital structure to the "normal" or "target" level). Even absent a complete offset, personal tax effects still serve to reduce the corporate tax advantage of debt.

Finally, note that the overall after-tax cost of capital, Equation (B-3b), still uses the corporate tax rate even when personal taxes matter. Equations (B-2b) and (B-3b) both correspond to the usual formula for the ATWACC. Personal taxes affect the way the cost of equity changes with capital structure -- Equation (B-3c) -- but not the formula for the overall after-tax cost of capital given that cost of equity.

B. NON-TAX EFFECTS

Q24. Please describe the non-tax effects of debt.

A24. If debt is truly valuable, firms should use as much as possible, and competition should drive firms in a particular industry to the same, optimal capital structure for the industry. If debt is harmful on balance, firms should avoid it. Neither picture corresponds to what we actually see. A large economic literature has evolved to try to explain why.

Part of the answer clearly are the costs of excessive debt. Here the results cannot be reduced to equations, but they are no less real for that fact. As companies add too much debt, the costs come to outweigh the benefits. Too much debt reduces or eliminates financial flexibility, which cuts the firm's ability to take advantage of unexpected opportunities or weather unexpected difficulty. Use of debt rather than internal financing may be taken as a negative signal by the market.

Also, even if the company is generally healthy, more debt increases the risk that a bad year will imply the company cannot use all of the interest tax shields when anticipated. As debt continues to grow, this problem grows worse and others crop up. Managers begin to worry about meeting debt payments instead of making good operating decisions. Suppliers are less willing to extend trade credit, and a liquidity shortage can translate into lower operating profits. Ultimately, the firm might have to go through the costs of bankruptcy and reorganization. Collectively, such factors are known as the costs of "financial distress."[14]

The net tax advantage to debt, if positive, is affected by costs such as a growing risk that the firm might have to bear the costs of financial distress. First, the expected present value of these costs offsets the value added by the interest tax shield. Second, since the likelihood of financial distress is greater in bad times when other investments also do poorly, the possibility of financial distress will increase the risks investors bear. These effects increase the variability of the value of the firm. Thus, firms that use too much debt can end up with a higher overall cost of capital than those that use none.

Other parts of the answer include the signals companies send to investors by the decision to issue new securities, and by the type of securities they issue. Other threads of the literature explore cases where management acts against shareholder interests, or where management attempts to "time" the market by issuing specific securities under different conditions. For present purposes, the important point is that no theory, whether based on taxes or on some completely different issue, has emerged as "the" explanation for capital structure decisions by firms.

[14] See, for example, Richard A. Brealey and Stewart C. Myers, *Principles of Corporate Finance*, 7th Ed., New York: Irwin McGraw-Hill (2003) at 497-508.

Nonetheless, despite the lack of a single "best" theory, there is a great deal of relevant empirical research.

Q25. What does that research show?

A25. The research does not support the view that debt makes a material difference in the value of the firm, at least not once a modest amount of debt is in place. If debt were truly valuable, competitive firms should use as much as possible without producing financial distress, and competitive firms that use less debt ought to be less profitable. The research shows exactly the opposite.

For example, Kestler[15] found that firms in the same industry in both the U.S. and Japan do not band around a single, "optimal" capital structure, and the most profitable firms are the ones that use the *least* debt. This finding comes despite the fact that both countries at the time (unlike the U.S. currently) had fully "classical" tax systems, in which dividends are taxed fully at both the corporate and personal level. Wald[16] confirms that high profitability implies low debt ratios in France, Germany, Japan, the U.K., and the U.S. Booth *et al.* find the same result for a sample of developing nations.[17] Fama and French[18] analyze over 2000 firms for 28 years (1965-1992,

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[15] Carl Kester, "Capital and Ownership Structure: A Comparison of United States and Japanese Manufacturing Concerns," *Financial Management*, 15:5-16, (Spring, 1986).

[16] John K. Wald, "How Firm Characteristics Affect Capital Structure: An International Comparison," *Journal of Financial Research*, 22:161-167 (Summer 1999).

[17] Laurence Booth *et al.*, "Capital Structures in Developing Countries," *The Journal of Finance* Vol. LVI (February 2001), pp. 87-130, finds at p. 105 that "[o]verall, the strongest result is that profitable firms use less total debt. The strength of this result is striking ..."

[18] Eugene F. Fama and Kenneth R. French, "Taxes, Financing Decisions and Firm Value," *The Journal of Finance*, 53:819-843 (June 1998).

inclusive) and conclude, "Our tests thus produce no indication that debt has net tax benefits."[19] A recent paper by Graham[20] carefully analyzes the factors that might have led a firm not to take advantage of debt. It confirms that a large proportion of firms that ought to benefit substantially from use of additional debt, including large, profitable, liquid firms, appear not to use it "enough."

This research leaves us with only three options: either (1) apparently good, profit-generating managers are making major mistakes or deliberately acting against shareholder interests, (2) the benefits of the tax deduction on debt are less than they appear, or (3) the non-tax costs to use of debt offset the potential tax benefits. Only the first of these possibilities is consistent with the view that the tax deductibility of debt conveys a material cost advantage. Moreover, if the first explanation were interpreted to mean that otherwise good managers are acting against shareholder interests, either deliberately or by mistake, it would require the additional assumption that their competitors (and potential acquirers) let them get away with it.

Q26. Are there any explanations in the financial literature for this puzzle other than stupid or self-serving managers at the most profitable firms?

A26. Yes. For example, Stewart C. Myers, a leading expert on capital structure, made it the topic of his Presidential Address to the American Finance Association.[21] The poor performance of tax-based explanations for capital structure led him to propose an entirely different mechanism, the "pecking

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[19] *Ibid.*, p. 841.

[20] John R. Graham, "How Big Are the Tax Benefits of Debt," *The Journal of Finance*, 55:1901-1942 (October 2000)

[21] Stewart C. Myers, "The Capital Structure Puzzle," *The Journal of Finance*, 39: 575-592 (1984). See also S. C. Myers and N. S. Majluf, "Corporate Financing Decisions When Firms Have Information Investors Do Not Have," *Journal of Financial Economics* 13:187-222 (June 1984).

order" hypothesis. This hypothesis holds that the net tax benefits of debt (i.e., corporate tax advantage over personal tax disadvantage) are at most of a second order of importance relative to other factors that drive actual debt decisions.[22] Similarly, Baker and Wurgler (2002)[23] observe a strong and persistent impact that fluctuations in market value have on capital structure. They argue that this impact is not consistent with other theories. The authors suggest a new capital structure theory based on market timing -- capital structure is the cumulative outcome of attempts to time the equity market.[24] In this theory, there is no optimal capital structure, so market timing financing decisions just accumulate over time into the capital structure outcome. (Of course, this theory only makes sense if investors do not recognize what managers are doing.)

Q27. Do inter-firm differences within an industry explain the wide variations in capital structure across the firms in an industry?

A27. No. Any such view is flatly contradicted by the empirical research. As already noted, it has long been found that the most profitable firms in an industry, i.e., those in the best position to take advantage of debt, use the least.[25] The recent Graham paper very carefully examines differences in firm characteristics as possible explanations for why firms use "too little" debt and concludes that such differences are *not* the explanation: firms that ought to benefit substantially from more

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[22] See also Stewart C. Myers, "Still Searching for Optimal Capital Structure," *Are the Distinctions Between Debt and Equity Disappearing?,* R.W. Kopke and E. S. Rosengren, eds., Federal Reserve Bank of Boston. (1989).

[23] Malcolm Baker and Jeffrey Wurgler, "Market Timing and Capital Structure," *The Journal of Finance* 57:1-32 (2002).

[24] *Ibid.*, p. 29.

[25] For example, Kestler, *op. cit.* and Wald, *op. cit.*

debt by all measurable criteria, if the net tax advantage of debt is truly valuable, voluntarily do not use it.[26]

Nor does the research support the view that firms are constantly trying to adjust their capital structures to optimal levels. Additional research on the pecking order hypothesis demonstrates that firms do not tend towards a target capital structure, or at least do not do so with any regularity, and that past studies that seemed to show the contrary actually lacked the power to distinguish whether the hypothesis was true or not.[27] In the words of the Shyam-Sunder - Myers paper (at p. 242), "If our sample companies did have well-defined optimal debt ratios, it seems that their managers were not much interested in getting there."[28]

C. COMBINED EFFECTS

Q28. Please summarize the implications of the literature for the combined impact of the tax and non-tax effects of debt.

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[26] While not contradicting Graham's finding that differences in firm characteristics do not explain capital structure differences, Nengjiu Ju, Robert Parrino, Allen M. Poteshman, and Michael S. Weisbach, "Horses and Rabbits? Optimal Dynamic Capital Structure from Shareholder and Manager Perspectives," Working Paper, December 27, 2003 (forthcoming in the *Journal of Financial and Quantitative Analysis*), looks at the issue in another way. This paper uses a dynamic rather than static model to analyze the tradeoff between the tax benefits of debt and the risk of financial distress. It finds that bankruptcy costs by themselves are enough to explain observed capital structures, once dynamic effects are considered. This simply means debt is not as valuable as the traditional static analysis, of the sort used by Graham and many others, implies.

[27] Lakshmi Shyam-Sunder and Stewart C. Myers, "Testing static tradeoff against pecking order models of capital structure," *Journal of Financial Economics* 51:219-244 (February 1999).

[28] See also the Winter 1995 issue of the *Journal of Applied Corporate Finance* 7, No. 4, which has a series of articles on what might explain capital structure, given that the static tradeoff approach does not.

A28. The above results are not just *theory*, they are empirical *fact*. The most profitable firms do not behave as if the precise amount of debt they use makes any material difference to value, and competition does not force them into an alternative decision, as it would if debt were genuinely valuable. The explanation that fits the facts and the research is that within an industry, there is no well-defined optimal capital structure. Use of some debt does convey an advantage in most industries, but that advantage is offset by other costs as firms add more debt. The range of capital structures over which the value of the firm in any industry is maximized is wide and should be treated as flat. The location and level of that range, however, does vary from industry to industry, just as the overall cost of capital varies from industry to industry. To conclude that more debt does add more value, once the firm is somewhere in the normal range for the industry, is to conclude that corporate management in general is either blind to an easy source of value or otherwise incompetent (and that their competitors let them get away with it).

The finding that there is no narrowly defined optimal capital structure implies that analysts should estimate the ATWACCs for a sample of companies in a given industry and treat the average ATWACC value as independent of capital structure. The right cost of equity for a rate-regulated company in the same industry is the number that yields the same ATWACC at the capital structure used to set the revenue requirement, since that is the cost of equity that (estimation problems aside) the sample companies would have had if their market-value capital structures had been equal to the regulatory capital structure.

Q29. Does this complete Appendix B?

A29. Yes, it does.

EXHIBIT
A-11
admitted

BEFORE THE ARIZONA CORPORATION COMMISSION

COMMISSIONERS

JEFF HATCH-MILLER, Chairman
WILLIAM A. MUNDELL
MARC SPITZER
MIKE GLEASON
KRISTIN K. MAYES

IN THE MATTER OF THE APPLICATION OF ARIZONA-AMERICAN WATER COMPANY, INC., AN ARIZONA CORPORATION, FOR A DETERMINATION OF THE CURRENT FAIR VALUE OF ITS UTILITY PLANT AND PROPERTY AND FOR INCREASES IN ITS RATES AND CHARGES BASED THEREON FOR UTILITY SERVICE BY ITS PARADISE VALLEY WATER DISTRICT.	DOCKET NO. WS-01303A-05-0405

REBUTTAL TESTIMONY
OF
A. LAWRENCE KOLBE
ON BEHALF OF
ARIZONA-AMERICAN WATER COMPANY
FEBRUARY 13, 2006

TABLE OF CONTENTS

I. INTRODUCTION AND SUMMARY

Q1. Please state your name and address for the record.

A1. My name is A. Lawrence Kolbe. My business address is The Brattle Group, 44 Brattle Street, Cambridge, Massachusetts, 02138.

Q2. Did you prepare direct testimony in this proceeding, filed on June 3, 2005?

A2. Yes. Appendix R-A provides an updated copy of my qualifications.

Q3. What is the purpose of your rebuttal testimony?

A3. I have been asked by Arizona-American Water Company ("Arizona-American") to review the Direct Testimony of Dennis Rogers ("Rogers Testimony") on behalf of the Staff of the Arizona Corporation Commission and the Direct Testimony of William A. Rigsby ("Rigsby Testimony") on behalf of the Residential Utility Consumer Office, and, if necessary, to respond to statements made in those documents related to areas covered in my own direct testimony ("Kolbe Direct").

Q4. Before you turn to your review, what are the various recommended allowed rates of return on equity for Paradise Valley?

A4. They are:[1]

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[1] These values include all three testimonies' adjustments for financial risk.

Source	Range	Recommendation
Kolbe Direct, p. 11	12%-13%	12.5%
Rogers Testimony, Executive Summary	10.2%-10.6%	10.4%
Rigsby Testimony, pp. 32-33	9.13%-11.05%	10.00%

I understand that the Company has requested a return on equity of 12.0 percent.[2]

Q5. Please summarize the results of your review.

A5. I address the Rogers Testimony and the Rigsby Testimony in turn.

Rogers Testimony: I agree with Mr. Rogers's decision to make an explicit adjustment for capital structure differences between his sample companies and the Paradise Valley Water Company ("Paradise Valley"), and with his decision to base the adjustment on a formal method from the financial literature, adapted from a method developed in a paper by Prof. Robert S. Hamada.[3] However, Mr. Rogers's calculations unfortunately do not actually reflect the cited Hamada procedure for making that adjustment, since the Hamada paper relied on *market*-value capital structures, not *book*-value capital structures. Additionally, the Hamada technique is from a 1969 paper. The intervening three and a half decades have taught us much more about the interaction of the cost of equity and capital structure than was known in 1969.

The capital structure procedures in the Kolbe Direct reflect the current state of knowledge about the interaction of capital structure and the cost of equity. I show below that Mr. Rogers is not correct to say that use of these principles for rate-regulated companies has the effect of guaranteeing the market value of the company in question, nor will it lead to an upward spiral of market values and allowed rates of return -- just the opposite. Since the after-

[2] Direct Testimony of David P. Stephenson, June 3, 2005, p. 8.

[3] Rogers Testimony, pp. 34-5.

tax weighted-average cost of capital ("ATWACC") reflects the sample's underlying business risk and is insensitive to capital structure, the rates of return on a regulated company's book assets *and* on its book equity are not affected at all by changes in the sample's capital structure, cost of equity estimation errors aside. No other result is possible with a flat ATWACC.

Mr. Rogers also asserts the merits of the market-to-book test of utility returns, but without addressing the problems with that test described in the Kolbe Direct.[4] My direct shows that were the market-to-book test valid, the cost of equity for utilities would be absurdly low, below the cost of long-term Treasury debt or even negative.[5] That cannot be correct, so the market-to-book test cannot be valid. Mr. Rogers does not dispute this demonstration, but instead says that the underlying methodology works for bonds, so it must work for stocks. That conclusion does not logically follow. To the contrary, the view that we understand the processes that underlie stock prices well enough to rely on the market-to-book test is, unfortunately, based on pure assumption, not the evidence. The evidence contradicts the assumption.

Rigsby Testimony: I agree with Mr. Rigsby's decision to adjust for differences in financial risk between Paradise Valley and his sample companies, but I disagree with his failure to provide any analysis of how much adjustment is needed.

I am not sure how to respond to Mr. Rigsby's dismissal of the principles set out in the Kolbe Direct as "an interesting exercise in academia." All of the methods used by modern cost-of-capital witnesses are based on academic research. As Mr. Rogers notes, those

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4 Kolbe Direct, pp. 25-33.

5 Kolbe Direct, Figure 6, p. 31.

responsible for the Capital Asset Pricing Model have been awarded Nobel Prizes.[6] Myron J. Gordon, source of the "Gordon growth model," which has come to be called the "Discounted Cash Flow" model, is himself a professor. I do not understand why Mr. Rigsby would rely on those academic results, but disparage reliance on the very large body of scholarly research initiated by the 1958 paper of Profs. Modigilani and Miller, also recipients of the Nobel Prize. Nor does Mr. Rigsby provide a reasoned refutation of that branch of the academic literature. Absent such a refutation, I would submit that the literature on capital structure is no less deserving of reliance than the literature on cost of capital estimation methods.

The results of that research, described in the Kolbe Direct, are both well established and directly applicable to rate-regulated companies, whose stocks, after all, trade in exactly the same capital markets as those of the companies in a "truly competitive environment" mentioned by Mr. Rigsby. I show again below that the effect on the stock price of a loss in the market value of the underlying assets depends just as much on the company's market-value capital structure for a utility as for a competitive company (or, for that matter, as for an unregulated monopoly). Mr. Rigsby's dismissal of this particular branch of the academic literature is unwarranted.

As further evidence that the principles on which I rely are relevant for rate-regulated companies, I would note that regulators in countries (e.g., Australia, New Zealand, and the United Kingdom) that commenced rate regulation in recent times, with the benefit of access to this modern literature, have adopted procedures consistent with these principles. The same principles have been recognized in this country by the Surface Transportation Board and the Missouri Public Service Commission.

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6 Rogers Testimony, p. 27.

Lastly, I would note that Mr. Rigsby's acceptance of the validity of the market-to-book test in its calculations is not warranted, for the reasons already discussed.

Q6. How is the remainder of your testimony organized?

A6. My testimony is organized by topic. *Section II* provides my comments on criticisms of the use of market-value capital structures to determine appropriate rates of return for companies regulated on book-value rate bases. *Section III* addresses the comments on the market-to-book test.

II. MARKET-VALUE CAPITAL STRUCTURE

Q7. How is this section organized?

A7. It addresses first Mr. Rogers's testimony and then Mr. Rigsby's.

A. THE ROGERS TESTIMONY

Q8. What does Mr. Rogers say about the use of the market-value capital structure weights in your direct testimony?

A8. He says on p. 37,

> Use of a market value capital structure to estimate the cost of equity is predicated on the underlying erroneous logic that the Commission is obligated to maintain stock prices and perpetuate an ongoing rising spiral between revenues and stock prices. As previously discussed, expected returns in excess of the cost of equity cause market values to exceed book values. Increasing revenues, in turn, increases market values resulting a perpetual upward cycle. Use of a market value capital structure overstates the ROR when the market-to-book ration exceeds 1.0.

Then he provides a numerical example of the problems he envisions.

Q9. Do you agree?

A9. No. The passage suggests that I may not have been clear about what Dr. Vilbert and I do and how we implement my recommendations. Our procedures are in no way premised on the assumption that the Commission is obligated to maintain stock prices, nor is that their effect. The difference between what we intend and the process envisioned by Mr. Rogers is perhaps most easily illustrated by expanding the Rogers Testimony's numerical example and correcting its contents to show our actual procedures.

Q10. Please review Mr. Rogers's numerical example.

A10. The example is contained in Mr. Rogers's Table 4, p. 37. Table R-1 below reproduces the example (hereafter simply, "Table 4"). The example postulates a market-to-book ratio of 3 for the company's equity, so that $50 of book equity is worth $150 in the stock market. Table 4 reports the overall WACC (i.e., the weighted average of the cost of equity and the pre-tax cost of debt) at both market-value and book-value weights. (Recall that the ATWACC is instead calculated with the after-tax cost of debt.) Importantly, the example keeps the cost of equity constant at 10% in both cases. Mr. Rogers concludes from this example that the use of market-value weights increases the WACC by 0.5 percent, which he feels is inappropriate.

Table R-1

Version 1: Table 4

	Market-Value Capital Structure				Book-Value Capital Structure			
	Dollars	Percent	Cost	WACC	Dollars	Percent	Cost	WACC
Equity	$150	75%	10%	7.5%	$50	50%	10%	5.0%
Debt	$50	25%	8%	2.0%	$50	50%	8%	4.0%
ROR/WACC				9.5%				9.0%

Q11. How does this table fail accurately to reflect your recommendations and procedures?

A11. The easiest way to respond is to walk through the ways in which the table needs to be changed to reflect our procedures. This demonstration will involve a series of modifications to the original version of Table 4. In particular, if I designate "Version 1" to be Table 4 as it originally appears, reproduced above, the demonstration will involve:

Version 1. The original Table 4, my Table R-1 above;

Version 2. A reproduction of Table 4 with both the ATWACC and the after-tax *dollar* returns on both market and book value added;

Version 3. A correction of the second version to hold the ATWACC constant, which is what I recommend; and

Version 4. A revision of the third version to show approximately the magnitudes of the relative market and book values and the cost of capital values that underlie my direct testimony, included for comparison.

Q12. You indicated that "Version 2" adds some items. Please provide "Version 2" and discuss the items it adds.

A12. The second version appears as Table R-2.

Table R-2

Version 2: Table 4 with Dollar Return and ATWACC Added

	Market-Value Capital Structure				Book-Value Capital Structure			
	Dollars	Percent	Cost	WACC	Dollars	Percent	Cost	WACC
Equity	$150	75%	10%	7.5%	$50	50%	10%	5.0%
Debt	$50	25%	8%	2.0%	$50	50%	8%	4.0%
Totals ($/%)	$200			9.5%	$100			9.0%
	ATWACC	After-Tax Dollar Return			ATWACC	After-Tax Dollar Return		
Equity	7.5%	$15.00			5.0%	$5.00		
Debt	1.2%	$2.40			2.4%	$2.40		
Totals ($/%)	**8.7%**	***$17.40***			**7.4%**	***$7.40***		

The top half of Table R-2 is identical to Table 4, except that it adds up the dollar market and book values to show the total asset value, in addition to the percentage "ROR/WACC." The line label therefore is changed to "Totals ($/%)"

The bottom half of the table adds quantities necessary to evaluate Mr. Rogers's claims about our procedures. In particular, based on the decades of economic research discussed in my direct testimony (particularly in Appendix B), Dr. Vilbert and I treat the ATWACC as constant. However, Table 4 does not report the ATWACC associated with its assumptions, so it is not possible to see directly whether the table is consistent or inconsistent with our procedures. Additionally, while Mr. Rogers mentions "an ongoing rising spiral between revenues and stock prices," Table 4 does not show the dollar returns implied by a particular rate of return applied to either the market or the book value of equity, debt, or assets. Accordingly, it is not possible to determine directly the associated revenues, either. The bottom half of Version 2 therefore adds both ATWACCs and dollar returns to the original Table 4.

These additions show that the ATWACC is *not* held constant between the market-value and the book-value capital structures in the original Table 4. The ATWACC on the market-value capital structures is 8.7 percent, while that on the book-value capital structures is only 7.4 percent. (Compare the percentages in boldface and a larger font.) That could only be economically appropriate if the *business* risk of the sample generating the market-value capital structure data were much higher than the business risk of the entity associated with the book-value capital structure. If the two are supposed to have comparable business risk, Table 4 provides an inadequate rate of return on the book-value capital structure.

Table R-2's Version 2 also shows that there are very different dollar values associated with the market-value and book-value capital structures. The dollar return to the market-value of assets is $17.40, while that on the book-value of assets is only $7.40. (Compare the dollar numbers in boldface and italics.) While the market-to-book value of assets is 2.0 in Table 4 (i.e., $200/$100), the ratio of the dollar return on assets is materially higher, at 2.35 (i.e., $17.40/$7.40). This is another sign of a mismatch in the underlying business risk assumptions.

Q13. Please present Version 3 and explain how it differs from Version 2.

A13. Version 3 is in Table R-3.

Table R-3

Version 3: Corrected Table 4 with Dollar Return and ATWACC Added

	Market-Value Capital Structure				Book-Value Capital Structure			
	Dollars	Percent	Cost	WACC	Dollars	Percent	Cost	WACC
Equity	$150	75%	10%	7.5%	$50	50%	**12.6%**	6.3%
Debt	$50	25%	8%	2.0%	$50	50%	8%	4.0%
Totals ($/%)	$200			9.5%	$100			10.3%
	ATWACC	After-Tax Dollar Return			ATWACC	After-Tax Dollar Return		
Equity	7.5%	$15.00			6.3%	$6.30		
Debt	1.2%	$2.40			2.4%	$2.40		
Totals ($/%)	**8.7%**	***$17.40***			**8.7%**	***$8.70***		

This version adopts my recommendation to keep the ATWACC the same for both the market-value and the book-value capital structures. This is economically appropriate if the underlying business risk of the two halves of Table 4 is supposed to be the same. To achieve this end, the cost of equity is increased to reflect the additional financial risk equityholders bear when moving from the market-value capital structure, at which the cost of equity is estimated, to the the book-value capital structure, on which rate regulation is based. (See the figure in boldface near the upper right corner of the table.) The result is an 8.7 percent ATWACC in both halves of the table, as shown on the last line.

Note also that while correcting the example increases the book rate of return on equity and the ATWACC, they do *not* increase to the point where they provide the same dollar return on book value as on market value. Now, the dollar return on the book-value capital structure is $8.70 (boldface italics, last line), exactly one half of that on the market-value capital structure. Thus, the dollar return has the same 2.0 ratio (i.e., $17.40/$8.70) as the assets do (i.e., $200/$100).

Q14. Is there a way to depict the basic message of Versions 1 to 3 in Tables R-1 to R-3 in a figure?

A14. Yes, Figure R-1 does so. The leftmost pair of columns in Figure R-1 depict the sample's ATWACC and cost of equity, which are the same in both the original version and the corrected version. (The ATWACC column shows the shares going to debt and equity separately, to facilitate comparisons with the other versions.) The middle pair of columns show the original Table 4 approach for the regulated company, which is to keep the cost of equity constant and let the ATWACC decline. The last pair shows the corrected approach for the regulated company, which keeps the ATWACC constant by raising the cost of equity accordingly.

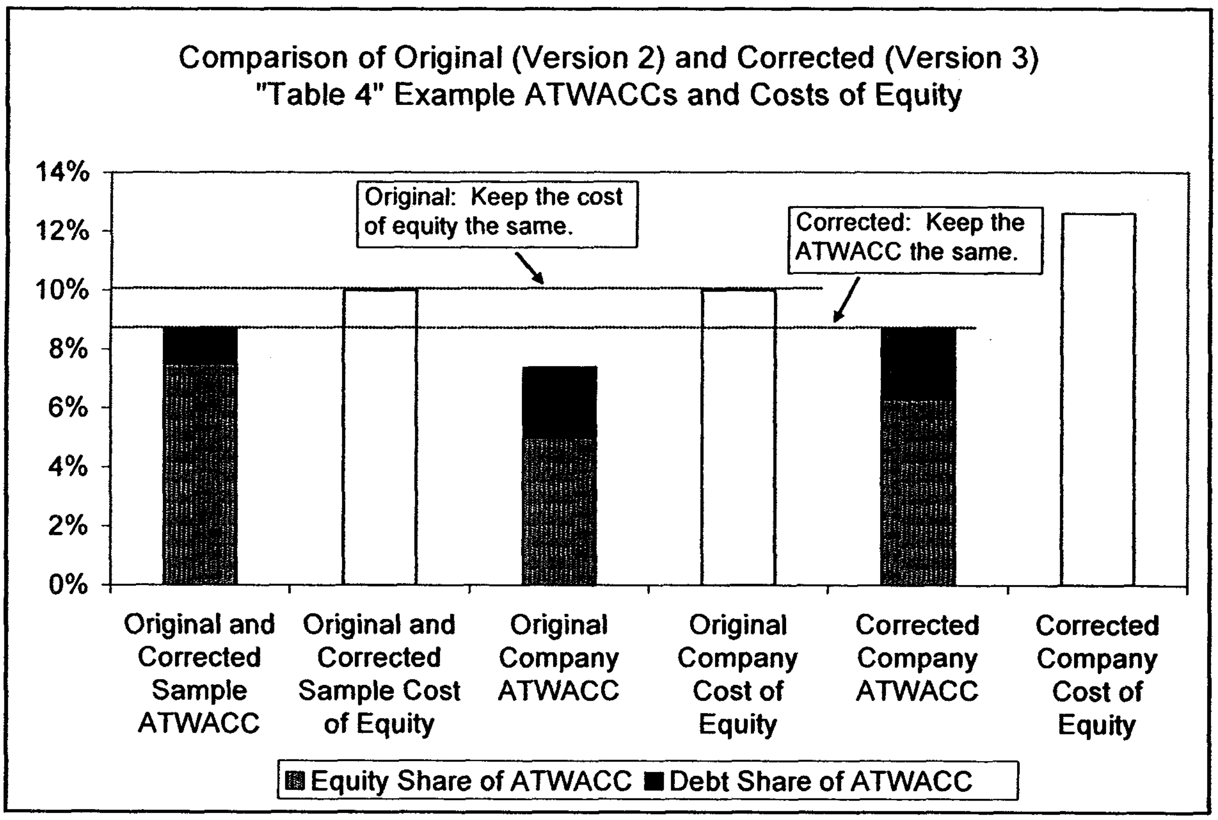

Figure R-1

Please recall that the problem with the original Table 4 example is that it keeps the cost of equity the same even though the capital structures vary sharply between the sample and the regulated company. The cost of equity at a lower equity ratio does not offer adequate compensation for the higher level of financial risk at that equity ratio. As explained in my original testimony, particularly in its Appendix B, decades of scholarly research lead to the conclusion that the ATWACC is *not* sensitive to capital structure, which means the cost of equity is very sensitive to capital structure (because unless the cost of equity goes up as the share of equity goes down, the after-tax weighted-average cost of capital cannot stay constant). Therefore, the correct quantity to hold constant is the ATWACC, not the cost of equity. Version 3 makes this correction, which permits calculation of the higher cost of equity that the sample would have had, estimation errors aside, if its actual capital structure had been the same as the company's ratemaking capital structure. That provides an equivalent rate of return for equivalent business risk.

Q15. Please present and describe Verison 4 of Table 4.

A15. Table R-4 presents the fourth version, which corresponds approximately to the actual situation presented in my direct testimony.

Table R-4

Version 4: Corrected Table 4 with Dollar Return and ATWACC Added, at Approximate Kolbe Testimony Values

	Market-Value Capital Structure				Book-Value Capital Structure			
	Dollars	Percent	Cost	WACC	Dollars	Percent	Cost	WACC
Equity	$106	66%	8.4%	5.6%	$37	36.7%	12.5%	4.6%
Debt	$54	34%	5.6%	1.9%	$63	63.3%	5.6%	3.5%
Totals ($/%)	$160			7.5%	$100			8.1%
	ATWACC	After-Tax Dollar Return			ATWACC	After-Tax Dollar Return		
Equity	5.6%	$8.89			4.6%	$4.57		
Debt	1.1%	$1.83			2.1%	$2.13		
Totals ($/%)	**6.7%**	**$10.72**			***6.7%***	***$6.70***		

The ATWACC is about 6.7 percent, not 8.7. The ratio of the market value of assets to the book value of assets is about 1.6, not 2.0. The debt rate is about 5.6 percent, and the initial estimate of the cost of equity, reflecting the very low level of financial risk at the market-value capital structure, is only about 8.4 percent. However, Paradise Valley's ratemaking capital structure (which is based on Arizona-American's) contains much less equity than the sample's market-value capital structure, so its equity bears much more financial risk. It takes a 12.5 percent return on equity at Paradise Valley's low equity ratio to produce the market-derived 6.7 percent ATWACC.

While the percentage return on equity is higher for Paradise Valley than for the sample, however, the *dollar* return on equity is much smaller, at $4.57, because the percentage of equity is so low. The total dollar returns on assets at the market-value and book-value capital structures are $10.72 and $6.70, respectively, which matches the underlying 1.6 ratio of the market value of assets to the book value of assets.

Q16. What conclusions emerge from the four versions of Table 4 presented above?

A16. First, Table 4 as originally presented does not reflect our procedures, since it does not produce the same ATWACC for both the market-value and book-value capital structures. Second, Table 4 as originally presented grants an inadequate return on the book value of assets, because the overall rate of return is far below that which the market requires for the underlying level of business risk.

Third, my recommendations clearly do *not* aim at maintaining the market-value of the assets. If investors were expecting a dollar return on rate base equal to the dollar return on market value (i.e., \$10.72 on assets or \$8.89 on equity, in Version 4), they would be sorely disappointed by our recommended \$6.70 on assets and \$4.57 on equity. Our procedures do not focus in any way on maintaining the stock price or trying to achieve a particular dollar return for investors. To the contrary, we derive the market-determined *rate* of return for the given level of business risk, and then apply that rate of return to the *book*-value rate base.

Figure R-2 illustrates this fact. The two left-hand pairs of columns in Figure R-2 depict the dollar returns on the Table 4 example's sample and the *corrected* dollar returns on the example's book rate base. The two right-hand pairs of columns depict the same data for Paradise Valley. Both sets of regulated company numbers (i.e., the second and fourth pairs of columns) follow our procedure of setting the cost of equity to the level that produces the same ATWACC. And both times the resulting dollar amounts are materially below the dollar amounts associated with the samples' values (i.e., the first and third pairs of columns).

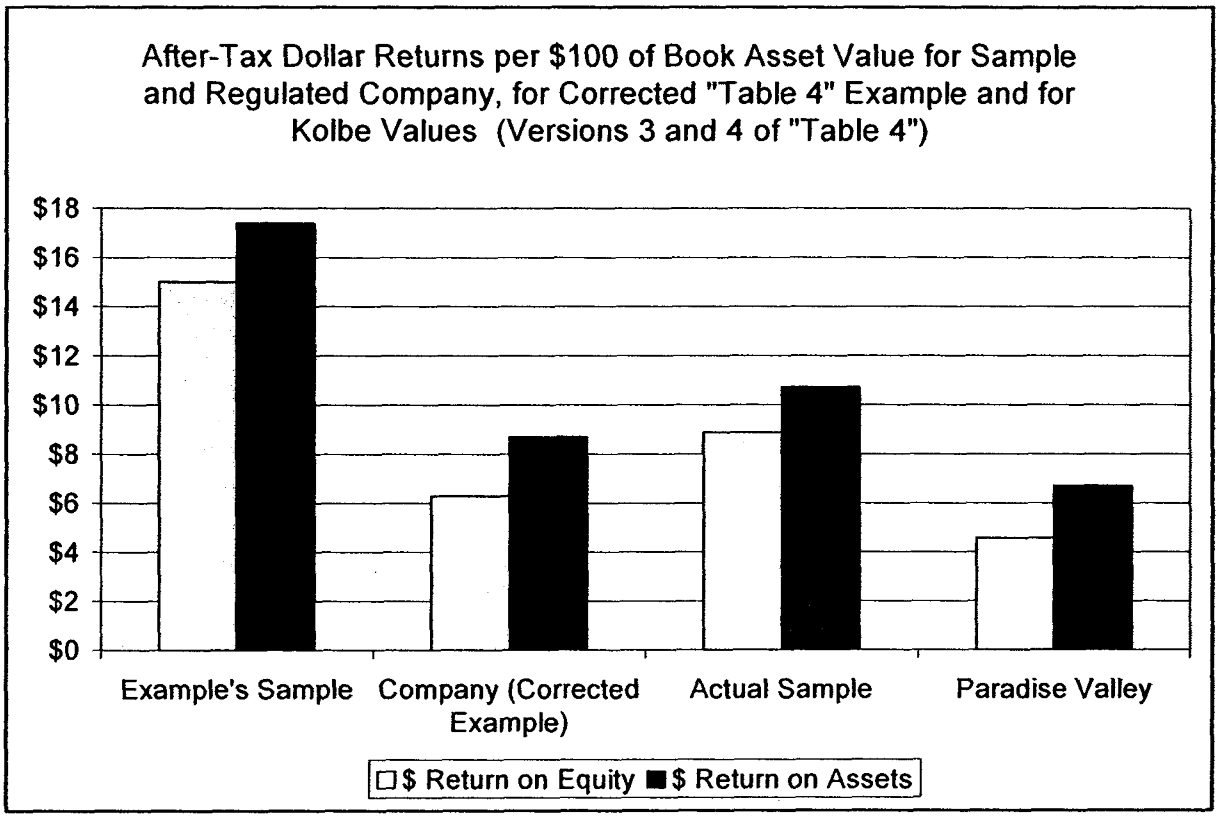

Figure R-2

Q17. But how can there be such a large discrepancy between the dollar return expected on market value and the dollar return expected on the rate base?

A17. The answer to that question is the answer to the question of how market prices are set and why market-to-book ratios are so high. Anyone who can definitively answer that question will soon be very rich, very famous, or both. However, with one exception, I would like to defer further discussion of that topic until the next section of my rebuttal, where I address the comments made on my market-to-book ratio testimony.

Q18. What is the "one exception"?

A18. I would like to make clear that I strongly agree with the view expressed by Mr. Rogers that no regulatory commission is obligated to maintain stock prices. Economically, the issue appears to be equivalent to a statement in the *Hope* decision, "[t]he heart of the matter is that rates cannot be made to depend upon 'fair value' when the value of the going enterprise depends on earnings under whatever rates may be anticipated,"[7] if the words "market value" are substituted for "fair value." A commission that attempted to maintain market value at any particular level (*including* at book value) would enter into a circular exercise with investors, in which the commission tried to determine why investors were paying a particular price and how they would react to a possible decision, while part of the reason investors pay that price is their current forecast of what that decision is going to be. To reach a decision, regulators would have to start guessing what investors were guessing about what regulators were about to do.

Here I disagree not with the philosophy expressed by Mr. Rogers, but with the suggestion that the procedures Dr. Vilbert and I use are in any way inconsistent with that philosophy.

Q19. All right. Are there any other capital-structure topics in Mr. Rogers's testimony to discuss before you turn to those in Mr. Rigsby's testimony?

A19. Yes, two, one related to the Mr. Rogers's claim that the use of market-value capital structures in analyzing sample risk-return data leads to a "perpetual upward cycle," and one relating to the procedure he uses to adjust for financial risk.

Q20. Please discuss the first of these.

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[7] *Federal Power Commission v. Hope Natural Gas* 320 U.S. 591 (1944) at 601.

A20. It simply is not correct that increasing revenues due to use of market-value capital structures in the analysis "in turn, increases market values resulting a perpetual upward cycle." The reason is illustrated in Table R-5, below.

Table R-5 first replicates Version 4 from Table R-4, above, to facilitate comparisons with two alternative cases, one with a higher sample equity market-to-book ratio and one with a lower sample equity market-to-book ratio. In particular, Version 5 is the same as Version 4 except that the market value of the equity happens to have increased by an additional $25, for whatever reason. Version 6 is the same as Version 4, except the market value of equity is $25 smaller. (The new equity values are shown in boldface italics near the upper left corners of each Version; the implied new market-value capital structures are in boldface right next to the new equity number.)

Table R-5

Version 4: Corrected Table 4 with Dollar Return and ATWACC Added, at Approximate Kolbe Testimony Values

	Market-Value Capital Structure				Book-Value Capital Structure			
	Dollars	Percent	Cost	WACC	Dollars	Percent	Cost	WACC
Equity	***$106***	**66%**	8.4%	5.6%	$37	36.7%	12.5%	4.6%
Debt	$54	**34%**	5.6%	1.9%	$63	63.3%	5.6%	3.5%
Totals ($/%)	$160			7.5%	$100			8.1%

	ATWACC	After-Tax Dollar Return	ATWACC	After-Tax Dollar Return
Equity	5.6%	$8.89	4.6%	$4.57
Debt	1.1%	$1.83	2.1%	$2.13
Totals ($/%)	**6.7%**	**$10.72**	***6.7%***	***$6.70***

Version 5: Version 4 with a Higher Market Value of Equity, Otherwise Approximate Kolbe Testimony Values

	Market-Value Capital Structure				Book-Value Capital Structure			
	Dollars	Percent	Cost	WACC	Dollars	Percent	Cost	WACC
Equity	***$131***	**71%**	8.1%	5.7%	$37	36.7%	12.5%	4.6%
Debt	$54	**29%**	5.6%	1.6%	$63	63.3%	5.6%	3.5%
Totals ($/%)	$185			7.4%	$100			8.1%

	ATWACC	After-Tax Dollar Return	ATWACC	After-Tax Dollar Return
Equity	5.7%	$10.57	4.6%	$4.57
Debt	1.0%	$1.83	2.1%	$2.13
Totals ($/%)	**6.7%**	**$12.39**	***6.7%***	***$6.70***

Version 6: Version 4 with a Lower Market Value of Equity, Otherwise Approximate Kolbe Testimony Values

	Market-Value Capital Structure				Book-Value Capital Structure			
	Dollars	Percent	Cost	WACC	Dollars	Percent	Cost	WACC
Equity	***$81***	**60%**	9.0%	5.3%	$37	36.7%	12.5%	4.6%
Debt	$54	**40%**	5.6%	2.3%	$63	63.3%	5.6%	3.5%
Totals ($/%)	$135			7.6%	$100			8.1%

	ATWACC	After-Tax Dollar Return	ATWACC	After-Tax Dollar Return
Equity	5.3%	$7.22	4.6%	$4.57
Debt	1.4%	$1.83	2.1%	$2.13
Totals ($/%)	**6.7%**	**$9.04**	***6.7%***	***$6.70***

Consider Verison 5, in which the market value of equity is $131, not $106, and the market value of the firm as a whole is $185, not $160. The market-value equity ratio is up to 71 percent. Does this mean that the rate of return on equity for the book rate base that is recommended by our procedures will go up? No!

Q21. Why not?

A21. Because the sample ATWACC is exactly the same, at 6.7 percent. The higher proportion of equity implies the sample's shareholders will be exposed to less financial risk. Estimation errors aside, the measured market cost of equity will be lower, at 8.1 percent instead of 8.4 percent, producing the same 6.7 percent ATWACC. When that ATWACC is applied to the book-value capital structure used to make rates, the outcome is the same rate of return on equity as derived at the original, Version 4 capital structure. The market automatically corrects the cost of equity for the change in capital structure, and no "perpetual upward cycle" due to an "ongoing rising spiral between revenues and stock prices" results. Instead, the regulated firm's revenues are based on the ATWACC and so are independent of the sample's precise capital structure. That is what a flat ATWACC *means.*

Version 6 shows that a reduction in the market value of equity similarly has no effect on the ATWACC, since that quantity reflects the underlying business risk of the assets and is not sensitive to the financial risk to which equity is exposed. Therefore, a decrease in the proportion of equity in the sample's capital structure, estimation errors aside, also has no effect on the recommended rate of return on book asset value. In Version 6 the sample's market-derived cost of equity goes up to 9.0 percent from 8.4 percent, not down as in Version 5. The reason is that the level of financial risk is higher when the proportion of equity is lower. But the ATWACC and the cost of equity that corresponds to the regulated company's ratemaking capital structure do not change at all, so the revenue requirement and the rates customers pay do not change at all, either.

In short, the right-hand half of Table R-5, depicting the returns on rate base for the regulated entity, is *exactly the same* in all three Versions.

Q22. Can you illustrate this finding in a figure?

A22. Yes. Figure R-3 depicts the key results from Table R-5. The four pairs of columns show the cost of equity and ATWACC for, respectively, the actual sample (Version 4), the sample at a higher equity-to-value ratio (Version 5), the sample at a lower equity-to-value ratio (Version 6), and Paradise Valley. Since the sample ATWACCs do not change as the market value capital structure changes, neither does the ATWACC or cost of equity for Paradise Valley. The Paradise Valley revenue requirement is the same in all three versions.

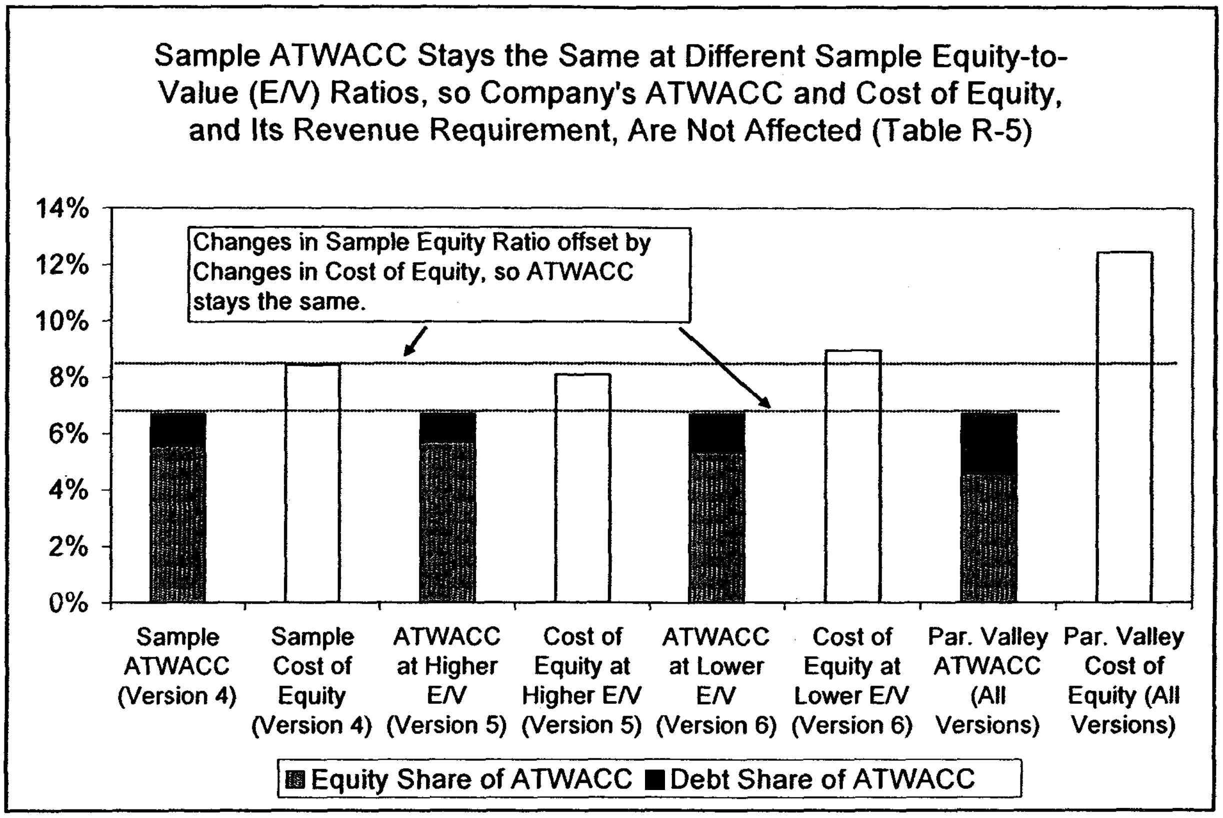

Figure R-3

Q23. Above, you mentioned that you have another comment on the capital structure discussions in Mr. Rogers's testimony, regarding his adjustment for financial risk. What is that?

A23. At pp. 34-35, Mr. Rogers states that he relies on a procedure developed by Prof. Hamada to adjust for the difference between the book-value capital structures of its sample companies and Paradise Valley. As noted at the outset, I agree with the decision to make an explicit adjustment for capital structure differences, and I agree with the decision to base that adjustment explicitly on principles from the financial literature.

However, I must note that the testimony does not in fact follow the Hamada procedure as originally specified. As noted in footnote 27 of the Kolbe Direct, Prof. Hamada's work relies on market-value capital structures, not book-value capital structures.[8] Additionally, Prof. Hamada's work came before Prof. Miller's 1977 Presidential Address to the American Finance Association, which stressed the importance of personal as well as corporate taxes, and even longer before the wealth of research that underlies the finding that the ATWACC is essentially flat across a broad middle range of capital structures.[9] Therefore, even use of Prof. Hamada's adjustment with market-value capital structures would not reflect a fully up-to-date application of the academic research.

B. THE RIGSBY TESTIMONY

Q24. Please turn to the comments on market-value capital structure contained in the Rigsby Testimony. What does Mr. Rigsby say on this issue?

A24. He says at pp. 61-2,

> While I believe that Dr. Kolbe's testimony is an interesting exercise in academia, and may have weight in regard to business entities that operate in a truly competitive environment, the higher rate of return that he advocates for PV water is not warranted. While PV Water may have a higher degree of financial risk, as a result of the Company's leveraged capital structure, it is still a regulated entity that can apply for rate relief when the need arises. This being the case, the Company is actually less risky than firms that have nothing to turn to but bankruptcy court when their debt becomes excessively burdensome. The fact that the ACC has allowed cost recovery for increased water-testing costs,

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[8] The Rogers Testimony does not cite the specific paper on which it relies, but the basic Hamada paper on this topic is Robert S. Hamada, "Portfolio Analysis, Market Equilibrium and Corporation Finance, *The Journal of Finance* 24:13-31 (March 1969). See pp. 21-22 of that paper.

[9] See Appendix B of the Kolbe Direct for citations to and discussion of the relevant literature.

> deferred Central Arizona Project costs and the costs associated with more stringent levels of arsenic is proof that water utilities in Arizona operate in a favorable regulatory environment which eliminates the need for the higher rates of return advocated by Dr. Kolbe.

Q25. Please comment on these statements.

A25. As noted at the outset of my evidence, the academic literature on capital structure is no less relevant to rate regulation than that on cost of equity estimation. The comments contained in the Rigsby Testimony, essentially to dismiss this branch of the literature, are *non sequiturs.* They address the relative risk of utilities versus unregulated companies, not whether utility shareholders' financial risk depends on market capital structure.

To see this, suppose an unregulated company and a utility each suffer a 5 percent fall in the market value of their assets as a result of a general decline in the economy. Table R-6, below, shows how their stocks would fare, per $100 of asset value, if they started with three different capital structures. The rates of return on assets and equity are highlighted, in boldface for the return on assets and in boldface italics for the return on equity.[10] But which company in the following table is the utility, A or B? It is impossible to tell, because the impact of the fall in market asset value is exactly the same. Nor are the companies' book values affected in any way. If these companies always had the same reaction to fluctuations in the economy, their estimated betas would be exactly the same at equal market-value capital structures, and those betas would increase at an ever-increasing rate as the market-value equity ratio declined.

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[10] The table assumes all of the loss in asset value falls on equity even at high capital structures. Letting a (realistic) proportion of the loss fall on debt would complicate the table without changing its implications.

Table R-6
Equity Rate of Return Depends on Market Value Capital Structures for Both Unregulated Company and Utility (Which One is the Utility?)

	Company A	Company B
Case 1: Market Equity = 70% of Market Assets		
Initial Market Value of Assets	$ 100.00	$ 100.00
Change in Market Value of Assets	$ (5.00)	$ (5.00)
Percentage Change in Market Value of Assets	**-5.0%**	**-5.0%**
Initial Market Value of Debt	$ 30.00	$ 30.00
Initial Market Value of Equity	$ 70.00	$ 70.00
Change in Market Value of Equity	$ (5.00)	$ (5.00)
Percentage Change in Market Value of Equity	***-7.1%***	***-7.1%***
Change in Book Value of Equity	$ -	$ -
Percentage Change in Book Value of Equity	0.0%	0.0%
Case 2: Market Equity = 50% of Market Assets		
Initial Market Value of Assets	$ 100.00	$ 100.00
Change in Market Value of Assets	$ (5.00)	$ (5.00)
Percentage Change in Market Value of Assets	**-5.0%**	**-5.0%**
Initial Market Value of Debt	$ 50.00	$ 50.00
Initial Market Value of Equity	$ 50.00	$ 50.00
Change in Market Value of Equity	$ (5.00)	$ (5.00)
Percentage Change in Market Value of Equity	***-10.0%***	***-10.0%***
Change in Book Value of Equity	$ -	$ -
Percentage Change in Book Value of Equity	0.0%	0.0%
Case 3: Market Equity = 30% of Market Assets		
Initial Market Value of Assets	$ 100.00	$ 100.00
Change in Market Value of Assets	$ (5.00)	$ (5.00)
Percentage Change in Market Value of Assets	**-5.0%**	**-5.0%**
Initial Market Value of Debt	$ 70.00	$ 70.00
Initial Market Value of Equity	$ 30.00	$ 30.00
Change in Market Value of Equity	$ (5.00)	$ (5.00)
Percentage Change in Market Value of Equity	***-16.7%***	***-16.7%***
Change in Book Value of Equity	$ -	$ -
Percentage Change in Book Value of Equity	0.0%	0.0%

Q26. But is it not likely that the utility would be less sensitive to economic fluctuations than a competitive company, as Mr. Rigsby suggests?

A26. Absolutely. But that fact says nothing about the whether market-value or book-value capital structure affects the utility's cost of equity. To see this, look at Table R-7, below, in which the fall in Company B's asset value in response to the change in economic conditions is half as great as that of Company A. The impact on Company B's return on assets and return on equity is always one-half that of Company A's. But the risk of Company B's equity increases as the market-value equity ratio shrinks in exactly the same way Company A's does. The risk of Company B's equity, and of any utility's equity, therefore still depends on its market-value capital structure, not its book-value capital structure.

Thus, any suggestion that the financial literature is irrelevant because utilities are less risky is flatly incorrect. Whatever the *business* risk of a utility, the level of *financial* risk that its equity bears depends on the utility's market-value capital structure. That level of financial risk directly drives the cost of equity, as estimated according to the models proposed in that branch of the financial literature.

Table R-7

Equity Rate of Return Depends on Market Value Capital Structures for Both Unregulated Company and Utility Even if Utility is Half as Risky

	Company A		Company B	
Case 1: Market Equity = 70% of Market Assets				
Initial Market Value of Assets	$	100.00	$	100.00
Change in Market Value of Assets	$	(5.00)	$	(2.50)
Percentage Change in Market Value of Assets		**-5.0%**		**-2.5%**
Initial Market Value of Debt	$	30.00	$	30.00
Initial Market Value of Equity	$	70.00	$	70.00
Change in Market Value of Equity	$	(5.00)	$	(2.50)
Percentage Change in Market Value of Equity		***-7.1%***		***-3.6%***
Change in Book Value of Equity	$	-	$	-
Percentage Change in Book Value of Equity		0.0%		0.0%
Case 2: Market Equity = 50% of Market Assets				
Initial Market Value of Assets	$	100.00	$	100.00
Change in Market Value of Assets	$	(5.00)	$	(2.50)
Percentage Change in Market Value of Assets		**-5.0%**		**-2.5%**
Initial Market Value of Debt	$	50.00	$	50.00
Initial Market Value of Equity	$	50.00	$	50.00
Change in Market Value of Equity	$	(5.00)	$	(2.50)
Percentage Change in Market Value of Equity		***-10.0%***		***-5.0%***
Change in Book Value of Equity	$	-	$	-
Percentage Change in Book Value of Equity		0.0%		0.0%
Case 3: Market Equity = 30% of Market Assets				
Initial Market Value of Assets	$	100.00	$	100.00
Change in Market Value of Assets	$	(5.00)	$	(2.50)
Percentage Change in Market Value of Assets		**-5.0%**		**-2.5%**
Initial Market Value of Debt	$	70.00	$	70.00
Initial Market Value of Equity	$	30.00	$	30.00
Change in Market Value of Equity	$	(5.00)	$	(2.50)
Percentage Change in Market Value of Equity		***-16.7%***		***-8.3%***
Change in Book Value of Equity	$	-	$	-
Percentage Change in Book Value of Equity		0.0%		0.0%

Q27. It is hard to see the pattern that emerges from the above table. Can you provide a graph of the relevant rates of return?

A27. Certainly. Figure R-4 does so.

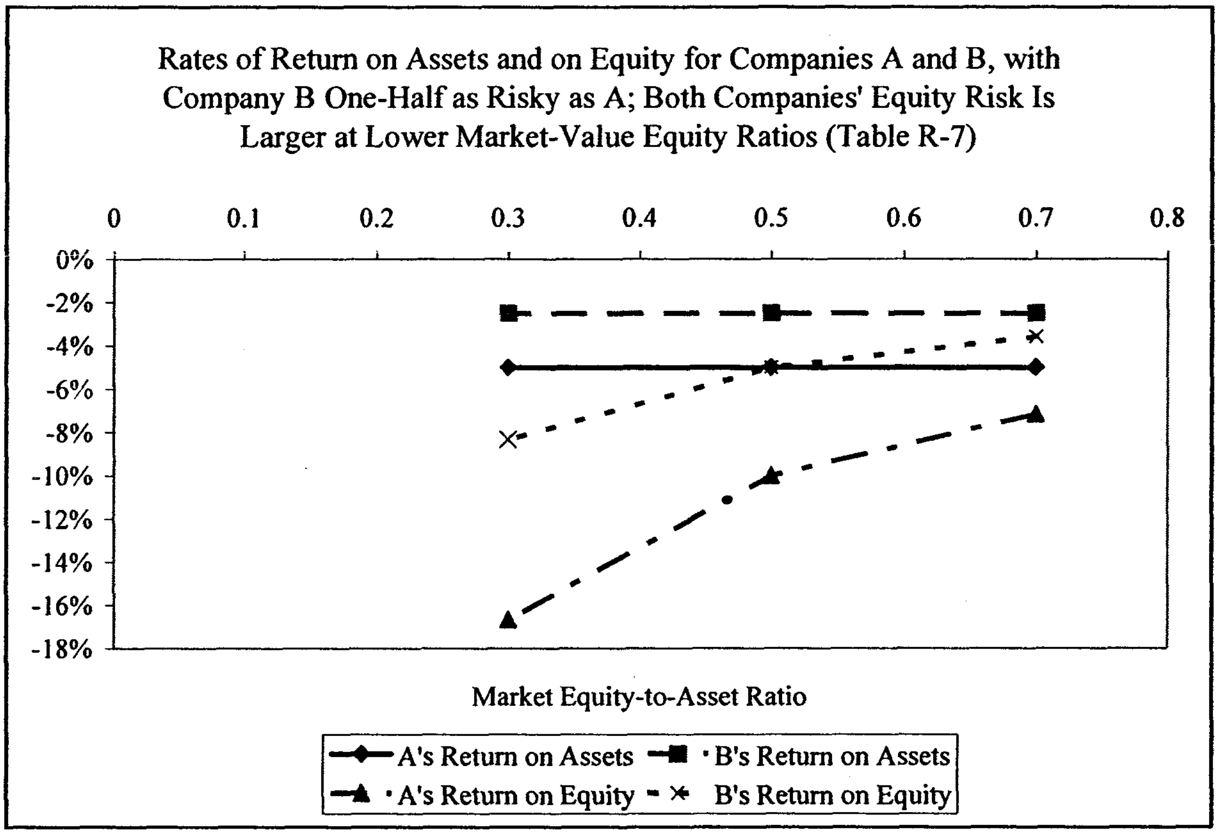

Figure R-4

The figure plots the negative rates of return from Table R-7 at the three alternative market equity-to-assets ratios. The two straight lines are the returns on assets, with Company B's being half as severe as Company A's because it is half as risky. The lines with changing slopes are the negative rates of return on equity. Company B's is exactly half as bad as Company A's at every equity ratio. But Company B's equity loss displays exactly the same pattern as Company A's: lower market-value equity ratios mean ever-increasing losses for equity due to a given loss in asset value, for utilities as for any other company. I agree with Mr. Rigsby that utilities are of lower than average business risk, but that fact is simply irrelevant to the question of whether the level of financial risk that utilities do bear depends on their market-value capital structure.

Q28. Does Mr. Rigsby make an adjustment for Paradise Valley's greater financial risk?

A28. Yes, and I certainly endorse the need for an adjustment. Unfortunately, the 50-basis-point adjustment made by Mr. Rigsby appears to be based on no financial model at all. The modern literature on the topic supports a much greater adjustment than made in the Rigsby Testimony.

Q29. Do you have any other comments on the subject of the applicability of market-value capital structures to utilities?

A29. Just one. There is additional evidence that, contrary to the position of the Rigsby Testimony, the principles on which my direct testimony relies are relevant to rate-regulated as well as to unregulated companies. The evidence comes from a source other than the economic literature, however.

In the last 15 years or so, other nations have come to understand that the North American model of privately-owned companies overseen by public regulatory bodies offers advantages over public ownership. Government-owned utilities have been "privatized" in countries such as Australia, the United Kingdom, and New Zealand. The regulators of these newly formed companies have had the advantage of access to the modern literature on capital structure, which was not available when North American rate regulation began, and these regulatory bodies have adopted procedures consistent with the recommendations I make in this proceeding.

Q30. Do any U.S. regulatory bodies rely on market-value capital structures?

A30. Yes. The Surface Transportation Board uses market-value weights to determine the required rate of return in railroad "revenue adequacy" determinations.[11] Additionally, a recent decision of the Missouri Public Service Commission does so.[12]

III. MARKET-TO-BOOK TEST

Q31. Do Mr. Rogers and Mr. Rigsby make use of the market-to-book ratio?

A31. Yes. Both pieces of testimony consider it in their DCF analyses.[13] In doing so, they accept the view that a market-to-book ratio of 1.0 signals that a utility expects to earn its cost of capital.

Q32. Does either piece of testimony address the issues your direct testimony raised with use of the market-to-book ratio to test utility rates of return?

A32. Mr. Rogers comments on my testimony on the topic at p. 36, but I have not found a reference to it in Mr. Rigsby's testimony.

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[11] See, for example, Surface Transportation Board, *Decision*, STB Ex Parte No. 558 (Sub-No. 9), Railroad Cost of Capital - 2005, Decided: December 19, 2005, p. 1.

[12] See Missouri Public Service Commission, Case No. ER-2004-0570, Tariff File No. YE-2004-1324, for The Empire District Electric Company, issued March 10, 2005.

[13] Rogers Testimony, pp. 19-23. Rigsby Testimony, p. 15.

Q33. What does Mr. Rogers say?

A33. The p. 36 passage, in its entirety, is,

> The market anomalies discussed in Dr. Kolbe's testimony to support his assertion do not invalidate fundamental financial concepts, but only show that markets are imperfect. Fundamental to pricing of securities is that they are priced to recognize the present value of expected future cash flows. The relationship of securities to expected cash flows is readily observable in the bond markets where bonds issued with stated interest rate greater (lower) than the market rate sell at premiums (discounts). The same principle applies to stocks. Accordingly, a market-to-book ratio for a stock exceeding 1.0 reflects that investors expect future cash flows to exceed the cost of equity capital. The cost of equity is determined by the market; it is independent of the cost of equity authorized by the Commission in setting rates.

Q34. Please comment on the passage.

A34. With respect, it consists entirely of assertion, unsupported by an analysis of how the problems identified in my direct testimony can possibly leave any room for the market-to-book test to remain valid. My testimony at pp. 25-33 addressed the market-to-book test in detail. It showed that if the market-to-book test is correct, the current cost of equity for utilities is extraordinarily low. For example, please recall Figure 6, p. 31 of the Kolbe Direct (which I reproduce below for convenience).

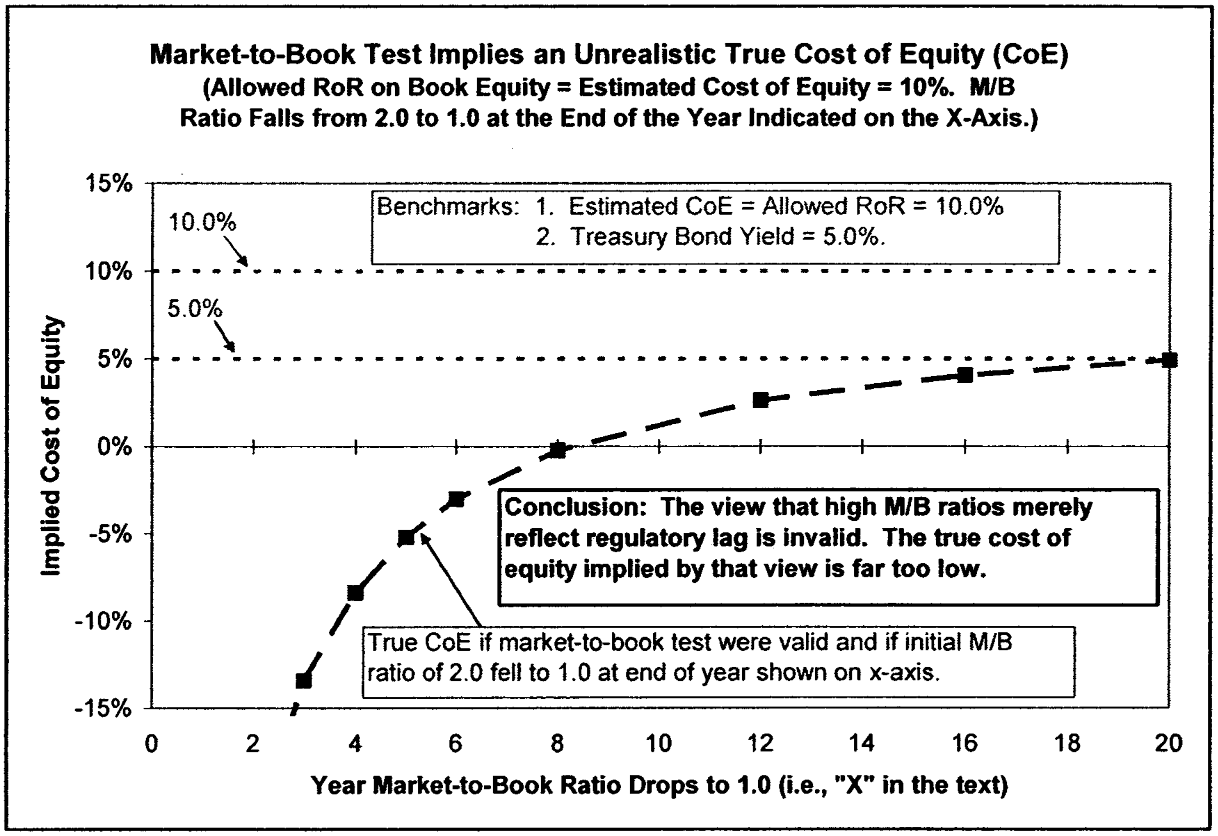

Figure 6 from Kolbe Direct

The only question is how low the cost of equity would be if the market-to-book test were somehow valid: "merely" somewhat lower than U.S. Treasury bond yields, much lower than Treasury bond yields, or negative? The calculations that underlie Figure 6 from my direct rely on the standard treatment of a stock's price as the present value of future cash flows, which underlies the market-to-book test. That model plainly does not explain current utility market-to-book ratios. The true model(s) of stock prices is(are) unknown, but must be more complicated than our current knowledge encompasses.

Q35. What about the fact that the present value formulation works well for fixed-income securities?

A35. That is enough to support a *hypothesis* that the same model works as well for stocks, but it is clearly not *proof* that the same model works as well for stocks. Saying that what works for bonds necessarily tells us what works for stocks is like saying that if we understand how to build a bicycle, we must understand how to build a car.

In the present case, the only way to maintain the hypothesis that the model underlying the market-to-book test works well enough for regulators to rely on the test is to conclude that the cost of equity for utilities is extraordinarily low, and perhaps negative. I think it more reasonable to reject the hypothesis, rather than to accept that utility equity holders at the very least require little or no premium for bearing risk, and possibly are willing to pay money for the "privilege."

Q36. Does this complete your rebuttal testimony?

A36. Yes, it does.

Appendix R-A: QUALIFICATIONS OF A. LAWRENCE KOLBE

Lawrence Kolbe is a Principal of The Brattle Group ("Brattle"), an economic, environmental and management consulting firm with offices in Cambridge (Massachusetts), Washington, London, San Francisco and Brussels. Before co-founding The Brattle Group, he was a Director of Putnam, Hayes & Bartlett, and before that, he was a Vice President of Charles River Associates ("CRA"). Earlier, he was an Air Force officer assigned to the Office of the Secretary of Defense with the job title "Health Economist," and before that, he was assigned to Headquarters, USAF with the job title "Systems Analyst."

His work has included extensive research in financial economics, especially as it applies to rate regulation, project or asset valuation, and the decisions of private firms. Clients for this work include the California Public Utilities Commission, the Consumer Advocate in a Newfoundland proceeding, the Edison Electric Institute, the Electric Power Research Institute, the Interstate Natural Gas Association of America, the Newfoundland Federation of Municipalities, the Nova Scotia Board of Commissioners of Public Utilities, the Town of Labrador City, the U.S. Department of Energy, the U.S. Department of Justice, the U.S. Department of State, and a number of private firms.

He is the coauthor of three books and he has published a number of articles. He is coauthor of a report filed with the British Office of Fair Trading, in London, and he has been an expert witness in: proceedings before the U.S.-U.K. Arbitration Concerning Heathrow Airport Landing Charges (under the auspices of the International Bureau of the Permanent Court of Arbitration) in The Hague, the Iran-United States Claims Tribunal in The Hague, the U.S. Court of Federal Claims, U.S. District Courts in Arizona, Colorado, Florida, New Jersey, Oklahoma, Pennsylvania, Texas and Virginia, the Supreme Court of the State of New Mexico, Colorado District Court, a commercial arbitration tribunal in Australia, a commercial arbitration tribunal held in London concerning a dispute in Australia, the Minerals Management Service of the U.S. Department of the Interior, the Master Settlement Agreement Tobacco Arbitration Panels for the State of Louisiana and the Commonwealth of Massachusetts (which determined fee awards to private counsel assisting the state), and a commercial arbitration in Arizona; federal regulatory proceedings before the Canadian Radio-television and Telecommunications Commission, the [Canadian] National Energy Board, the [U.S.] Postal Rate Commission, the [U.S.] Surface Transportation Board, the U.S. Federal Communications Commission, the U.S. Federal Energy Regulatory Commission and the U.S. Federal Maritime Commission; and state or provincial regulatory proceedings in Alaska, Alberta, Arizona, Arkansas, California, Connecticut, Illinois, Maine, Massachusetts, Michigan, Montana, Newfoundland, New Mexico, New York, Nova Scotia, Ohio, Ontario, Virginia and West Virginia.

He holds a B.S. in International Affairs (Economics) from the U.S. Air Force Academy and a Ph.D. in Economics from the Massachusetts Institute of Technology. Additional information on his qualifications follows.

HONORS AND AWARDS

Sears Foundation National Merit Scholarship, 1963 (declined).
Fairchild Award, U.S. Air Force Academy, 1968 (for standing first in his class, academically).
National Science Foundation Graduate Fellowship in economics, MIT, 1968-1971.

Joint Service Commendation Medal, 1975.

PROFESSIONAL AFFILIATIONS

American Economic Association
American Finance Association
The Econometric Society
Served as Referee for *The Rand Journal of Economics, Land Economics, The Journal of Industrial Economics*

AVAILABLE PAPERS AND PUBLICATIONS

"Measuring Return on Equity Correctly: Why current estimation models set allowed ROE too low," *Public Utilities Fortnightly* (with Michael J. Vilbert and Bente Villadsen), August 2005.

"The Effect of Debt on the Cost of Equity in a Regulatory Setting," (with Michael J. Vilbert and Bente Villadsen, and with "The Brattle Group" listed as author), published by the Edison Electric Institute (dated January 2005, issued April 2005)

Capital Investment and Valuation, (with Richard A. Brealey and Stewart C. Myers, with "The Brattle Group" listed as third author), New York: McGraw-Hill/Irwin (2003).

"The True Hourly Rate for Private Counsel in the State of Louisiana Tobacco Lawsuit," (with August J. Baker and Bin Zhou), Brattle report prepared for private counsel to the Louisiana Attorney General in the state's lawsuit to recover health care costs from the tobacco industry (July 2000).

"The Cost of Capital for the Dampier to Bunbury Natural Gas Pipeline," (with M. Alexis Maniatis and Boaz Moselle) Brattle report submitted to the Office of Gas Access Regulation, Western Australia (October 1999).

"Compensation for Asymmetric Risks," (with others) Brattle report prepared for GPU PowerNet, Melbourne, Australia (October 1999).

"A Non-Practitioner's Guide to the State of the Art in Cost of Capital Estimation," (with others) Brattle report prepared for GPU PowerNet, Melbourne, Australia (June 1999).

"A Note on the Pre-tax Weighted Average Cost of Capital in a Regulatory Context with Australian Dividend Tax Credits and Alternative Debt Refinancing Policies" (with M. Alexis Maniatis), Working Paper in Progress.

"The Impact of Stranded-Cost Risk on Required Rates of Return for Electric Utilities: Theory and An Example" (with Lynda S. Borucki). *Journal of Regulatory Economics* Vol. 13 (1998), 255-275.

"Taxing Mutual and Stock Insurance Companies" (with Stewart C. Myers), Working Paper in Progress.

"Current Taxation of Mutual Life Insurance Companies and the 'Graetz Theory'" (with Stewart C. Myers, Susan J. Guthrie and M. Alexis Maniatis), Working Paper in Progress.

"Compensation for the Risk of Stranded Costs" (with William B. Tye). *Energy Policy*, Vol. 24, No. 12 (1996), 1025-1050.

"Impact of Deregulation on Capital Costs: Case Studies of Telecommunications and Natural Gas," (with Lynda S. Borucki). Brattle report prepared for The Energy Association of New York State (January 1996, released July 1996).

"Response to Brown," (with William B. Tye and Stewart C. Myers). *Yale Journal on Regulation*, Vol. 13 (Winter 1996), 414-417.

"How to Value a Lost Opportunity: Defining and Measuring Damages from Market Foreclosure," (with William B. Tye and Stephen H. Kalos), *Research in Law and Economics* 17, 83-125 (1995).

"Faulty Analysis Underlies Claims of Excess Card Profits", (with Carlos Lapuerta). *American Banker*, October 10, 1995.

"It Ain't In There: The Cost of Capital Does Not Compensate for Stranded-Cost Risk," (with William B. Tye), *Public Utilities Fortnightly*, May 15, 1995.

"Purchased Power: Hidden Costs or Benefits?" (with Sarah Johnson, Johannes P. Pfeifenberger and David W. Weinstein). *The Electricity Journal* 7, 74-83 (September 1994).

The Utility Capital Budgeting Notebook (with others), EPRI TR-104369, Palo Alto, CA: Electric Power Research Institute, September 1994.

"Rate of Return Recommendations in Cable Television Cost-of-Service Regulation" (with Lynda S. Borucki). Brattle report filed in Federal Communications Commission Docket No. 93-215, CS Docket No. 94-28, July 1994.

"Financial and Discount Rate Issues for Strategic Management of Environmental Costs" (with Stewart C. Myers). *Air and Waste Management Association*, Cincinnati, June 1994.

"Banking on NUG Reliability" (with Sarah Johnson and Johannes P. Pfeifenberger). *Public Utilities Fortnightly*, May 15, 1994.

"Section 712 Issues: Risk Identification, Allocation and Compensation." Paper presented to National Association of Regulatory Utility Commissioners (July 1993) and published in *Presentations and Papers from the National Seminars on Public Utility Commission Implementation of the Energy Policy Act of 1992*. Columbus, OH: National Regulatory Research Institute, December 1993.

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EXHIBIT
A-12
admitted

BEFORE THE ARIZONA CORPORATION COMMISSION

COMMISSIONERS

JEFF HATCH-MILLER, Chairman
WILLIAM A. MUNDELL
MARC SPITZER
MIKE GLEASON
KRISTIN K. MAYES

IN THE MATTER OF THE APPLICATION OF ARIZONA-AMERICAN WATER COMPANY, INC., AN ARIZONA CORPORATION, FOR A DETERMINATION OF THE CURRENT FAIR VALUE OF ITS UTILITY PLANT AND PROPERTY AND FOR INCREASES IN ITS RATES AND CHARGES BASED THEREON FOR UTILITY SERVICE BY ITS PARADISE VALLEY WATER DISTRICT.	DOCKET NO. WS-01303A-05-0405

REJOINDER TESTIMONY
OF
A. LAWRENCE KOLBE
ON BEHALF OF
ARIZONA-AMERICAN WATER COMPANY
MARCH 16, 2006

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I. INTRODUCTION AND SUMMARY

Q1. Please state your name and address for the record.

A1. My name is A. Lawrence Kolbe. My business address is The Brattle Group, 44 Brattle Street, Cambridge, Massachusetts, 02138.

Q2. Did you prepare direct and rebuttal testimony earlier in this proceeding?

A2. Yes.

Q3. What is the purpose of your rejoinder testimony?

A3. I have been asked by Arizona-American Water Company ("Arizona-American") to review the Surrebuttal Testimony of Dennis R. Rogers ("Rogers Surrebuttal") on behalf of the Staff of the Arizona Corporation Commission and the Surrebuttal Testimony of William A. Rigsby ("Rigsby Surrebuttal") on behalf of the Residential Utility Consumer Office, and, if necessary, to respond to statements made in those documents related to areas covered in my rebuttal testimony.

Q4. Before you turn to your review, are there any changes to the various recommended allowed rates of return on equity for Paradise Valley, as you understand them?

A4. Yes. My rebuttal testimony reported a range for Staff of 10.2 percent to 10.6 percent, with a recommendation of 10.4 percent, citing the Executive Summary in Mr. Rogers's direct testimony. However, the Rogers Surrebuttal's Executive Summary reports that the Staff's range is 10.0 to 10.6 percent and that Staff is recommending the midpoint, 10.3 percent.

Q5. Please summarize the results of your review.

A5. Both Mr. Rogers and Mr. Rigsby address my comments on the use of market-value capital structures to assess the sample's degree of financial risk, for the purpose of adjusting for the different level of financial risk at Paradise Valley's ratemaking capital structure. Mr. Rogers states that the regulatory commissions I cite as using market-value capital structures are a "small portion of the regulatory universe." I would agree that this is true in North America, but they are a huge portion of the regulatory universe that has instituted rate regulation with the benefit of access to the modern financial literature. In fact, I am unaware of any recently instituted regulatory system that uses anything other than market-value weights. Regulatory procedures should, and do, evolve as economic knowledge advances.

Mr. Rogers also argues that simplicity and consistency suggest that book-value sample weights should be used with book-value regulatory weights. However, the ratemaking process itself uses both market and book values. That is, nearly half a century of research has concluded that the level of financial risk in the measured cost of equity depends on the sample's *market*-value capital structure. But the ratemaking capital structure is based on *book* value, not market value. True consistency takes account of this difference explicitly, by calculating the level of financial risk that goes with the ratemaking capital structure, starting from the actual, market-value capital structure that determines the measured cost of equity.

Mr. Rigsby focuses on why he believes it to be inappropriate to view a regulated utility in the same light as competitive companies. By way of example, he compares utilities' risks to those faced by pizza parlors and airline companies, enterprises with a high risk of bankruptcy. This discussion is misplaced, in two ways.

First, the principles in my testimony do not rely on the risk of bankruptcy. They instead focus on how changes in the level of debt affect the value of cash flows received by equity. In particular, the magnification of the variability of equity returns and equity value due to the addition of debt happens even if there is no risk of bankruptcy at all. In fact, the initial papers in this literature assumed away bankruptcy risk entirely, yet they still concluded that debt magnifies equity's risk.

Second, it is double-counting to use a utility's low business risk to argue that a full adjustment for financial risk differences is unwarranted. There is no dispute among the parties that utilities have materially less business risk than the typical company. That is why all parties start with utility sample groups. Use of a utility sample *automatically* takes care of the fact that utilities have unusually low business risk. It double-counts that risk to use it again to avoid a full adjustment for the difference in financial risk between the sample's actual, market-value capital structure and the utility's ratemaking capital structure.

Q6. What about your rebuttal's comments on the market-to-book test?

A6. Only Mr. Rogers addresses this topic. He states that I have been inconsistent in giving some weight to one cost of equity estimate based on the DCF model, which assumes the validity of the present value formula, while at the same time saying that the present value formula does not explain stock prices well enough to permit reliance on the market-to-book test. He also stresses the present value formula's widespread use for valuing stock prices and other investments, and states that it would be wrong to drop a widely recognized model in favor of my personal interpretation.

Q7. Please summarize your response.

A7. First, Dr. Vilbert's direct testimony clearly states our concerns over the present value formula that underlies the DCF model. But estimation of the cost of equity is hard, and the profession is nowhere close to an agreed methodology for how to perform the task. In my view, giving *some* weight to a DCF estimate without any problems other than that with the formula itself is still warranted.

However, the market-to-book test goes far beyond the mere giving of some weight to one of several methods of estimating the cost of capital. The market-to-book test for a pure-play utility with a book-value rate base purports to be an absolute test of whether shareholders expect to earn more or less than the cost of capital. My direct testimony, and my rebuttal, explored the implications of accepting that test at face value. These implications (for example, utility costs of equity that are below the risk-free interest rate or even negative) go far beyond my "personal interpretation."[1] I do not find discussions of these points in the Rogers Surrebuttal.

I agree with Mr. Rogers that the present value formula is a standard tool. I believe that it is a tool for which there is no ready substitute in many applications. But that does *not* mean that regulators can rely on the market-to-book test. Whatever the true underlying model or models that eventually will be found to explain stock prices, the evidence cited in my earlier testimony demonstrates that they will be more complicated than the simple present value formula. No absolute test of value can be solidly grounded if it assumes that the present value formula completely explains stock prices.

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[1] Additionally, as noted in footnotes 22 and 24 of my direct testimony, some very well respected economists also believe that stock price formation is more complicated than our simple models admit.

Q8. How is the remainder of your testimony organized?

A8. My testimony is organized by topic. *Section II* provides my comments on criticisms of the use of market-value capital structures to interpret sample evidence on appropriate rates of return for utilities. *Section III* addresses the comments on the market-to-book test.

II. MARKET-VALUE CAPITAL STRUCTURE

Q9. How is this section organized?

A9. It addresses first Mr. Rogers's surrebuttal and then Mr. Rigsby's.

A. THE ROGERS SURREBUTTAL

Q10. What does Mr. Rogers say about the comments in your rebuttal testimony on use of market-value capital structure weights?

A10. I read his surrebuttal testimony as making three points:

- The examples of regulatory use of market-value capital structures that my rebuttal cites are "a small portion of the rate regulated universe," which implies use of market-value capital structures is not a widely accepted methodology. (Rogers Surrebuttal, p. 5)
- The cost of equity when using market-value capital structures is dependent on the cost of debt, which (1) is "inappropriate" and (2) leads to problems because "a utility's cost of equity decreases if it uses low cost debt." (Rogers Surrebuttal, pp. 5-6)
- While Staff acknowledges that the its financial risk adjustment uses book-value weights rather than the market-value weights used in the actual Hamada procedure Staff cites, Staff "prefers to use the book values" for their ease of estimation and consistency with other parts of the calculation. (Rogers Surrebuttal, p. 6) Additionally, had Staff used market-value weights for Paradise Valley and for its sample, based on an assumed market-to-book ratio for Paradise Valley, it would have made a lower financial risk adjustment than it did. (Rogers Surrebuttal, p. 7)

Q11. Please respond to the first of these points.

A11. In my experience, rate regulation is like an oil supertanker. Even when economics discovers clearly superior methods and techniques, it can take a long time for regulation to change prior approaches, just as it takes a long time to change the course of a supertanker. I cited the experience of Australia, New Zealand and the United Kingdom in my rebuttal testimony because those countries had the advantage of initiating rate regulation with access to the modern economics literature. In effect, those countries launched their own "supertankers" on a heading that took advantage of this modern literature, and they uniformly adopted market-value capital structures in analyzing the cost of capital.

North America, which has a much longer history of rate regulation, started off on a different course, and the fact that North American rate regulation has not yet fully incorporated the modern economic understanding of the effects of capital structure on the cost of equity is not surprising. At one time, rate regulation in the United States relied on "fair value" rate bases derived from engineers' estimates of reproduction cost, and solely on "comparable earnings" estimates of the cost of capital. Original cost rate bases and discounted cash flow or capital asset pricing model estimates of the cost of capital were once controversial and only "a small portion of the rate regulated universe." That gradually changed, as regulatory commissions grew to understand and adopt the results of more modern research. That process of change is underway for use of market-value capital structures, as well. But if the mere fact that an advance in technique has not yet been incorporated were to prevent its adoption by regulators, there would be no changes in regulatory procedures in the U.S.

Q12. Please respond to the second point, regarding how a dependence of the cost of equity on the cost of debt is "inappropriate" and how a lower cost of debt leads to a lower cost of equity.

A12. Modern finance teaches that the most basic measure of the required rate of return on an investment is the after-tax weighted-average cost of capital ("ATWACC"), calculated with market-value weights. The research shows the ATWACC is insensitive to capital structure over a broad middle range, which varies from industry to industry. A constant ATWACC implies that all else equal, the cost of equity *must* vary with the cost of debt.

Additionally, if the ATWACC is constant, a company with a lower cost of debt has to have a *higher* cost of equity, not a lower one, all else held equal.[2] If both the cost of equity and cost of debt went down (or up), the ATWACC would also, so that the ATWACC would no longer be constant.

Q13. Please respond to the third point, regarding Staff's preference for book values and the results if a market-value capital structure were imputed to Paradise Valley.

A13. Ease of calculation is desirable, but not if it produces an incorrect answer. Nor is consistency of book with book or market with market appropriate if the result is incorrect.

The after-tax rate of return required on an investment is like water in a pitcher. It can be poured into glasses labeled "return on equity" or "[after-tax] return on debt," but within a

[2] Surrebuttal Schedule DRR-9 in the Rogers Surrebuttal, cited and discussed at p. 6, appears to lead to the opposite conclusion. However, the schedule does not conform to the principles that underlie my testimony. I have been informed by Arizona-American that Staff has acknowledged that this Schedule contains calculation errors. Additionally, I would note that since regulatory practice is to use the *current* cost of equity and the *embedded* cost of debt, there is no inconsistency in *calculating* the allowed return on equity using the current cost of debt and the current ATWACC, and then allowing the embedded cost of debt in rates.

broad middle range of capital structures, the total amount of water is unchanged by the names on the glasses into which it is poured.[3] The modern way to measure the amount of water in the pitcher is to analyze a sample's ATWACC, calculated with market-value weights. If, after pouring water into ratemaking glasses labeled "return on equity" and "return on debt," the overall regulatory rate of return ends up with water left in the pitcher, the return is inadequate.[4]

Unfortunately, this is the outcome that Staff's recommendation produces. The Staff recommendation starts with an estimated cost of equity that reflects a low level of financial risk because of the high *market*-value capital structures of the sample, but adjusts that rate of return only for the financial risk difference between the sample's and Paradise Valley's *book*-value capital structures. This would be correct only if the sample's market-value capital structure had been equal to its book-value capital structure.

Q14. What about Staff's calculation of the financial risk adjustment that would have resulted at the market-value capital structure it imputes to Paradise Valley?

A14. This alternative procedure, of imputing a market-value capital structure to Paradise Valley and adjusting only for differences in that and the sample's market-value capital structure, also leaves water in the pitcher. That return would be correct only if Paradise Valley's imputed market-value capital structure were to be used to set Paradise Valley's rates.

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[3] Not to strain the analogy too far, the glass labeled "return on debt" cannot hold all the water, although the one labeled "return on equity" could.

[4] This analogy abstracts from the regulatory use of embedded instead of current interest rates. If that difference is thought of as a separate element of the revenue requirement, the analogy works as stated.

Q15. But does not consistency require that both calculations be either book-based or market-based?

A15. No, that would not be in accord with the current proceeding's facts. Here, the amount of financial risk in the estimated cost of equity is based on the samples' market-value capital structures, yet Paradise Valley's revenue requirement is based on book-value weights. True consistency requires that this difference be recognized in the analysis, not ignored. Given that there is in fact a distinction between (1) the sample's *market*-value-based level of financial risk and (2) Paradise Valley's *book*-value-based regulatory capital structure, it is the use of the same weights, whether based on market or book values, that would be inconsistent.

B. THE RIGSBY SURREBUTTAL

Q16. Please turn to the comments on market-value capital structure contained in the Rigsby Surrebuttal. What does Mr. Rigsby say on this issue?

A16. Part of his surrebuttal suggests that my own rebuttal may not have been as clear as I had hoped,[5] but the main thrust of his comments addresses why he believes it is inappropriate to view a regulated utility "in the same light as companies that operate in a purely competitive environment."[6] Much of his testimony on this point consists of an extended comparison between risks such as bankruptcy facing a utility and a local pizza parlor, or the airline

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[5] For example, I was not offended by Mr. Rigsby's comments on the capital structure literature, merely puzzled. Nor did I say that he failed to quantify the basis of his 50 basis point adjustment for financial risk, merely that it, unlike Staff's, was not based on an analysis that used any financial model at all.

[6] Rigsby Surrebuttal, p. 8.

industry.[7] At the end, he adds some other comments and quotations regarding Arizona-American's and the water industry's relative risk.[8]

Q17. Please comment on Mr. Rigsby's discussion.

A17. Unfortunately, the discussion is not relevant to the question of whether market-value or book-value weights determine the level of financial risk measured in the cost of equity. Mr. Rigsby highlights bankruptcy risk, but bankruptcy risk at most affects how *fast* the cost of equity changes with market-value capital structure, not *whether* it changes with market-value capital structure.[9] The clearest possible illustration of this point is that the original papers by Profs. Modigliani and Miller, as well as the work by Prof. Hamada, assumed *risk-free debt*.[10] That is, the papers developed their theories on the interaction between capital structure and firm value, and hence between capital structure and the cost of equity, on the assumption that the company faced no risk of bankruptcy at all.

Q18. If the issue isn't bankruptcy, what is it?

A18. The issue is the way the addition of debt loads the variability in the firm's cash flows and value onto equity. Please recall Figure 9 in my direct testimony, which showed how the value of

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[7] Rigsby Surrebuttal, pp. 8-11.

[8] Rigsby Surrebuttal, pp. 11-14.

[9] See Appendix B of my direct testimony.

[10] Appendix B of the my direct testimony and my rebuttal testimony give citations to these papers. For convenience, I reproduce them here: Franco Modigliani and Merton H. Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," *American Economic Review*, 48: 261-297 (June 1958); Franco Modigliani and Merton H. Miller, "Corporate Income Taxes and the Cost of Capital: A Correction," *American Economic Review*, 53: 433-443 (June 1963); and Robert S. Hamada, "Portfolio Analysis, Market Equilibrium and Corporation Finance, *The Journal of Finance* 24:13-31 (March 1969).

equity in a dwelling becomes ever more sensitive to fluctuations in the market price of housing as the size of the mortgage goes up. That example works just as well for utilities' assets and equities as for dwellings. Moreover, while the details would differ, the outcome would be the same in all material respects whether the debt is guaranteed by the government or supported only by the dwelling (or utility assets). In fact, since the Figure 9 illustration shows literally all of the fluctuation in asset values falling on the equity, instead of merely the vast majority of the value fluctuation, the Figure example effectively assumes risk-free debt, too.

Q19. Putting aside the irrelevance of Mr. Rigsby's discussion for the issue of whether to use market-value capital structures to analyze the level of financial risk in the estimated cost of equity, do you have any comments on the discussion in and of itself?

A19. Yes, I have two comments.

First, I would note that the comparison of bankruptcy risk between a retail proprietorship, such as a pizza parlor, and a utility is about as extreme as one could make. Retail proprietorships are extraordinarily risky in part because they have little or no access to capital markets. Many things could be true of a retail proprietorship that would be untrue not only of utilities, but of the vast majority of publicly traded companies.

Mr. Rigsby subsequently invokes airlines, but that is hardly a typical industry, either. Airlines are a business in which the short-run marginal cost of a seat is often far below average cost, leading to an unusual potential for price wars. Added to that are the ease of repossession of and high fungibility of airplanes, which permit the use of large amounts of debt in their financing (either directly or through leasing). The result is another industry that is atypically prone to bankruptcy.

Q20. What is your second comment on Mr. Rigsby's risk discussion?

A20. To the best of my knowledge, there is no disagreement among Mr. Rogers, Mr. Rigsby, and myself that utilities are less risky than most industries. But that fact is *automatically* taken into account when utility-based samples are used to estimate the cost of equity. It would be double-counting to use that fact again to argue against taking account of the actual amount of financial risk embodied in the sample's measured cost of equity.

Q21. Please explain this comment in more detail.

A21. All parties' cost of capital estimates use utility samples. The estimated costs of equity from those samples reflect both business and financial risk. All parties agree, I believe, that utilities' business risk is below that of the average company. The issue in dispute is how to consider the financial risk that debt adds to a stock's business risk.

Nearly half a century of economic research leads to the conclusion that the level of financial risk in the *measured* cost of equity depends on *market*-value capital structures. Mr. Rigsby's argument is that this research should be ignored because utilities have low business risks. He thus double-counts utilities' low business risks, once by selecting utilities as a sample group, and a second time by arguing that utilities' low risks mean the Commission should not adjust for the difference between the sample's actual level of financial risk, at its actual, market-value capital structure, and that which the sample would have had if its market-value capital structure were instead equal to Paradise Valley's ratemaking capital structure.

I disagree with Mr. Rigsby's recommendation. I think utilities' low business risk should be counted once and only once.

III. MARKET-TO-BOOK TEST

Q22. What comments do Mr. Rogers and Mr. Rigsby make concerning the market-to-book ratio discussion in your rebuttal?

A22. I can find explicit comments only in Mr. Rogers's surrbuttal, at pp. 3-4. He states that the present value concept is widely recognized for pricing stocks among other investments, that I myself rely on it when I give some weight to Dr. Vilbert's DCF results for one of his samples, and that I advocate "disregarding a widely recognized financial concept in favor of [my] personal interpretation."

Q23. Do you have any comments on these statements?

A23. Yes. I would start by noting that concerns about the merits of the present value formula in analyzing stock prices were mentioned explicitly by Dr. Vilbert in his discussion of the merits of the DCF model:[11]

> The DCF model only works for companies for which the standard present value formula works. The standard formula does *not* work for options (*e.g.*, puts and calls on common stocks), and so it will not work for companies whose stocks behave as options do. ... In recent years even the most basic DCF assumption, that the market price of a stock in the absence of growth options is given by the standard present value formula ..., has been called into question by a literature on market volatility as well as the issue of the meaning of the market to book ratio discussed in Dr. Kolbe's testimony. In any case, it is still too early to throw out the standard formula, if for no other reasons than that the evidence is still controversial and no one has offered a good replacement. But the evidence suggests that it must be viewed with more caution than financial analysts have traditionally applied. Simple models of stock prices may not be consistent with the available evidence on stock market volatility.

[11] Direct Testimony of Michael J. Vilbert, Appendix C, pp. C-4 to C-5.

Estimation of the cost of equity is hard. The economics profession has nothing close to an agreed-upon model for how to do the job. In my opinion, giving *some* weight to a DCF estimate, when the other assumptions of the DCF model (i.e., those in addition to acceptance of the present value formula for the price of a stock) seem to be met, is still warranted.

Q24. Why does this logic not apply equally well to the market-to-book test?

A24. The market-to-book test goes far beyond the mere giving of some weight to one of several methods of estimating the cost of capital. The market-to-book test for a pure-play utility with a book-value rate base purports to be an absolute test of whether shareholders expect to earn more or less than the cost of capital. My direct testimony, and my rebuttal, explored the implications of accepting that test at face value. These implications go far beyond my "personal interpretation."

For example, one implication, discussed in my direct testimony, is that the kind of dramatic stock price movements seen in 1987 or 2000 could not have happened if the market-to-book test were valid; yet they did happen. Another implication is that if the market-to-book test were valid, utilities' current cost of equity is at or below the risk-free interest rate, or even negative; I would submit that such a finding is plainly unreasonable. Additionally, my direct testimony cited statements by very well respected economists that suggest that I am far from alone in believing that simple models such as the present value formula do not adequately explain stock prices.[12]

I do not find discussions of these points in the Rogers Surrebuttal. I agree with Mr. Rogers that the present value formula is a standard tool. I believe that it is a tool for which

[12] See footnotes 22 and 24 of my direct testimony.

there is no ready substitute in many applications. But that does *not* mean that regulators can rely on the market-to-book test. Whatever the true underlying model or models that eventually will be found to explain stock prices, the evidence cited above demonstrates that they will be more complicated than the simple present value formula.

Q25. Does this complete your rejoinder testimony?

A25. Yes, it does.

EXHIBIT
A-13
admitted

BEFORE THE ARIZONA CORPORATION COMMISSION

COMMISSIONERS

JEFF HATCH-MILLER, Chairman
WILLIAM A. MUNDELL
MARC SPITZER
MIKE GLEASON
KRISTIN K. MAYES

IN THE MATTER OF THE APPLICATION OF ARIZONA-AMERICAN WATER COMPANY, AN ARIZONA CORPORATION, FOR A DETERMINATION OF THE CURRENT FAIR VALUE OF ITS UTILITY PLANT AND PROPERTY AND FOR INCREASES IN ITS RATES AND CHARGES BASED THEREON FOR UTILITY SERVICE BY ITS PARADISE VALLEY DISTRICT	DOCKET NO. W-01303A-05-0405

DIRECT TESTIMONY
OF
RONALD L. KOZOMAN
ON BEHALF OF
ARIZONA-AMERICAN WATER COMPANY
JUNE 17, 2005

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I. IDENTIFICATION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS?

A. Ronald L. Kozoman, 1605 W. Mulberry Drive, Phoenix, Arizona 85015.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am a Certified Public Accountant and specialize in public utility accounting and regulatory matters. I am currently self-employed and provide consulting services to utility companies.

Q. PLEASE SUMMARIZE YOUR PRIOR REGULATORY EXPERIENCE.

A. I was employed by the Illinois Commerce Commission ("ICC") from 1977 to 1981 in various accounting and management positions. While with the ICC, I testified as the ICC Staff's expert witness on cost-of-capital, rate-base, and operating-income issues in rate cases involving Commonwealth Edison Company, Illinois Bell Telephone, and other major Illinois utility companies.

After moving to Arizona, I was retained by the Commission in 1981 as a consultant to prepare cost-of-capital testimony for the Southwest Gas Corporation and Southern Union Gas Company rate cases. I later became Chief Rate Analyst for the Utilities Division ("Staff"). As Chief Rate Analyst, I was responsible for supervising all of the Commission's rate analysts and utility auditors. While employed by the Commission, I testified on cost-of-capital issues concerning Sun City West Utilities, Continental Telephone Company of California, and Mountain Bell Telephone (now Qwest), among others.

Since leaving the Commission's employment, I have testified before the Commission as an independent consultant on behalf of utility companies, utility consumers, and regulatory agencies. Among other things, I have testified on numerous occasions on rate-design and cost-of-service issues, and I have prepared and supported cost-of-service studies in many rate cases. I have also been an instructor in the areas of public utility accounting and general regulatory practices for the National Association of Regulatory Utility Commissioners at its Annual Regulatory Studies Program, held at Michigan State University in East Lansing, Michigan. I have taught courses in revenue-requirement accounting, and regulatory-accounting methods, applications under changing regulatory and market conditions, and cost of service and rate design.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. I am testifying on behalf of the Arizona-American Water Company ("Arizona-American" or "the Company"), in connection with its rate application for its Paradise Valley Water District.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. I will testify for the Company in support of its proposed rates and the Company's cost-of-service study.

Q. WHAT SCHEDULES ARE YOU RESPONSIBLE FOR PREPARING?

A. I prepared the Company's G and H Schedules, which are submitted in support of the Company's proposed rate design.

Q. HOW IS YOUR TESTIMONY ORGANIZED?

A. I will first discuss the Company's proposed rates and rate design, and the H Schedules. I will then discuss the cost-of-service study that I have prepared and the G Schedules, which contain the key elements of that study.

II. PROPOSED RATE DESIGN

Q. HOW IS ARIZONA-AMERICAN PROPOSING TO SPREAD THE PROPOSED REVENUE INCREASE?

A. Generally, the proposed revenue increase will be spread equally among customers. That means that the percentage increases for each customer class should be approximately the same.

This rate design proposes a three-tiered rate design (for residential customers), and a conservation surcharge on all units of water consumed in the final block of the approved tariff. Please note that the final block is actually two sub-blocks in order that the conservation surcharge can take two levels. The Company is proposing the surcharge to reduce high-block water consumption and to reduce needed rate increases in future rate cases. This surcharge would be $2.00 per 1,000 gallons of water used in the highest block up to the last five percent of the total usage in the highest block, and $5.00 per 1,000 gallons for usage in the last five percent of the highest block. Funds collected through the surcharge would be treated as a Contribution in Aid of Construction, which will reduce the rate base in future rate cases.

Imposing an inverted-tier rate design, together with the high-consumption surcharge, is not without consequences; it will put the Company at risk.

Q WHY ARE AN INVERTED-TIER RATE DESIGN AND A HIGH-CONSUMPTION SURCHARGE RISKY FOR ARIZONA-AMERICAN?

A. As the Commission has recognized, the objective of this type of-rate design is to encourage customers to reduce their water usage. If customers do reduce their water usage, the Company will experience a reduction in revenues from water sales, will not earn its authorized rate of return, and will reduce cash flow. The precise impact is difficult to predict, however, because other factors, such as weather, economic conditions, and customer response, also affect sales.

Q. WHAT IS THE COMPANY'S PROPOSED REVENUE INCREASE AS A PERCENTAGE OF THE COMPANY'S TEST YEAR REVENUE?

A. The overall increase is approximately six percent.

Q. WHAT ARE THE COMPANY'S PRESENT RATES?

A. The monthly charges at present rates are listed below.

Meter Size (Inches)	Monthly Minimum Charge	Gallons Included in Monthly Minimum
5/8 x 3 /4	$8.41	0
3/4	$8.74	0
1	$14.01	0
1 1/2	$28.02	0
2	$44.83	0
3	$84.06	0
4	$140.10	0
6	$280.20	0

The above monthly minimums apply to the Paradise Valley customers. Mummy Mountain customers currently have different monthly minimums: $9.00 for the 5/8 x 3/4 and 3/4 inch meters; $9.75 for one-inch meters; $14.00 for 1 ½-inch meters; and $25.75 for two-inch meters. The Paradise Valley County Club is on a contract rate.

The present commodity rates for residential customers are $.072, $1.68, and $2.17 per 1,000 gallons for usage for tiers 1, 2, and 3 respectively. The rates for commercial customers are $1.17 and $1.46 for tiers 1 and tier 2. Mummy Mountain customers have a single commodity rate of $1.42.

The present commodity rate for turf customers is $0.90 per 1,000 gallons. There are no tiers for this class of customer.

The charge for fire service is $5.00 per month regardless of meter size.

Q. **WILL THE MUMMY MOUNTAIN CUSTOMERS BE CHARGED THE SAME RATES AS PARADISE VALLEY CUSTOMERS IN THE FUTURE?**

A. Yes. The Company proposes to charge the same residential and commercial rates throughout the District.

Q. **WHAT ARE THE PROPOSED MONTHLY-MINIMUM AND COMMODITY RATES?**

A. The proposed monthly minimum charges are:

Meter Size (Inches)	Monthly Minimum Charge	Gallons Included in Monthly Minimum
5/8 x 3/ 4	$9.26	0
3/4	$9.62	0
1	$15.42	0
1 1/2	$30.83	0
2	$49.32	0
3	$92.47	0
4	$154.11	0
6	$308.22	0

This represents an increase of approximately ten percent over existing minimums for Paradise Valley customers.

The percentage increase for the Mummy Mountain customers varies by size of the meter through which the customer is taking service. The increase in the monthly minimum charge will range from approximately $0.20, about 3%, for a 5/8-inch meter, to $16.83 which is approximately 120%. However, these customers will see a substantial decrease in the rate they pay for water for their first tier. Additionally, the 1,000 gallons included in their monthly minimum will be removed.

The proposed commodity rates for residential customers are $0.79, $1.75, and $2.25 per 1,000 gallons for tiers 1, 2, and 3, respectively. These are increases of $0.06, $0.07, and $0.08 in tiers 1, 2, and 3, respectively.

The proposed commodity rates for commercial customers are $1.26 per 1,000 gallons for the first-tier and $1.57 for the second tier.

The proposed commodity rate for turf customers is $1.00 per 1,000 gallons.

There is no change for fire service at $5.00 per month regardless of meter size.

Q. WHAT IS THE EXPECTED IMPACT ON RESIDENTIAL CUSTOMERS ON A 5/8 x 3/4 AND A ONE-INCH METER BASED ON MONTHLY AVERAGE WATER USE?

A. Average usage by residential customers through a 5/8 x 3/4-inch meter is 22,193 gallons per month. This "average" customer would see his or her bill increase from $24.61 to $26.79. This is an increase of $2.18, or 8.86%. For residential customers on a one-inch meter, average usage is 59,845 gallons per month. Monthly bills would increase from $90.80 to $96.15, a rate increase of $5.35 per month, or approximately 5.60%. In both instances, my calculation assumes the customer is already on the Paradise Valley rates.

Q. WOULD YOU PLEASE EXPLAIN WHAT IS SHOWN ON SCHEDULE H-1?

A. The H-1 Schedule shows the revenues at present and proposed rates from each class of customer.

Q. WOULD YOU PLEASE EXPLAIN WHAT IS SHOWN ON SCHEDULE H-2?

A. Schedule H-2 shows the rate increase based on the average usage for each customer class, and meter size. The bills are computed at present and proposed rates based on average usage.

Q. WHAT IS CONTAINED ON SCHEDULE H-3?

A. Schedule H-3 contains rates at both present and proposed rates. The schedule also shows the dollar increase and percentage increase.

Q. IS THE COMPANY PROPOSING TO CHANGE THE GALLON THRESHOLDS FOR EACH TIER?

A. No. For Paradise Valley residential customers the tiers will still be 0 – 25,000 gallons, 25,001 to 80,000 gallons, and over 80,000 gallons for tiers 1 though 3 respectively. These tiers will also apply to customers on the Mummy Mountain system. Please note that the sub-tiers for the conservation surcharge are unique to each customer class and meter size.

For commercial customers there are only two tiers, 0 - 400,000 gallons and gallons over 400,000.

Q. WHAT IS SHOWN ON SCHEDULE H-4?

A. Schedule H-4 shows monthly bills at both present and proposed rates based on various usage levels. The schedule also shows the dollar increase and percentage increase at various usage levels, including the surcharge if applicable. The surcharge is applicable for usages only in the highest tier.

Q. FINALLY, WHAT IS SHOWN ON SCHEDULE H-5?

A. The H-5 Schedules contain the usage for each class of customer or meter size during the test year. These schedules are commonly referred to as the bill-count schedules, as the schedules show usage by various classes of customers during the test year. The mid-point was used to determine test year revenues and quantities. This calculation proved accurate to within less than one half of one percent of actual.

Q. IS THE COMPANY PROPOSING ANY CHANGES TO ITS OTHER CHARGES?

A. Yes. The Company is proposing to increase its meter/service line charges to match the charges shown on the June 30, 2004, memorandum by Staff Engineer Marlin Scott, Jr. Additionally, the Company proposes to collect the income taxes associated with the meter / service-line charge, as these charges are treated as taxable income for income tax purposes. Refunds of the meter / service-line charge will include a refund of the income taxes collected spread over the refund period.

Q. DO THESE PROPOSED CHANGES IN METER AND SERVICE-LINE CHARGES IMPACT REVENUE?

A. No. When a meter and service line are installed, the other side of the entry is to (1) increase meter deposits (a deduction from rate base), or (2) increase advances in aid of construction, also a deduction from rate base. Thus, the increase in this charge is revenue neutral.

Q. ARE YOU PROPOSING ANY OTHER TARIFF CHANGES?

A. No, other than the Surcharge on high-block water usage, which will be treated as a Contribution in Aid of Construction.

Q. WILL THE SURCHARGE APPLY TO ALL CUSTOMERS?

A. No. The surcharge will only apply to residential customers using more than 80,000 gallons per month and commercial customers who use more than 400,000 gallons per month.

III. <u>COST-OF-SERVICE STUDY</u>

Q. WHAT IS A COST-OF-SERVICE STUDY?

A. A cost-of-service study allocates plant and expenses among each class of customers. Utility plant and expenses are allocated to cost and asset functions. The cost functions are then allocated to customer classifications. The study attempts to trace the costs resulting from meeting the customers' service requirements. Ideally, the revenues received from each customer class should equal the cost of providing service to that customer class. The cost to provide service includes the recovery of the costs to serve customers, as well as income necessary to pay interest on debt, provide a return on the equity financing the investment, and provide funds for the payment of income taxes on the equity return.

Q. WHAT IS THE PURPOSE OF A COST-OF-SERVICE STUDY?

A. The purpose of preparing a cost-of-service study is to offer guidance in setting the rates charged for utility service. Generally, the Commission should set rates based on the cost of service. This assures that the cost of providing service is allocated equitably among customers and customer classes. Cost-based rates also send an appropriate price signal to customers because the amount paid for service approximates the cost to provide the service. In other words, subsidies between customers are minimized.

However, other, non-economic factors may be at play when rates are set. For example, the regulatory body may favor subsidizing one class of customer by shifting costs to other classes of customers. Lifeline or discounted rates, which are sometimes used to assist low-income customers in areas with high utility costs, are prime examples of the subsidization of a class of customers by other customers.

Another example is a rate design intended to encourage conservation. Conservation-based rates may deviate from cost-of-service principles if larger water users pay more than their cost of service. Inverted-tier rates shift revenue recovery into the upper rate blocks in order to send a price signal to customers, regardless of the cost to serve those customers. This may be a desirable social policy, but violates general cost-of-service principles. Therefore, inequities may result, which, in extreme cases, could cause customers to develop alternatives to service from the utility provider. As I discuss below, deviations may also make it more difficult for a provider to earn its authorized rate of return.

Q. HOW IS YOUR COST-OF-SERVICE STUDY ORGANIZED?

A. The standard filing requirements call for Schedules G-1 through-G-7. I have also included Schedules G-8 and G-9, which I will explain later in my testimony.

Schedules G-5, G-6, and G-7 contain the allocation factors and actual allocations to functions. These functions are then carried forward to the summary schedules G-1, G-2 and G-3, which allocate expenses and plant (by function) to classes of customers (by meter size).

For the required schedules, I will first discuss Schedule G-7 and end with Schedules G-2 and G-1. I will finally discuss Schedules G-8 and G-9.

Q. WHAT ARE THE FUNCTIONS?

A. They represent the plant and associated expenses needed to get the water (the commodity) from the source (well or surface water) to the customer. The functions are commodity, demand, customer, meter, and service. The service and meter functions are subsets of the customer function.

Commodity refers to the volume of water delivered. The commodity function should be used to derive the commodity rate or the rate charged per unit of measurement, i.e., 1,000 gallons of water.

Demand refers to how the water system is sized to deliver the water, which is normally determined by the total customers and minimum flow requirements. Hence, the system is built to be able to deliver water (the commodity) to customers, as well as the demand placed on the water system when water is used at maximum levels.

Customer, service, and meter functions support delivery of the water from the Company's wells, surface sources, or reservoirs through the transmission and distribution mains to the individual customer's premises.

The costs associated with the demand, customer, service, and meter functions are incurred and do not vary, whether the customer uses 1,000 or 1,000,000 gallons of water each month. In fact, these costs are incurred by the utility even if the customer uses no water. These functions are used to develop the monthly minimum charged to each class of customer, because these costs are not affected by usage. Theoretically, the demand function should also be included in the monthly minimum, because the maximum potential usage also does not vary by month. However, the practice of the Staff has been to allocate a portion of the demand function to both the commodity rate and to the monthly minimum charge.

Fire protection assets (e.g., hydrants) and expenses associated with fire protection, including depreciation, should be allocated to the customer function because fire protection generally benefits all customers on the system. This has been the Commission's policy with regard to fire protection costs.

Q. **WHAT TYPE OF COST-OF-SERVICE STUDY DID YOU PREPARE TO SUPPORT THE PROPOSED RATES?**

A. I used the Commodity/Demand Method for the cost-of-service study. This method normally separates expenses and assets into three primary functions or components: commodity, demand, and customer (with further breakdown of customer costs and plant into meter and service costs).

Commodity costs are costs that tend to vary with the production or output of water. These costs consist primarily of power costs, chemicals, water treatment, purchased water, and other variable expenses. I included a portion of the demand function in the commodity function, to adhere to the Staff's past practices.

Demand costs are capital and maintenance costs of facilities related to meeting the peak demand or peak usage requirements. The plant assets that constitute the bulk of the demand costs are related to water production, water treatment, and transmission and distribution mains.

Customer costs are those costs related to serving customers, without regard to the amount of water used. These costs include meter reading, billing, customer accounting and collection, and the capital costs and maintenance costs related to the meters, services, and customer equipment, including meters, service lines, computers, office furniture, and transportation equipment.

Q. AFTER COSTS ARE ALLOCATED TO FUNCTIONS, HOW ARE EXPENSES AND ASSETS THEN ALLOCATED TO THE INDIVIDUAL CLASSES OF CUSTOMERS?

A. Expenses and assets are also allocated to the commodity, demand, customer, service, and meter functions. These values for the functions are then allocated to various customer classes. Customer classes are based on meter sizes on the system.

Q. DOES A COST-OF-SERVICE STUDY PROVIDE THE DATA NECESSARY FOR DEVELOPING A TIERED RATE DESIGN?

A. No. As I have explained, inverted-tier rates are not based on cost-of-service principles. The cost-of-service study will provide the approximate cost of furnishing the commodity by class or meter size, but it will not indicate where rate tiers and break-over points should be set. The cost-of-service study would produce a single commodity rate per 1,000 gallons. However, a cost of study is helpful in indicating how far inverted-tier rates deviate from cost-based rates and the extent to which undesirable subsidies may be created between customer classes. This evaluation can be used to minimize inequities between customer classes in designing rates.

Q. PLEASE DESCRIBE HOW THE VARIOUS FUNCTIONS WERE DEVELOPED.

A. I show the allocations for the development of the class allocation factors on Schedule G-7, pages 1 through 3.

The commodity allocation is based on the number of gallons of water used by customers on various sizes of meters divided by the total gallons of water sold (including gallons from the revenue annualization) during the test year. Thus, if 50,000,000 gallons of water were sold through the one-inch meters, out of a total of 100,000,000 gallons of water sold by the water utility, this meter size would be allocated 50 percent of the commodity cost.

The demand-allocation factor consists of the number of meters for each size of meter on the system, multiplied by the equivalent weight of each meter. The equivalent weight is determined by the flow capacity of each size meter. A 5/8-inch meter can flow 20 gallons per minute, while a 6-inch meter can flow 1,000 gallons per minute. Thus, one 6-inch meter is equivalent to approximately 50 - 5/8 x 3/4 inch meters.. The larger meters are restated to equivalent 5/8-inch meters to derive a base monthly meter charge for a 5/8-inch meter. Then, based on flow capacity, monthly minimums are developed for larger meters using the base charge for a 5/8 inch meter.

The customer-allocation factor is the number of customers on each size meter. The allocation is based on total meters, not equivalent meters. It costs no more to read a 6-inch meter than a 5/8 inch meter, or to issue the corresponding bill.

I computed the meter-allocation factor by multiplying the number of meters by the cost of installing a meter. This cost was based on the June 30, 2004, Staff Engineering memorandum originated by Marlin Scott, Jr. The dollar-weighted value of meters was then divided by the total, computed meter cost to derive the meter allocation factor for each class of customer.

The service-line allocations were computed in the same manner as the meters. That is, I used the values listed on the Staff Engineering memorandum to derive a total value of the service lines. The allocation to each service line size was the result of dividing the dollar value of the service lines for each customer class by the total dollar value of the service lines.

Schedule G-7, page 2a, lists the allocations that were used to allocated demand and commodity expenses, and assets to functions.

The depreciation expense allocations shown on Schedule G-6, page 2, apply the allocation factors shown on Schedule G-7, page 2, to the depreciation expense for each plant asset. For the demand function for wells, water treatment equipment, and pumping equipment, I assumed an allocation factor of 90 percent. Ten percent of plant values and related depreciation expense for wells and pumping equipment was allocated to the commodity function.

Depreciation expense was computed using the Company's depreciation rates.

The operation and maintenance expense allocation to functions (commodity, demand, customer, service, and meter) are shown on Schedule G-6, page 1.

On Schedule G-5, page 2, I allocated net plant rather than gross plant by deducting accumulated depreciation from each plant asset account.

I allocated the advances and contributions to both the demand and commodity functions to be consistent with my allocation of the transmission and distribution mains. The allocations are shown on Schedule G-5, page 2.

I next computed rate bases for each function (commodity, demand, customer, service, and meter). The rate bases by function are shown on Schedule G-5, page 1. I also allocated property taxes based on the revenue requirement for each function at proposed rates, based on the expenses and returns and the rate bases shown on Schedule G-9.

Schedule G-4 shows the allocation of the commodity, demand, customer, service, and meter expenses to meter sizes using the allocation factors developed on Schedule G-7, page 3.

Schedule G-3 allocates the rate bases for commodity, demand, customer, service, and meter to customer classes. On this schedule, I allocated interest expense to the various rate bases, consistent with the synchronization of interest expense.

Schedules G-1 and G-2 derive the earned rates of return by customer classes (meter sizes) at present and proposed rates, respectively. The rates of return are computed by dividing the operating income for each meter size by the value of the rate base for that meter size.

Property taxes are allocated on Schedules G-1 and G-1 based on revenue, as revenue is the primary component used by the Arizona Department of Revenue to determine the full cash value of the utility.

Income taxes are also allocated on Schedules G-1 and G-2 based on taxable income.

Q. WHY DO YOU SHOW A SLIGHTLY DIFFERENT RATE OF RETURN AT PROPOSED RATES ON SCHEDULE G-2 THAN WHAT IS SHOWN ON SCHEDULE D-1?

A. The computed rate of return uses the proposed revenues from the bill count. However, the bill count does not produce the full revenue requirement using full pennies for the rate design without going over the revenue requirement.

Q. WHAT IS THE RANGE OF THE RATE OF RETURN FOR THE VARIOUS METER SIZES AT PRESENT RATES?

A. The rates of return vary substantially at present rates, as shown on Schedule G-1. The 2, 3 and 6-inch meter classes provide the highest rate of return at present rates, while the 3/4 and 4-inch meter class provides the lowest rate of return at present rates, due to that class' low sales volume. The meter size serving most of the customers on the system, the 5/8-inch meter also has a relatively low rate of return.

Q. WHAT IS THE RATE OF RETURN FOR THE VARIOUS METER SIZES AT PROPOSED RATES?

A. Under the Company's inverted-tier rate design, the rate of return from the meter size that serves the majority of the Company's customers, the 5/8 inch meter, is still <u>below</u> the overall return for the system. However, it is more in line with the overall rate of return than at present rates. By contrast, the 1-inch, 2-inch, 3-inch and 6-inch meter classes provide a return substantially above the system average. This highlights the difficulty in developing inverted tier rates that allocate costs equitably among customer classes.

The 3/4-inch and 4-inch customer classes still produce negative rates of return. Due to the small number of customers on these meters it would be very difficult to design rates that produce a profit.

Q. WOULD YOU PLEASE EXPLAIN SCHEDULE G-8?

A. Schedule G-8 computes a cost-based monthly minimum charge for each meter size and cost-based commodity rates. In the monthly minimums for each size meter, I have included the demand-related expenses and capital costs. This allocation is necessary to properly reflect the fact that a utility must have facilities available to meet its customers' potential demand, regardless of normal usage. The computed monthly minimum charge provides guidance on the rates that should be charged regardless of the customer's water usage. The Company's proposed monthly minimum charges are noticeably below what the monthly minimums should be under cost-of-service principles.

As can be seen from Schedule G-8, page 3, the computed commodity rate of $0.605, including profit, is substantially below the proposed commodity rate (and for that matter, below the present commodity rate) for the first tier. The disparity between the computed cost and the commodity rates increases when the proposed inverted tier commodity rates are considered.

Q. DOES THE FACT THAT THE COMPANY WILL BE CHARGING COMMODITY RATES SUBSTANTIALLY ABOVE THE COMMODITY COST CREATE ADDITIONAL RISK FOR THE COMPANY?

A. Yes, and the risk is quite substantial. If conservation actually takes place, which is the purpose of an inverted-tier rate design (and the Surcharge), the impact will occur primarily in the last tier, which has a higher rate to encourage conservation. This will cause a substantial shortfall in the revenues the Company collects. That means that it may be impossible for the Company to actually earn its rate of return.

Q. COULD YOU ILLUSTRATE YOUR POINT REGARDING THE IMPACT OF INVERTED-TIER RATES ON REVENUE?

A. Schedule G-9 illustrates what happens when conservation is achieved. The profit (which includes an equity return and income taxes related to that return) is shown based on a 3/4-inch meter customer. I have constructed the illustration showing the profit or loss that is achieved at increments of 1,000 gallons through 41,000 gallons of monthly usage. The crossover point going from a loss to a profit is substantially <u>above</u> the average usage a residential customer on a 5/8-inch residential meter. By pricing the commodity rate substantially above cost, the Company will over-earn with increased water sales, and will under-earn if water sales drop.

Q. BUT DON'T THE CALCULATIONS ON PAGES 1 THROUGH 3 OF SCHEDULE G-8 CONTAIN AN EQUITY RETURN AND INCOME TAXES ON THE EQUITY RETURN?

A. That's correct, they do contain an equity return and income taxes, as they should. The Company is entitled to earn a return on its investment, including the associated income taxes. This is part of the cost of service.

Q. HAVE YOU COMPUTED THE REVENUES AND EXPENSES BASED ON THE COMPUTATIONS YOU SHOW ON SCHEDULE G-8, PAGE 4, WHICH EXCLUDE AN EQUITY RETURN AND THE RELATED INCOME TAXES?

A. Yes, I have. Please refer to Schedule G-9, page 2 to see the impact of excluding the equity return and the related income taxes. The crossover point from loss to profit is somewhat lowered. However these computations assume that an equity investment has no cost, and there are no income taxes. This is not a reasonable assumption.

Q. WHAT IS THE MONTHLY MINIMUM FOR A CUSTOMER ON A 5/8-INCH METER THAT YOU COMPUTED IN YOUR COST-OF-SERVICE STUDY?

A. The monthly minimum, with no water in that minimum, should be $31.92 if the allocations of expenses and plant for the functions of demand, customer, meter and service line are included.

Q. HOW DOES THE COMPUTED MONTHLY MINIMUM CHARGE COMPARE TO THE COMPANY'S PROPOSED MONTHLY MINIMUM?

A. The proposed monthly minimum for a 5/8-inch meter is $9.26, or approximately 29 percent of the computed monthly minimum. Thus, you have a case where the proposed monthly minimum does not reflect the actual cost of service.

Q. WHAT IS THE COMPUTED COMMODITY CHARGE, WITHOUT REGARD TO TIERS THAT WOULD BE DERIVED FROM YOUR COST-OF-SERVICE STUDY?

A. The computed commodity rate is $0.605 per 1,000 gallons of water from the cost-of-service study.

Q. HOW DOES THE COMPUTED COMMODITY RATE COMPARE TO THE COMPANY PRESENT AND PROPOSED COMMODITY RATES?

A. The present commodity rate is $0.73 per 1,000 gallons for usage up to 25,000 gallons. This rate is approximately 120% of the cost to produce the water.

The Company's proposed commodity rates are $.0.79 for the first tier, $1.75 of usage from 25,001 to 80,000 gallons (tier 2) and $2.25 for all usage beyond 80,001 gallons per month. The Company's proposed second-tier rate is three times the cost to produce the water.

Q. BUT AREN'T THE MONTHLY MINIMUM CHARGES AND THE COMMODITY COSTS IMPACTED BY WHAT ALLOCATION FACTORS YOU USE IN THE COST-OF-SERVICE STUDY?

A. Yes. In the cost-of-service study I assigned 90 percent of costs for plant and related expenses for wells, pumping equipment, and water treatment equipment to the demand function and 10 percent of those costs to the commodity function. If I change the allocation to the demand function to only 10 percent and allocation to the commodity function to 90 percent for the wells, pumping equipment, and water treatment plant, I would derive different monthly minimum costs and commodity costs.

Q. WHAT MONTHLY MINIMUM DO YOU DERIVE IF YOU CHANGE THE ALLOCATION FACTORS FOR WELLS, PUMPING EQUIPMENT, AND WATER TREATMENT PLANT TO 10 PERCENT DEMAND AND 90 PERCENT COMMODITY?

A. With the changed allocation factors, the monthly minimum charge would be $10.59 for a 5/8-inch meter. This compares to the proposed monthly minimum charge of $9.26 for a 5/8-inch meter. So there still has to be a subsidy from the commodity rates to recover the costs that should be recovered through the monthly minimum. However, the subsidy would be less.

Q. WITH THE MODIFIED ALLOCATION FACTORS FOR THE DEMAND AND COMMODITY FUNCTIONS, WHAT COMMODITY RATE WOULD THE COST-OF-SERVICE STUDY PRODUCE?

A. The commodity rate should be approximately $1.46 per 1,000 gallons. The present commodity rates are $0.73, $1.68, and $2.17 for tiers 1, 2 and 3, for the residential customers respectively. As you can see, the present commodity rates still exceed the cost to produce the commodity, once a customer gets into tier 2 usage.

The proposed commodity rates for residential customers are $0.79, $1.75, and $2.25 for tiers 1, 2 and 3 respectively.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes, it does.

G - SCHEDULES

Arizona-American Water Company / Paradise Valley Water District
Test Year Using 12 Months Ended December 2004
Cost of Service Study, Using Commodity Demand Method
Rates of Return at Present Rates

Exhibit
Schedule G-1
Page 1
Witness: Kozoman

Meter Size->	Totals	5/8" x 3/4"	3/4"	1"	1 1/2"	2"	3"	4"	6"
Water Revenues **(1)**	5,010,572	961,663	2,647	2,462,061	119,141	1,027,930	163,586	1,681	271,864
Revenue Annualizations & Adjustments **(2)**	21,597	8,168							13,429
Other Revenues **(a)**	12,458	12,458							
Misc. Revenue **(a)**	924	924							
Total Revenues	5,045,551	983,213	2,647	2,462,061	119,141	1,027,930	163,586	1,681	285,293
Operating Expenses **(b)**	3,178,388	758,859	6,018	1,554,110	76,431	537,694	93,227	5,273	146,776
Depreciation and Amortization **(b)**	720,578	219,450	1,212	332,648	13,782	94,066	20,576	392	38,452
Property Tax **(c)**	228,120	44,453	120	111,315	5,387	46,475	7,396	76	12,899
Income Tax **(d)**	216,705	(62,293)	(2,315)	114,216	6,163	119,910	13,348	(1,940)	29,617
Total Operating Expenses	4,343,791	960,469	5,034	2,112,289	101,763	798,145	134,546	3,802	227,744
Operating Income	701,760	22,744	(2,387)	349,771	17,378	229,785	29,039	(2,121)	57,549
Interest Expense **(e)**	399,637	109,590	841	190,535	8,786	62,611	10,430	584	16,259
Net Income	302,123	(86,846)	(3,228)	159,236	8,592	167,174	18,609	(2,705)	41,291
Rate Base **(f)**	11,651,215	3,195,055	24,512	5,554,969	256,150	1,825,393	304,095	17,027	474,014
Rate of Return **(g)**	6.02%	0.71%	-9.74%	6.30%	6.78%	12.59%	9.55%	-12.45%	12.14%

(1) Revenues from Rate Schedules labeled as H - 1
(2) Certain Other Adjustments would not occur in the rate book.
(a) Miscellaneous Revenue, Adjustment, and Other Revenues allocated to 5/8 Inch Customer Class.
(b) Operating Expenses and Depreciation computations are shown on Schedule G-4, Page 1.
(c) Present Property Taxes allocation based on Revenues
(d) Income Tax from Schedule F-1, at Present Rates. Income Taxes allocation based on taxable income
(e) Interest Expense allocation based on Rate Base, Please see Schedule G-3, Page 1
(f) Rate Base computations are shown on Schedule G-3, Page 1
(g) Operating Income Divided by Rate Base

Arizona-American Water Company / Paradise Valley Water District
Test Year Using 12 Months Ended December 2004
Cost of Service Study, Using Commodity Demand Method
Rates of Return at Proposed Rates Net Plant and Expenses

Exhibit
Schedule G-2
Page 1
Witness: Kozoman

Meter Size->	Totals	5/8" x 3/4"	3/4"	1"	1 1/2"	2"	3"	4"	6"
Water Revenues **(1)**	5,313,414	1,027,058	2,869	2,596,966	127,703	1,097,109	178,740	1,849	281,121
Revenue Annualizations & Adjustments **(2)**	21,597	8,168							13,429
Other Revenues **(a)**	12,458	12,458							
	-								
Misc. Revenue **(a)**	924	924							
Total Revenues	5,348,393	1,048,608	2,869	2,596,966	127,703	1,097,109	178,740	1,849	294,550
Operating Expenses **(b)**	3,178,388	758,859	6,018	1,554,110	76,431	537,694	93,227	5,273	146,776
Depreciation and Amortization **(b)**	720,578	219,450	1,212	332,648	13,782	94,066	20,576	392	38,452
Property Tax **(c)**	213,241	41,808	114	103,541	5,092	43,742	7,126	74	11,744
Income Tax **(d)**	323,408	(31,353)	(2,055)	160,875	9,128	138,787	18,317	(1,730)	31,438
Total Operating Expenses	4,435,615	988,764	5,289	2,151,175	104,433	814,289	139,246	4,010	228,410
Operating Income	912,778	59,844	(2,420)	445,791	23,270	282,820	39,494	(2,160)	66,140
Interest Expense **(e)**	399,637	109,590	841	190,535	8,786	62,611	10,430	584	16,259
Net Income	513,141	(49,746)	(3,261)	255,256	14,484	220,209	29,063	(2,744)	49,882
Rate Base **(f)**	11,651,215	3,195,055	24,512	5,554,969	256,150	1,825,393	304,095	17,027	474,014
Rate of Return **(g)**	7.83%	1.87%	-9.87%	8.03%	9.08%	15.49%	12.99%	-12.69%	13.95%

(1) Revenues from Rate Schedules labeled as H - 1
(2) Certain Other Adjustments would not occur in the rate book.
(a) Miscellaneous Revenue, Adjustment, and Other Revenues allocated to 5/8 Inch Customer Class.
(b) Operating Expenses and Depreciation computations are shown on Schedule G-4, Page 1.
(c) Proposed Property Taxes allocation based on Revenues at Proposed Rates.
(d) Income Tax from Schedule F-1, at Proposed Rates. Income Taxes allocation based on taxable income
(e) Interest Expense allocation based on Rate Base, Please see Schedule G-3, Page 1
(f) Rate Base computations are shown on Schedule G-3, Page 1
(g) Operating Income Divided by Rate Base

Arizona-American Water Company / Paradise Valley Water District
Test Year Using 12 Months Ended December 2004
Cost of Service Study Using Commodity / Demand Method
Allocation of Assets to Customer Classes

Exhibit
Schedule G-3
Page 1
Witness: Kozoman

Line No.		Totals	5/8 x 3/4"	3/4"	1"	1 1/2"	2"	3"	4"	6"
	Plant, Minus Accumulated Depreciation, Advances and Contributions in Aid, Meter Deposits, and Deferred Income Tax Plus Working Capital (from Schedule G-5, Page 1)									
1	Commodity	3,301,922	693,310	767	1,587,804	73,801	491,538	147,857	-	306,846
2	Demand	6,129,326	1,497,675	16,175	3,033,935	154,853	1,119,027	139,010	15,332	153,319
3	Customer	649,061	334,595	2,409	271,124	6,919	31,250	1,941	137	685
4	Service	1,252,305	589,523	4,245	539,731	14,882	90,098	7,506	771	5,549
5	Meter	318,602	79,953	917	122,374	5,695	93,480	7,782	787	7,615
6	Totals	11,651,215	3,195,055	24,512	5,554,969	256,150	1,825,393	304,095	17,027	474,014
7										
8										
9	Commodity	-	-	-	-	-	-	-	-	-
10	Demand	-	-	-	-	-	-	-	-	-
11	Customer		-	-	-	-	-	-	-	-
12	Service		-	-	-	-	-	-	-	-
13	Meter		-	-	-	-	-	-	-	-
14	Totals	-	-	-	-	-	-	-	-	-
15										
16										
17				-	-	-	-	-	-	-
18				-	-	-	-	-	-	-
19				-	-	-	-	-	-	-
20				-	-	-	-	-	-	-
21										
22	Net Rate Base	11,651,215	3,195,055	24,512	5,554,969	256,150	1,825,393	304,095	17,027	474,014

	Interest	Allocated Interest Expense to Customer Classes							
Interest Expense Allocation:	399,637	109,590	841	190,536	8,786	62,611	10,430	584	16,259
Ratio of rate bases to total rate base		27.4225%	0.2104%	47.6772%	2.1985%	15.6670%	2.6100%	0.1461%	4.0684%

Arizona-American Water Company / Paradise Valley Water District
Test Year Using 12 Months Ended December 2004
Cost of Service Study, Using Commodity Demand Method
Allocation of Expenses to Customer Classes

Exhibit
Schedule G-4
Page 1
Witness: Kozoman

	Totals	5/8 x 3/4"	3/4"	1"	1 1/2"	2"	3"	4"	6"	Total
Operation and Maintenance Expense (from Schedule G-6, Page 1)										
Commodity	1,012,693	212,637	235	486,976	22,635	150,754	45,347	-	94,109	1,012,693
Demand	2,102,841	513,820	5,549	1,040,878	53,127	383,914	47,691	5,260	52,601	2,102,841
Customer	62,854	32,401	233	26,255	670	3,026	188	13	66	62,854
Service	-	-	-	-	-	-	-	-	-	-
Meter	-	-	-	-	-	-	-	-	-	-
Totals	3,178,388	758,859	6,018	1,554,110	76,431	537,694	93,227	5,273	146,776	3,178,388
Depreciation Expense on Plant (from Schedule G-6, Page 2)										
Commodity	375,061	78,752	87	180,357	8,383	55,833	16,795	-	34,854	375,061
Demand	96,376	23,549	254	47,705	2,435	17,595	2,186	241	2,411	96,376
Customer	121,040	62,397	449	50,561	1,290	5,828	362	26	128	121,040
Service	102,842	48,413	349	44,324	1,222	7,399	616	63	456	102,842
Meter	25,258	6,338	73	9,701	451	7,411	617	62	604	25,258
Totals	720,578	219,450	1,212	332,648	13,782	94,066	20,576	392	38,452	720,578
Total Expenses (excluding Income Tax and Property Taxes)	3,898,966	978,308	7,230	1,886,758	90,213	631,761	113,802	5,666	185,228	3,898,966

Arizona-American Water Company / Paradise Valley Water District
Test Year Using 12 Months Ended December 2004
Cost of Service Study, Using Commodity Demand Method
Allocation of Rate Base by Function

Exhibit
Schedule G-5
Page 1
Witness: Kozoman

Line No.			Adjusted	Demand	Commodity	Customer	Meter	Service	Totals
1	**Rate Base**		11,651,215	6,129,326	3,301,922	649,061	318,602	1,252,305	11,651,215
2	Plant minus (Accumulated Depreciation								
3	Contributions in Aid of Construction								
4	Advances in Aid of Construction,								
5	Meter Deposits and Deferred Income Tax)								
6			11,651,215	6,129,326	3,301,922	649,061	318,602	1,252,305	11,651,215
7									
8									
9									
10									
11									
12	Revenue Requirement from G-8		5,347,725	2,968,019	1,810,346	262,309	238,473	68,577	
13	Percent of Total		100.00%	55.50%	33.85%	4.91%	4.46%	1.28%	
14	Property Taxes Allocation at Computed Rates								
15									
16		213,241	213,241	118,350	72,188	10,460	9,509	2,735	

Arizona-American Water Company / Paradise Valley Water District
Test Year Using 12 Months Ended December 2004
Allocation of Plant

Exhibit
Schedule G-5
Page 2
Witness: Kozoman

Line No.	NARUC Account Number	Plant Description	Original Cost	Accumulated Depreciation	Total Net Plant Values	Demand	Commodity	Customer	Meter	Service
1	100.4	Property Held For Future Use	$ 138,682	$ -	$ 138,682	$ 124,814	$ 13,868			
2	301	Organization	15,350	(477,338)	492,688	443,419	49,269			
3	303.5	Dist. Res. & Standpipe Land	8,324	-	8,324	7,492	832			
4	304.1	SS Structures & Improvements	7,953	13,190	(5,236)	(4,713)	(524)			
5	304.2	Pumping Structures & Improve	69,131	(22,038)	91,169	82,052	9,117			
6	304.3	WT Structures & Improvements	3,038,848	454,776	2,584,072	2,325,665	258,407			
7	304.4	Grit Removal Equipment	23,864	806	23,058	20,752	2,306			
8	304.5	Struct & Imp AG	15,173	3,295	11,878	10,690	1,188			
9	304.7	Stores Shop & Gar. Structures	93,285	63,784	29,500	26,550	2,950			
10	304.8	Struct & Imp Misc	149,284	14,179	135,105	121,595	13,511			
11	307	Wells & Springs	1,252,563	526,585	725,978	653,380	72,598			
12	311.2	Elec Pumping Equipment	3,337,081	993,356	2,343,725	2,109,352	234,372			
13	311.3	Diesel Pumping Equipment	59,421	18,735	40,686	36,617	4,069			
14	320	Water Treatment Equipment	5,825,149	2,867,630	2,957,519	295,752	2,661,767			
15	330	Dist Reservoirs & Standpipes	912,619	140,643	771,976	694,778	77,198			
16	331.1	T & D Mains - 4" & Less	706,252	488,966	217,286	195,557	21,729			
17	331.2	T & D Mains - 6" - 8"	3,974,977	2,012,781	1,962,196	1,765,976	196,220			
18	331.3	T & D Mains - 10" or More	5,485,424	1,392,736	4,092,688	3,683,420	409,269			
19	333	Services	2,178,857	924,802	1,254,055					1,254,055
20	334	Meters	328,579	90,243	238,336				238,336	
21	334	Meter Installations	103,799	7,074	96,725				96,725	
22	335	Hydrants	746,904	362,444	384,460			384,460		
23	339	Other P/e CPS	-	-	-					
24	340.1	Office Furniture	43,931	19,546	24,384			24,384		
25	340.2	Computers & Peripherals	98,019	114,016	(15,997)			(15,997)		
26	340.3	Computer Software	134,174	171,171	(36,997)			(36,997)		
27	340.5	Other Office Equipment	25,224	7,015	18,209			18,209		
28	341.1	Trans. Equip. - Light Trucks	2,882	20,122	(17,240)	(4,310)		(12,930)		
29	341.3	Trans. Equip. - Automobiles	19,307	16,087	3,220	805		2,415		
30	341.4	Trans. Equip. - Other	13,606	1,857	11,749	2,937		8,812		
31	343	Tools Shop & Garage Equipment	83,291	24,816	58,475			58,475		
32	345	Power Operated Equipment	147,066	46,243	100,823	25,206		75,617		
33	346	Communication Equipment	284,556	140,452	144,104	36,026		108,078		
34	346.3	Comm Equip Other	81,331	35,285	46,046	11,512		34,535		
35		Subtotal of Plant and Accum. Depr.	29,404,906	10,473,260	18,931,646	12,665,325	4,028,144	649,061	335,061	1,254,055
36		Allocated Plant	73,781	30,033	43,748	39,373	4,375			
37		Regulatory Asset	950		950	855	95			
38		Total Plant and Subtotal Accumulated Depreciation	29,479,637	10,503,293	18,976,344	12,705,553	4,032,614	649,061	335,061	1,254,055
39		Minus UPIS Removal Cost		($65,866)	$65,866	59,280	6,587			
40		Plus UPIS Scrap Meters		14,709	($14,709)				(14,709)	
41		Minus UPIS Original Cost Not Classifed		(538,267)	$538,267	484,440	53,827			
42		Total Accumulated Depr. & Subtotal		9,913,869	19,565,768	13,249,273	4,093,027	649,061	320,352	1,254,055
43		Minus Customers' Advances for Construction			(635,912)	(572,321)	(63,591)			
44		Minus Contributions in Aid of Construction			(6,486,559)	(5,837,903)	(648,656)			
45		Minus Deferred Taxes			(1,139,528)	(1,025,575)	(113,953)			
46		Minus Customer Deposits			(3,500)				(1,750)	(1,750)
47		Plus Deferred Debits			182,814	164,532	18,281			
48		Plus Working Capital			168,133	151,320	16,813			
49		Rate Bases			11,651,215	6,129,326	3,301,922	649,061	318,602	1,252,305

Arizona-American Water Company / Paradise Valley Water District
Test Year Using 12 Months Ended December 2004
Cost of Service Study, Using Commodity Demand Method
Allocation of Expenses to Functions

Exhibit
Schedule G-6
Page 1
Witness: Kozoman

Line No.		Adjusted	Demand	Commodity	Customer	Meter	Service	Totals
1	OPERATING EXPENSES							
2	Source of Supply Expenses	67,292	60,563	6,729				67,292
3	Pumping Expenses							-
4	Purchased Power	812,312		812,312				812,312
5	Pumping Expense	4,416		4,416				4,416
6	Water Treatment Expenses							-
7	Chemicals	16,499	1,650	14,849				16,499
8	Water Treatment Expense	(53,034)	(5,303)	(47,731)				(53,034)
9	Transmission & Distribution Expense	74,437	66,993	7,444				74,437
10	Customer Accounting Expense	62,854			62,854			62,854
11	Administrative & General	1,318,933	1,187,040	131,893				1,318,933
12	Operations Labor	523,032	470,729	52,303				523,032
13	MAINTENANCE EXPENSES							-
14	Source of Supply	14,552	13,097	1,455				14,552
15	Pumping	0						-
16	Water Treatment	(5,860)	(586)	(5,274)				(5,860)
17	Transmission & Distribution	140,049	126,044	14,005				140,049
18	Administrative & General	133	120	13				133
19	Maintenance Labor	148,056	133,250	14,806				148,056
20	Payroll Taxes	54,716	49,244	5,472				54,716
21	Property Taxes Allocated on Sch. G5, P 1							
22	Depreciation Allocated on Sch. G-6, P2							
23	State Income Tax Allocated on Sch.G-1 & G-2							
24	Federal Income Tax Allocated on Sch.G-1 & G-2							
25	Totals	3,178,388	2,102,841	1,012,693	62,854	0	0	3,178,388
26								
27								

Arizona-American Water Company / Paradise Valley Water District
Test Year Using 12 Months Ended December 2004
Allocation of Depreciation Expense to Functions

Exhibit
Schedule G-6
Page 2
Witness: Kozoman

Okay

Line No.	NARUC Account Number	Plant Description	Original Cost	Depreciation Rates	Depreciation Expense	Demand	Commodity	Customer	Meter	Service	Totals
1	100.4	Property Held For Future Use	$138,682	0.00%	-	$ -	$ -				$ -
2	301	Organization	15,350	0.00%	-	-	-				-
3	303.5	Dist. Res. & Standpipe Land	8,324	0.00%	-	-	-				-
4	304.1	SS Structures & Improvements	7,953	14.59%	1,160	1,044	116				1,160
5	304.2	Pumping Structures & Improve	69,131	3.99%	2,758	2,482	276				2,758
6	304.3	WT Structures & Improvements	3,038,848	2.00%	60,777	54,699	6,078				60,777
7	304.4	Grit Removal Equipment	23,864	1.50%	358	322	36				358
8	304.5	Struct & Imp AG	15,173	0.00%	-	-	-				-
9	304.7	Stores Shop & Gar. Structures	93,285	0.00%	-	-	-				-
10	304.8	Struct & Imp Misc	149,284	0.00%	-	-	-				-
11	307	Wells & Springs	1,252,563	2.48%	31,064	27,957	3,106				31,064
12	311.2	Elec Pumping Equipment	3,337,081	4.39%	146,498	131,848	14,650				146,498
13	311.3	Diesel Pumping Equipment	59,421	4.39%	2,609	2,348	261				2,609
14	320	Water Treatment Equipment	5,825,149	7.06%	411,255	41,126	370,130				411,255
15	330	Dist Reservoirs & Standpipes	912,619	3.15%	28,747	25,873	2,875				28,747
16	331.1	T & D Mains - 4" & Less	706,252	4.17%	29,451	26,506	2,945				29,451
17	331.2	T & D Mains - 6" - 8"	3,974,977	2.52%	100,169	90,152	10,017				100,169
18	331.3	T & D Mains - 10" or More	5,485,424	2.34%	128,359	115,523	12,836				128,359
19	333	Services	2,178,857	4.72%	102,842					102,842	102,842
20	334	Meters	328,579	7.21%	23,691				23,691		23,691
21	334	Meter Installations	103,799	1.51%	1,567				1,567		1,567
22	335	Hydrants	746,904	2.10%	15,685			15,685			15,685
23	339	Other P/e CPS	-	0.00%	-						-
24	340.1	Office Furniture	43,931	4.04%	1,775			1,775			1,775
25	340.2	Computers & Peripherals	98,019	15.89%	15,575			15,575			15,575
26	340.3	Computer Software	134,174	37.71%	50,597			50,597			50,597
27	340.5	Other Office Equipment	25,224	7.13%	1,798			1,798			1,798
28	341.1	Trans. Equip. - Light Trucks	2,882	28.05%	809	202		606			809
29	341.3	Trans. Equip. - Automobiles	19,307	7.80%	1,506	376		1,129			1,506
30	341.4	Trans. Equip. - Other	13,606	0.93%	127	32		95			127
31	343	Tools Shop & Garage Equipment	83,291	3.61%	3,007			3,007			3,007
32	345	Power Operated Equipment	147,066	4.64%	6,824	1,706		5,118			6,824
33	346	Communication Equipment	284,556	9.76%	27,773	6,943		20,829			27,773
34	346.3	Comm Equip Other	81,331	7.91%	6,433	1,608		4,825			6,433
35	Allocated Plant / Corporate		73,781	4.29%	3,165	2,848	316				3,165
36	Plant and Subtotal of Depreciation		29,478,687		1,206,379	533,597	423,641	121,040	25,258	102,842	1,206,379
37											
38	Less Amortization of Contributions in Aid of Construction				(525,004)	(472,504)	(52,500)				(525,004)
39	Plus: Amortization of Mt. Mummt Mt. Aquistion Adj.				6,570	5,913	657				6,570
40	Plus: Amortization of CPS				32,634	29,371	3,263				32,634
41	Total Depreciation Expense				720,578	96,376	375,061	121,040	25,258	102,842	720,578

Arizona-American Water Company / Paradise Valley Water District
Test Year Using 12 Months Ended December 2004
Summary of Commodity - Demand Method Functions Factors

Exhibit
Schedule G-7
Page 1
Witness: Kozoman

Description	5/8" x 3/4"	3/4"	1"	1 1/2"	2"	3"	4"	6"	Totals
Commodity	21.00%	0.02%	48.09%	2.24%	14.89%	4.48%	0.00%	9.29%	100.00%
Demand	24.43%	0.26%	49.50%	2.53%	18.26%	2.27%	0.25%	2.50%	100.00%
Customer	51.55%	0.37%	41.77%	1.07%	4.81%	0.30%	0.02%	0.11%	100.00%
Services	47.08%	0.34%	43.10%	1.19%	7.19%	0.60%	0.06%	0.44%	100.00%
Meters	25.09%	0.29%	38.41%	1.79%	29.34%	2.44%	0.25%	2.39%	100.00%

Arizona-American Water Company / Paradise Valley Water District
Test Year Using 12 Months Ended December 2004
COMMODITY - DEMAND METHOD FUNCTION FACTORS
Plant and Depreciation Expense Allocations Functions

Exhibit
Schedule G-7
Page 2
Witness: Kozoman

Line No.	Description	Total	Demand	Commodity	Customer	Meter	Service
1							
2							
3	Wells	1.00	90.00%	10.00%			
4	Pumps & Equipment	1.00	90.00%	10.00%			
5	Distribution Mains	1.00	90.00%	10.00%			
6	Customer	1.00			100.00%		
7	Services	1.00			100.00%		
8	Meters	1.00			100.00%		
9	Fire Hydrants	1.00			100.00%		
10	Transportation Equip.	1.00	25.00%		75.00%		
11	Office Furniture	1.00			100.00%		
12	Office Equipment	1.00			100.00%		
13	Communication Equip.	1.00	25.00%		75.00%		
14	Water Treatment Equipment	1.00	10.00%	90.00%			

Arizona-American Water Company / Paradise Valley Water District
Test Year Using 12 Months Ended December 2004
Cost of Service Study, Using Commodity Demand Method
Development of Class Allocation Factors

Exhibit
Schedule G-7
Page 3
Witness: Kozoman

COMMODITY ALLOCATION FACTOR

Meter Size	Total Gallons (in 1,000's) In Test Year	Percent of Total
5/8" x 3/4"	628,145	21.00%
3/4"	695	0.02%
1"	1,438,565	48.09%
1-1/2"	66,864	2.24%
2"	445,338	14.89%
3"	133,960	4.48%
4"	-	0.00%
6"	278,005	9.29%
Totals	2,991,571	100.00%

DEMAND ALLOCATION FACTOR

	Meter Size	Number of Meters and/or Services	Equivalent Weight	Equivalent Number of Meters and/or Services	Percent of Total
(b)	5/8" x 3/4"	2,442	1	2,442	24.43%
	3/4"	18	1.5	26	0.26%
	1"	1,979	2.5	4,947	49.50%
	1-1/2"	51	5.0	253	2.53%
	2"	228	8.0	1,825	18.26%
	3"	14	16.0	227	2.27%
	4"	1	25.0	25	0.25%
	6"	5	50.0	250	2.50%
	Totals	4,737		9,994	100.00%

CUSTOMER ALLOCATION FACTOR

Meter Size	Number of Meters	Percent of Total
5/8" x 3/4"	2,442	51.55%
3/4"	18	0.37%
1"	1,979	41.77%
1-1/2"	51	1.07%
2"	228	4.81%
3"	14	0.30%
4"	1	0.02%
6"	5	0.11%
Totals	4,737	100.00%

SERVICES ALLOCATION FACTOR (a)

	Meter Size	Number of Services	Installation Cost	Weighted Number Services	Percent of Total
(b)	5/8" x 3/4"	2,442	$ 385.00	940,202	47.08%
	3/4"	18	385.00	6,770	0.34%
	1"	1,979	435.00	860,793	43.10%
	1-1/2"	51	470.00	23,735	1.19%
	2"	228	630.00	143,693	7.19%
	3"	14	845.00	11,971	0.60%
	4"	1	1,230.00	1,230	0.06%
	6"	5	1,770.00	8,850	0.44%
	Totals	4,737		1,997,243	100.00%

METER ALLOCATION FACTOR (a) (b)

Meter Size	Number of Meters	Meter Cost	Weighted Dollars of Meters	Percent of Total
5/8" x 3/4"	2,442	$ 135.00	329,681	25.09%
3/4"	18	215.00	3,780	0.29%
1"	1,979	255.00	504,603	38.41%
1-1/2"	51	465.00	23,483	1.79%
2"	228	1,690.00	385,461	29.34%
3"	14	2,265.00	32,088	2.44%
4"	1	3,245.00	3,245	0.25%
6"	5	6,280.00	31,400	2.39%
Totals	4,737		1,313,740	100.00%

(a) Meter and Service Line cost from Arizona Corporation Commission Memo of June 30, 2004 from Marlin Scott, Jr.. Meter costs based on compound meters. Cost of service line and meter is based on costs allowed for a compound meter installation.
(b) Includes Sales for Resale.

Arizona-American Water Company / Paradise Valley Water District
Test Year Using 12 Months Ended December 2004
Cost of Service Study Using Commodity / Demand Method
Computation of Monthly Minimums for Customer, Service, Meter
Using Function Costs and Expenses

Exhibit
Schedule G-8
Page 1
Witness: Kozoman

Line No.					Customer	Service	Meter
1	Rate Bases from Schedule G-5, Page 1				649,061	1,252,305	318,602
2	Multiply by weighted Rate of Return for Debt (From Schedule D-1)				3.43%	3.43%	3.43%
3	Required Operating Income - for Debt				22,263	42,954	10,928
4	Rate Bases				649,061	1,252,305	318,602
5	Weighted Rate of Return for Equity (From Schedule D-1)				4.41%	4.41%	4.41%
6	Required Operating Income for Equity				28,624	55,227	14,050
7	Multiply by Revenue Conversion Factor (From Schedule C-3)				1.62860	1.62860	1.62860
8	Equity Return plus Income tax component (Line 6 x Line 7)				46,616	89,942	22,882
9							
10	Revenue Requirement for Debt Component, from Line 3				22,263	42,954	10,928
11	Revenue Requirement for Equity and Income						
12	Tax Component, from Line 8				46,616	89,942	22,882
13	Total Return Requirement with Income Tax				68,879	132,896	33,810
14	Misc. Revenues				(924)		
15	Property Tax Expense, from Schedule G-5, Page 1				10,460	2,735	9,509
16	Customer, Services and Meter Expenses (From Sch. G-6. Page 1)				62,854	-	-
17	Dep. & Amort. Exp. / Customer, Services, and Meter Plant (From Sch. G-6, Page 2)				121,040	102,842	25,258
18	Total Revenue Requirement / Customer, Meter & Service (Line 13+15+16+17)				262,309	238,473	68,577
19							
20	**Customer Charge**						
21	Number of Bills =	4,737	times	12	56,847		
22							
23	**Charge per Bill**				$ 4.61		
24	(Customer Revenue Requirement divided by Annualized Number of Bills)						
25							
26	**Service Line and Meter Charge**						
27	Equivalent 5/8 Meters	9,994	Times	12		119,933	119,933
28							
29	**Charge per Equivalent Meter**					$ 1.99	$ 0.57
30							
31	**CUSTOMER CHARGE:**						
32	Monthly Minimum for 5/8 Inch Meter (with no water included in Minimum or Demand Charge)						
33	Charge per Bill					$ 4.61	
34	Charge per Equivalent Service Line					1.99	
35	Charge per Equivalent Meter					0.57	
36	(Service and Meter Revenue Requirement divided by Annual Equivalent Meters)						
37	Monthly Minimum for 5/8 Inch Meter, **WITHOUT** Demand Charge Included					$ 7.17	

Arizona-American Water Company / Paradise Valley Water District
Test Year Using 12 Months Ended December 2004
Cost of Service Study Using Commodity / Demand Method
Computation of Monthly Minimums for Demand Charge

Exhibit
Schedule G-8
Page 2
Witness: Kozoman

Line No.	DEMAND CHARGE:	
1		
2	Rate Base (From Schedule G-5, Page 1)	6,129,326
3	Multiply by weighted Rate of Return for Debt (From Schedule D-1)	3.43%
4	Required Operating Income - for Debt (Line 2 x Line 3)	210,236
5	Rate Base	6,129,326
6	Weighted Rate of Return for Equity (From Schedule D-1)	4.41%
7	Required Operating Income for Equity	270,303
8	Multiply by Revenue Conversion Factor (From Schedule C-3)	1.62860
9	Equity Return plus Income tax component (Line 7 x Line 8)	440,216
10		
11	Revenue Requirement for Debt Component, from Line 4	210,236
12	Revenue Requirement for Equity and Income	
13	Tax Component, from Line 9	440,216
14		
15	Property Tax Expense, from Schedule G-5, Page 1	118,350
16	Demand Expenses, from Schedule G-6, Page 1	2,102,841
17	Depreciation, from Schedule G-6, Page 2	96,376
18	Totals	2,968,019
19	Total Revenue Requirement / Demand Component	
20	Equivalent Number of 5/8Inch Meters billings	119,933
21	Demand Charge for 5/8 Inch Meter	$ 24.75

Line No.		Demand Charge	5/8 Inch Meter Capacity Ratio	Demand Charge	Customer Charge	Service Charge	Meter Charge	Monthly Minimun
22								
23								
24								
25	Monthly Minimum Charge							
26	5/8 x 3/4 Inch Meter	$ 24.75	1	$ 24.75	$ 4.61	$ 1.99	$ 0.57	$ 31.92
27	3/4 Inch Meter	24.75	1.5	37.12	4.61	2.98	0.86	45.58
28	1 Inch Meter	24.75	2.5	61.87	4.61	4.97	1.43	72.88
29	1 1/2 Inch Meter	24.75	5.0	123.74	4.61	9.94	2.86	141.15
30	2 Inch Meter	24.75	8.0	197.98	4.61	15.91	4.57	223.08
31	3 Inch Meter	24.75	16.0	395.96	4.61	31.81	9.15	441.54
32	4 Inch Meter	24.75	25.0	618.69	4.61	49.71	14.30	687.30
33	6 Inch Meter	24.75	50.0	1,237.37	4.61	99.42	28.59	1,369.99
34								

Arizona-American Water Company / Paradise Valley Water District
Test Year Using 12 Months Ended December 2004
Cost of Service Study Using Commodity / Demand Method
Computation Demand Charge and Commodity

Exhibit
Schedule G-8
Page 3
Witness: Kozoman

Line No.		Commodity	Customer	Service	Meter	Demand
1	Rate Bases from Schedule G-5, Page 1	3,301,922	649,061	1,252,305	318,602	6,129,326
2	Multiply by weighted Rate of Return for Debt (From Schedule D-1)	3.430%	3.430%	3.430%	3.430%	3.430%
3	Required Operating Income - for Debt	113,256	22,263	42,954	10,928	210,236
4	Rate Bases from Schedule G-5, Page 1	3,301,922	649,061	1,252,305	318,602	6,129,326
5	Weighted Rate of Return for Equity (From Schedule D-1)	4.41%	4.41%	4.41%	4.41%	4.41%
6	Required Operating Income for Equity	145,615	28,624	55,227	14,050	270,303
7	Multiply by Revenue Conversion Factor (From Schedule C-3)	1.62860	1.62860	1.62860	1.62860	1.62860
8	Equity Return plus Income tax component (Line 6 x Line 7)	237,148	46,616	89,942	22,882	440,216
9						
10	Revenue Requirement for Debt Component, from Line 3	113,256	22,263	42,954	10,928	210,236
11	Revenue Requirement for Equity and Income					
12	Tax Component, from Line 8	237,148	46,616	89,942	22,882	440,216
13	Total Return Requirement with Income Tax (Line 10 + Line 12)	350,404	68,879	132,896	33,810	650,452
14	Less: Miscellaneous Revenues		(924)			
15	Property Taxes (Allocation from Schedule G-5, Page 1)	72,188	10,460	2,735	9,509	118,350
16	Expenses (From Sch. G-6. Page 1)	1,012,693	62,854	-	-	2,102,841
17	Depreciation and Amortization (From Schedule G-6, Page 2)	375,061	121,040	102,842	25,258	96,376
18	Total Revenue Requirement by function	1,810,346	262,309	238,473	68,577	2,968,019
19	Gallons Sold	2,991,571				
20	Computed Commodity Rate	**$ 0.6051**				
21	Number of Bills		56,847			
22	Equivalent Meters and Service Lines			119,933	119,933	119,933
23	Customer Charge (line 18 divided by line 21)		$ 4.61			
24	Meter, Service Line & Demand Charge (Line 18 divided by Line 22)			$ 1.99	$ 0.57	$ 24.75
25	Total Monthly Minimum Charge for a 5/8 Inch Meter (Sum of Customer					
26	Service Line, Meter and Demand Charge on Lines 23 & Line 24)					$ 31.92

Arizona-American Water Company / Paradise Valley Water District
Test Year Using 12 Months Ended December 2004
Cost of Service Study Using Commodity / Demand Method
Computation of Break Over Point when of Computed Monthly
Minimums & Commodity Rate (Single Tier) From Cost of Service Study
Equals Proposed Revenues for 5/8 Inch Meter Residential Meter

Exhibit
Schedule G-9
Page 1
Witness: Kozoman

Water Usage	Computed Demand Charges	Computed Customer Charges	Computed Service Line Charges	Computed Meter Charges	Computed Commodity Charges	Total Computed Charges & Costs	Revenues From Proposed Rates: From Minimums	Revenues From Proposed Rates: From Commodity	Revenues From Proposed Rates: Total Revenue	Profit or (Loss)
-	$ 24.75	$ 4.61	$ 1.99	$ 0.57	-	$ 31.92	$ 9.26	$ -	$ 9.26	$ (22.66)
1,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	0.61	32.53	9.26	0.79	$ 10.05	(22.48)
2,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	1.21	33.13	9.26	1.58	$ 10.84	(22.29)
3,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	1.82	33.74	9.26	2.37	$ 11.63	(22.11)
4,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	2.42	34.34	9.26	3.16	$ 12.42	(21.92)
5,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	3.03	34.95	9.26	3.95	$ 13.21	(21.74)
6,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	3.63	35.55	9.26	4.74	$ 14.00	(21.55)
7,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	4.24	36.16	9.26	5.53	$ 14.79	(21.37)
8,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	4.84	36.76	9.26	6.32	$ 15.58	(21.18)
9,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	5.45	37.37	9.26	7.11	$ 16.37	(21.00)
10,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	6.05	37.97	9.26	7.90	$ 17.16	(20.81)
11,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	6.66	38.58	9.26	8.69	$ 17.95	(20.63)
12,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	7.26	39.18	9.26	9.48	$ 18.74	(20.44)
13,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	7.87	39.79	9.26	10.27	$ 19.53	(20.26)
14,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	8.47	40.39	9.26	11.06	$ 20.32	(20.07)
15,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	9.08	41.00	9.26	11.85	$ 21.11	(19.89)
16,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	9.68	41.60	9.26	12.64	$ 21.90	(19.70)
17,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	10.29	42.21	9.26	13.43	$ 22.69	(19.52)
18,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	10.89	42.81	9.26	14.22	$ 23.48	(19.33)
19,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	11.50	43.42	9.26	15.01	$ 24.27	(19.15)
20,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	12.10	44.02	9.26	15.80	$ 25.06	(18.96)
21,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	12.71	44.63	9.26	16.59	$ 25.85	(18.78)
22,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	13.31	45.24	9.26	17.38	$ 26.64	(18.60)
23,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	13.92	45.84	9.26	18.17	$ 27.43	(18.41)
24,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	14.52	46.45	9.26	18.96	$ 28.22	(18.23)
25,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	15.13	47.05	9.26	19.75	$ 29.01	(18.04)
26,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	15.73	47.66	9.26	21.50	$ 30.76	(16.90)
27,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	16.34	48.26	9.26	23.25	$ 32.51	(15.75)
28,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	16.94	48.87	9.26	25.00	$ 34.26	(14.61)
29,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	17.55	49.47	9.26	26.75	$ 36.01	(13.46)
30,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	18.15	50.08	9.26	28.50	$ 37.76	(12.32)
31,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	18.76	50.68	9.26	30.25	$ 39.51	(11.17)
32,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	19.36	51.29	9.26	32.00	$ 41.26	(10.03)
33,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	19.97	51.89	9.26	33.75	$ 43.01	(8.88)
34,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	20.58	52.50	9.26	35.50	$ 44.76	(7.74)
35,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	21.18	53.10	9.26	37.25	$ 46.51	(6.59)
36,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	21.79	53.71	9.26	39.00	$ 48.26	(5.45)
37,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	22.39	54.31	9.26	40.75	$ 50.01	(4.30)
38,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	23.00	54.92	9.26	42.50	$ 51.76	(3.16)
39,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	23.60	55.52	9.26	44.25	$ 53.51	(2.01)
40,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	24.21	56.13	9.26	46.00	$ 55.26	(0.87)
41,000	$ 24.75	$ 4.61	$ 1.99	$ 0.57	24.81	56.73	9.26	47.75	$ 57.01	$ 0.28

Computation of Break Over Point when of Computed Monthly Minumums & Commodity Rate (Single Tier) from Cost of Service Reached when 5/8 Inch Residential Customer is midway through Second Tier Rate.

H - SCHEDULES

Arizona-American Water Company /Paradise Valley Water District
Test Year 12 Months Ended December 2004
Revenue Summary

Exhibit
Schedule H-1
Page 1
Witness: Kozoman

Line No.	Meter Size	Class		Present Revenues	Proposed Revenues	Dollar Change	Percent Change	Percent of Present Water Revenues	Percent of Proposed Water Revenues
1	5/8 Inch	Residential	P1M1A	$ 935,153	$ 998,719	$ 63,566	6.80%	18.53%	18.67%
2	5/8 Inch	Residential	P1M1B/Mummy Mt.	2,189	1,964	(225)	-10.28%	0.04%	0.04%
3	3/4 Inch	Residential	P1M1A	2,592	2,814	222	8.55%	0.05%	0.05%
4	3/4 Inch	Residential	P1M1B/Mummy Mt.						
5	1 Inch	Residential	P1M1A	2,336,786	2,463,042	126,255	5.40%	46.31%	46.05%
6	1 Inch	Residential	P1M1B/Mummy Mt.	69,426	73,400	3,974	5.72%	1.38%	1.37%
7	1.5 Inch	Residential	P1M1A	43,095	44,991	1,895	4.40%	0.85%	0.84%
8	1.5 Inch	Residential	P1M1B/Mummy Mt.	37,868	41,429	3,561	9.41%	0.75%	0.77%
9	2 Inch	Residential	P1M1A	410,108	430,541	20,433	4.98%	8.13%	8.05%
10	2 Inch	Residential	P1M1B/Mummy Mt.						
11		Subtotal		$ 3,837,218	$ 4,056,899	$ 219,682	5.73%	76.05%	75.85%
12									
13	5/8 Inch	Commercial	P2M1A	$ 6,882	$ 7,502	$ 620	9.01%	0.14%	0.14%
14	3/4 Inch	Commercial	P2M1A						
15	1 Inch	Commercial	P2M1A	47,649	51,475	3,827	8.03%	0.94%	0.96%
16	1.5 Inch	Commercial	P2M1A	38,177	41,282	3,105	8.13%	0.76%	0.77%
17	2 Inch	Commercial	P2M1A	614,090	662,509	48,419	7.88%	12.17%	12.39%
18	3 Inch	Commercial	P2M1A	92,390	99,663	7,273	7.87%	1.83%	1.86%
19	4 Inch	Commercial	P2M1A	1,681	1,849	168	10.00%	0.03%	0.03%
20	6 Inch	Commercial	P2M1A	118,060	127,317	9,257	7.84%	2.34%	2.38%
21		Subtotal		$ 918,929	$ 991,599	$ 72,669	7.91%	18.21%	18.54%
22									
23	3 Inch	Turf	P2M1T	$ 61,382	$ 68,193	$ 6,811	11.10%	1.22%	1.28%
24	3 Inch	Turf	P4MIT	8,973	9,960	987	11.00%	0.18%	0.19%
25		Subtotal		$ 70,355	$ 78,152	$ 7,798	11.08%	1.39%	1.46%
26									
27	6 Inch	Paradise Valley CC	P2PVC	$ 153,804	$ 153,804	0	0	3.05%	2.88%
28		Subtotal	Contract Rate	$ 153,804	$ 153,804	0	0	3.05%	2.88%
29									
30									
31	5/8 Inch	Other Metered	P5M1A OWU/OPA	$ 508	$ 559	$ 52	10.17%	0.01%	0.01%
32	1 Inch	Other Metered	P5M1A OWU/OPA	8,080	8,928	$ 849	10.50%	0.16%	0.17%
33	2 Inch	Other Metered	P5M1A OWU/OPA	3,192	3,519	327	10.24%	0.06%	0.07%
34		Subtotal		$ 11,780	$ 13,007	$ 1,227	10.42%	0.23%	0.24%
35									
36	5/8 Inch	Fire Hydrant Meter	P6M1A Fire	$ 3,660	$ 3,660	$ -	0.00%		0.07%
37	3/4 Inch	Fire Hydrant Meter	P6M1A Fire	55	55	$ -	0.00%		0.00%
38	1 Inch	Fire Hydrant Meter	P6M1A Fire	120	120	$ -	0.00%		
39	2 Inch	Fire Hydrant Meter	P6M1A Fire	540	540	$ -	0.00%		
40		Subtotal		$ 4,375	$ 4,375	$ -	0.00%	0.09%	0.08%
41									
42	3 Inch	Other Metered	P7M1A	841	925	$ 84	10.00%	0.02%	0.02%
43		Subtotal		$ 841	$ 925	$ 84	10.00%	0.02%	0.02%
44									
45	Various	Sales for Resale		$ 13,270	$ 14,654	$ 1,383	10.42%	0.26%	0.27%
46		Subtotal		$ 13,270	$ 14,654	$ 1,383	10.42%	0.26%	0.27%
47									
48		Other Revenues		$ 12,458	$ 12,458	$ -	0.00%	0.25%	0.23%
49		Misc. Revenues		$ 924	$ 924	$ -	0.00%	0.02%	0.02%
50		Adjustments to Revenue		$ 8,168	$ 8,168	$ -	0.00%	0.16%	0.15%
51		From Sch. C-2		$ 13,429	$ 13,429	$ -	0.00%	0.27%	0.25%
52									
53		Total		$ 5,045,551	$ 5,348,393	$ 302,843	6.00%	100.00%	100.00%
54									

Arizona-American Water Company /Paradise Valley Water District
Test Year 12 Months Ended December 2004
Analysis of Revenue by Detailed Class

Exhibit
Schedule H-2
Page 1
Witness: Kozoman

Line No.	Meter Size, Class, Rate Code			(a) Average Number of Customers at 12/31/2004	Average Consumption	Revenues Present Rates	Revenues Proposed Rates	Proposed Increase Dollar Amount	Proposed Increase Percent Amount
1	5/8 Inch	Residential	P1M1A	2,319	22,193	$ 24.61	$ 26.79	2.18	8.86%
2	5/8 Inch	Residential	P1M1B/Mummy Mt.	2	48,250	$ 91.22	$ 69.70	(21.52)	-23.59%
3	3/4 Inch	Residential	P1M1A	17	3,473	$ 11.28	$ 12.36	1.09	9.65%
4	3/4 Inch	Residential	P1M1B/Mummy Mt.						
5	1 Inch	Residential	P1M1A	1,895	59,845	$ 90.80	$ 96.15	5.35	5.89%
6	1 Inch	Residential	P1M1B/Mummy Mt.	32	98,970	$ 180.22	$ 174.10	(6.12)	-3.39%
7	1.5 Inch	Residential	P1M1A	10	181,715	$ 359.39	$ 375.69	16.30	4.53%
8	1.5 Inch	Residential	P1M1B/Mummy Mt.	19	87,555	$ 164.61	$ 163.83	(0.78)	-0.47%
9	2 Inch	Residential	P1M1A	118	133,501	$ 271.58	$ 285.70	14.12	5.20%
10	2 Inch	Residential	P1M1B/Mummy Mt.						
11									
12		Subtotal		4,411					
13									
14	5/8 Inch	Commercial	P2M1A	37	5,971	$ 15.40	$ 16.78	1.39	9.01%
15	3/4 Inch	Commercial	P2M1A						
16	1 Inch	Commercial	P2M1A	41	70,880	$ 96.94	$ 104.73	7.79	8.04%
17	1.5 Inch	Commercial	P2M1A	22	99,279	$ 144.18	$ 155.92	11.75	8.15%
18	2 Inch	Commercial	P2M1A	98	218,311	$ 300.25	$ 324.39	24.14	8.04%
19	3 Inch	Commercial	P2M1A	12	415,461	$ 574.63	$ 620.74	46.11	8.02%
20	4 Inch	Commercial	P2M1A	1	-	$ 140.10	$ 154.11	14.01	10.00%
21	6 Inch	Commercial	P2M1A	4	1,561,292	$ 2,443.69	$ 2,635.45	191.76	7.85%
22									
23		Subtotal		214					
24									
25	3 Inch	Turf	P2M1T	1	6,726,800	$ 6,138.18	$ 6,819.27	681.09	11.10%
26	3 Inch	Turf	P4MIT	1	812,955	$ 815.72	$ 905.42	89.71	11.00%
27									
28		Subtotal		-					
29									
30	6 Inch	Paradise Valley CC	P2PVC	1	16,921,917	$ 12,817.00	$ 12,817.00	-	0.00%
31									
32									
33	5/8 Inch	Other Metered	P5M1A OWU/OPA	4	887	$ 9.58	$ 10.56	0.97	10.17%
34	1 Inch	Other Metered	P5M1A OWU/OPA	9	45,542	$ 74.12	$ 81.91	7.79	10.50%
35	2 Inch	Other Metered	P5M1A OWU/OPA	4	21,000	$ 72.55	$ 79.98	7.43	10.24%
36									
37		Subtotal		17					
38									
39	5/8 Inch	Fire Hydrant Meter	P6M1A Fire	61	136	$ 5.00	$ 5.00	-	0.00%
40	3/4 Inch	Fire Hydrant Meter	P6M1A Fire	1	-	$ 5.00	$ 5.00	-	0.00%
41	1 Inch	Fire Hydrant Meter	P6M1A Fire	2	-	$ 5.00	$ 5.00	-	0.00%
42	2 Inch	Fire Hydrant Meter	P6M1A Fire	9	14	$ 5.00	$ 5.00	-	0.00%
43									
44		Subtotal		73					

Arizona-American Water Company /Paradise Valley Water District
Test Year 12 Months Ended December 2004
Analysis of Revenue by Detailed Class

Exhibit
Schedule H-2
Page 2
Witness: Kozoman

Line No.	Meter Size, Class, and Zone			(a) Average Number of Customers at 12/31/2004	Average Consumption	Revenues Present Rates	Revenues Proposed Rates	Proposed Increase Dollar Amount	Proposed Increase Percent Amount
1	3 Inch	Other Metered	P7M1A	1	-	$ 84.06	$ 92.47	8.41	10.00%
2									
3		Subtotal		1					
4									
5			Totals	4,717					
6									
7	Various	Other Metered	Sales for Resale	19	565,000	$ 1,105.87	$ 1,221.14	115.27	10.42%
8									
9									
10									
11									
12									
13									
14									
15			(a) Average number of customers of less than one (1), indicates that less than 12 bills were issued during the ye						

Arizona-American Water Company /Paradise Valley Water District
Test Year 12 Months Ended December 2004
Present and Proposed Rates

Exhibit
Schedule H-3
Page 1
Witness: Kozoman

Line No.		Present Rates	Proposed Rates	Percent Change	Dollar Change
1	**Monthly Usage Charge for:**				
2	Residential, Commercial, Turf, Other				
3	5/8 x 3/4 Inch	$ 8.41	$ 9.26	10.11%	$ 0.85
4	3/4 Inch	8.74	9.62	10.07%	0.88
5	1 Inch	14.01	15.42	10.06%	1.41
6	1 1/2 Inch	28.02	30.83	10.03%	2.81
7	2 Inch	44.83	49.32	10.02%	4.49
8	3 Inch	84.06	92.47	10.00%	8.41
9	4 Inch	140.10	154.11	10.00%	14.01
10	6 Inch	280.20	308.22	10.00%	28.02
11	Paradise Valley Country Club (Contract Rate)	12,817.00	12,817.00	0.00%	
12					
13	Fire Protection				
14	All*	$ 5.00	$ 5.00	0.00%	
15	Greater of 1% of min charge of $5.00				
16					
17	Mummy Moutain System				
18	Standpipe				
19	5/8 x 3/4 Inch	$ 9.00	9.26	2.89%	$ 0.26
20	3/4 Inch	9.00	9.62	6.89%	0.62
21	1 Inch	9.75	15.42	58.15%	5.67
22	1 1/2 Inch	14.00	30.83	120.21%	16.83
23	2 Inch	25.75	49.32	91.53%	23.57
24					
25	Gallons In Minimum				
26	Residential, Commecial	-	-		
27	Residential - Mummy Mountain	1,000	-		
28	Turf	-	-		
29	Standpipe (Fire Hydrant Meter)	-	-		
30	Fire Sprinkler	-	-		
31					
32	**Residential**				
33	**Gallons for Rate Tiers**				
34	**Tier 1: (Gallon upper limit,)**				
35	All		25,000	**25,000**	
36	**Tier 2:** (Gallons upper limit)				
37	All		80,000	**80,000**	
38	**Tier 3: (Gallon over)**				
39	All		999,999,999	**999,999,999**	
40	**N/T** = No Tariff. **N/C** = Not computed due to lack of denominator.				
41					
42	**Residential - Mummy Mountain**				
43	**Gallons for Rate Tiers**				
44	**Tier 1: (Gallon upper limit,)**				
45	All		999,999,999	**25,000**	
46	**Tier 2:** (Gallons upper limit)				
47	All		999,999,999	**80,000**	
48	**Tier 3: (Gallon over)**				
49	All		999,999,999	**999,999,999**	
50	**N/T** = No Tariff. **N/C** = Not computed due to lack of denominator.				
51					

Arizona-American Water Company /Paradise Valley Water District
Test Year 12 Months Ended December 2004
Present and Proposed Rates

Exhibit
Schedule H-3
Page 2
Witness: Kozoman

	Present Rates	Proposed Rates	Percent Change
Commercial			
Gallons for Rate Tiers			
Tier 1: (Gallon upper limit,)			
All	400,000	400,000	
Tier 2: (Gallons upper limit)			
All	999,999,999	999,999,999	
Tier 3: (Gallon over)			
All	999,999,999	999,999,999	
N/T = No Tariff. **N/C** = Not computed due to lack of denominator.			
Turf			
Gallons for Rate Tiers			
Tier 1: (Gallon upper limit,)			
All	999,999,999	999,999,999	
Tier 2: (Gallons upper limit)			
All	999,999,999	999,999,999	
Tier 3: (Gallon over)			
All	999,999,999	999,999,999	
N/T = No Tariff. **N/C** = Not computed due to lack of denominator.			
Other Metered			
Gallons for Rate Tiers			
Tier 1: (Gallon upper limit,)			
All	999,999,999	999,999,999	
Tier 2: (Gallons upper limit)			
All	999,999,999	999,999,999	
Tier 3: (Gallon over)			
All	999,999,999	999,999,999	
N/T = No Tariff. **N/C** = Not computed due to lack of denominator.			

Residential			
Commodity Rates	**Present Rates**	**Proposed Rates**	**Percent Change**
First Tier			
All	0.73	0.79	8.22%
Second Tier			
All	1.68	1.75	4.17%
Third Tier			
All	2.17	2.25	3.69%
Fourth Tier			
All	2.17	2.25	3.69%

Arizona-American Water Company /Paradise Valley Water District
Test Year 12 Months Ended December 2004
Present and Proposed Rates

Exhibit
Schedule H-3
Page 3
Witness: Kozoman

Line No.		Present Rates	Proposed Rates	Percent Change
1				
2	**Residential - Mummy Mountain**			
3	**Commodity Rates**	**Present**	**Proposed**	**Percent**
4	**First Tier**	**Rates**	**Rates**	**Change**
5	All	1.42		
6	Plus Purchased Water Adjuster	0.32		
7	Combined Rate	1.74	0.79	-54.60%
8				
9	**Second Tier**			
10	All	1.42		
11	Plus Purchased Water Adjuster	0.32		
12	Combined Rate	1.74	1.75	0.57%
13				
14	**Third Tier**			
15	All	1.42		
16	Plus Purchased Water Adjuster	0.32		
17	Combined Rate	1.74	2.25	29.31%
18				
19	**Fourth Tier**			
20	All	1.42		
21	Plus Purchased Water Adjuster	0.32		
22	All	1.74	2.25	29.31%
23				
24	**Commercial**			
25	**Commodity Rates**	**Present**	**Proposed**	**Percent**
26	**First Tier**	**Rates**	**Rates**	**Change**
27	All	1.17	1.26	7.69%
28				
29	**Second Tier**			
30	All	1.46	1.57	7.53%
31				
32	**Third Tier**			
33	All	1.46	1.57	7.53%
34				
35	**Fourth Tier**			
36	All	1.46	1.57	7.53%
37				
38	**Turf**			
39	**Commodity Rates**	**Present**	**Proposed**	**Percent**
40	**First Tier**	**Rates**	**Rates**	**Change**
41	All	0.90	1.00	11.11%
42				
43	**Second Tier**			
44	All	0.90	1.00	11.11%
45				
46	**Third Tier**			
47	All	0.90	1.00	11.11%
48				
49	**Fourth Tier**			
50	All	0.90	1.00	11.11%
51				

Arizona-American Water Company /Paradise Valley Water District
Test Year 12 Months Ended December 2004
Present and Proposed Rates

Exhibit
Schedule H-3
Page 4
Witness: Kozoman

Other General Metered

Commodity Rates	**Present**	**Proposed**	**Percent**
First Tier	**Rates**	**Rates**	**Change**
All	1.32	1.46	10.61%
Second Tier			
All	1.32	1.46	10.61%
Third Tier			
All	1.32	1.46	10.61%
Fourth Tier			
All	1.32	1.46	10.61%

Other Water Utility

Commodity Rates	**Present**	**Proposed**	**Percent**
First Tier	**Rates**	**Rates**	**Change**
All	1.18	1.46	23.73%
Second Tier			
All	1.18	1.46	23.73%
Third Tier			
All	1.18	1.46	23.73%
Fourth Tier			
All	1.18	1.46	23.73%

High Block Usage Surcharges Treated as Contirbution in Aid of Construction:

Surcharges: To be Accounted for as Contributions in Aid of Construction

Residential & Commercial

Surcharge per Unit of Water (1,000 Gallons) Consumed in the High Block up to the last 5.00% of usage, in addition to usage charge. **$ 2.00**

Surcharge per unit of Water (1,000 gallons) Consumed in the last 5.00% of the High Block, in addition to usage charge. **$ 5.00**

Arizona-American Water Company /Paradise Valley Water District
Changes in Representative Rate Schedules
Test Year 12 Months Ended December 2004

Exhibit
Schedule H-3
Page 5
Witness: Kozoman

Line No.	Other Service Charges	Present Rates	Proposed Rates
1	Establishment	$ 20.00	$ 20.00
2	Establishment (After Hours)	$ 40.00	$ 40.00
3	Reconnection (Deliquent)	$ 30.00	$ 30.00
4	Reconnection (Deliquent and After Hours)	$ 60.00	$ 60.00
5	Meter Test, if meter is correct	$ 15.00	$ 15.00
6	Deposit	*	*
7	Deposit Interest	*	*
8	Re-Establishment (Within 12 Months)	**	**
9	NSF Check	$ 12.00	$ 12.00
10	Deferred Payment	1.5%	1.5%
11	Meter Re-Read (If Correct)	$ 10.00	$ 10.00
12	Late Payment Penalty	1.5%	1.5%

14 Service Line and Meter Installation Charges:

* PER COMMISSION RULES A.A.C. (R14-2-403.B)

** Months off system times the monthly minimum per Commission Rule A.A.C. R14-2-403(D)

IN ADDITION TO THE COLLECTION OF REGULAR RATES, THE UTILITY WILL COLLECT FROM ITS CUSTOMERS A PROPORTIONATE SHARE OF ANY PRIVILEGE, SALES, USE, AND FRANCHISE TAX. PER COMMISSION RULE (14-2-409.D 5).

ALL ADVANCES AND/OR CONTRIBUTIONS ARE TO INCLUDE LABOR, MATERIALS, OVERHEADS, AND ALL APPLICABLE TAXES, INCLUDING ALL GROSS-UP TAXES FOR INCOME TAXES, IF APPLICABLE.

(a) From Memorandum from Marlin Scott, dated June 30, 2004

(b) As meters and service lines are now taxable income for income purposes, The Company shall collect income taxes on the meter and service line charges. Any tax collected will be refunded as the meter & service line is refunded.

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 5/8 Inch Residential (P1M1A)

Exhibit
Schedule H-4
Page 1
Witness: Kozoman

Usage	Present Bill	Proposed Bill	Dollar Increase	Percent Increase
-	$ 8.41	$ 9.26	$ 0.85	10.11%
1,000	9.14	10.05	$ 0.91	9.96%
2,000	9.87	10.84	$ 0.97	9.83%
3,000	10.60	11.63	$ 1.03	9.72%
4,000	11.33	12.42	$ 1.09	9.62%
5,000	12.06	13.21	$ 1.15	9.54%
6,000	12.79	14.00	$ 1.21	9.46%
7,000	13.52	14.79	$ 1.27	9.39%
8,000	14.25	15.58	$ 1.33	9.33%
9,000	14.98	16.37	$ 1.39	9.28%
10,000	15.71	17.16	$ 1.45	9.23%
11,000	16.44	17.95	$ 1.51	9.18%
12,000	17.17	18.74	$ 1.57	9.14%
13,000	17.90	19.53	$ 1.63	9.11%
14,000	18.63	20.32	$ 1.69	9.07%
15,000	19.36	21.11	$ 1.75	9.04%
16,000	20.09	21.90	$ 1.81	9.01%
17,000	20.82	22.69	$ 1.87	8.98%
18,000	21.55	23.48	$ 1.93	8.96%
19,000	22.28	24.27	$ 1.99	8.93%
20,000	23.01	25.06	$ 2.05	8.91%
40,000	51.86	55.26	$ 3.40	6.56%
80,000	119.06	125.26	$ 6.20	5.21%
160,000	292.66	305.26	$ 12.60	4.31%
321,000	642.03	667.51	$ 25.48	3.97%
332,000	665.90	692.26	$ 26.36	3.96%
337,000	676.75	703.51	$ 26.76	3.95%
398,000	809.12	840.76	$ 31.64	3.91%
Average Usage				
22,193	$ 24.61	$ 26.79	$ 2.18	8.86%
Median Usage				
11,500	$ 16.81	$ 18.35	$ 1.54	9.16%

Present Rates:

Monthly Minimum:		$ 8.41
Gallons in Minimum		-
Charge Per 1,000 Gallons		
Up to	25,000	$ 0.73
Up to	80,000	$ 1.68
Up to	999,999,999	$ 2.17
Over	1,000,000,000	$ 2.17

Proposed Rates:

Monthly Minimum:		$ 9.26
Gallons in Minimum		-
Charge Per 1,000 Gallons		
Up to	25,000	$ 0.79
Up to	80,000	$ 1.75
Up to	999,999,999	$ 2.25
Over	1,000,000,000	$ 2.25

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 3/4 Inch Residential (P1M1A)

Exhibit
Schedule H-4
Page 2
Witness: Kozoman

Usage	Present Bill	Proposed Bill	Dollar Increase	Percent Increase
-	$ 8.74	$ 9.62	$ 0.88	10.07%
1,000	9.47	10.41	$ 0.94	9.93%
2,000	10.20	11.20	$ 1.00	9.80%
3,000	10.93	11.99	$ 1.06	9.70%
4,000	11.66	12.78	$ 1.12	9.61%
5,000	12.39	13.57	$ 1.18	9.52%
6,000	13.12	14.36	$ 1.24	9.45%
7,000	13.85	15.15	$ 1.30	9.39%
8,000	14.58	15.94	$ 1.36	9.33%
9,000	15.31	16.73	$ 1.42	9.27%
10,000	16.04	17.52	$ 1.48	9.23%
11,000	16.77	18.31	$ 1.54	9.18%
12,000	17.50	19.10	$ 1.60	9.14%
13,000	18.23	19.89	$ 1.66	9.11%
14,000	18.96	20.68	$ 1.72	9.07%
15,000	19.69	21.47	$ 1.78	9.04%
16,000	20.42	22.26	$ 1.84	9.01%
17,000	21.15	23.05	$ 1.90	8.98%
18,000	21.88	23.84	$ 1.96	8.96%
19,000	22.61	24.63	$ 2.02	8.93%
20,000	23.34	25.42	$ 2.08	8.91%
40,000	52.19	55.62	$ 3.43	6.57%
80,000	119.39	125.62	$ 6.23	5.22%
134,000	236.57	247.12	$ 10.55	4.46%
Average Usage				
3,473	$ 11.28	$ 12.36	$ 1.09	9.65%
Median Usage				
1,000	$ 9.47	$ 10.41	$ 0.94	9.93%

Present Rates:

Monthly Minimum:		$ 8.74
Gallons in Minimum		-
Charge Per 1,000 Gallons		
Up to	25,000	$ 0.73
Up to	80,000	$ 1.68
Up to	999,999,999	$ 2.17
Over	1,000,000,000	$ 2.17

Proposed Rates:

Monthly Minimum:		$ 9.62
Gallons in Minimum		-
Charge Per 1,000 Gallons		
Up to	25,000	$ 0.79
Up to	80,000	$ 1.75
Up to	999,999,999	$ 2.25
Over	1,000,000,000	$ 2.25

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 1 Inch Residential (P1M1A)

Exhibit
Schedule H-4
Page 3
Witness: Kozoman

Usage	Present Bill	Proposed Bill	Dollar Increase	Percent Increase
-	$ 14.01	$ 15.42	$ 1.41	10.06%
1,000	14.74	16.21	$ 1.47	9.97%
2,000	15.47	17.00	$ 1.53	9.89%
3,000	16.20	17.79	$ 1.59	9.81%
4,000	16.93	18.58	$ 1.65	9.75%
5,000	17.66	19.37	$ 1.71	9.68%
6,000	18.39	20.16	$ 1.77	9.62%
7,000	19.12	20.95	$ 1.83	9.57%
8,000	19.85	21.74	$ 1.89	9.52%
9,000	20.58	22.53	$ 1.95	9.48%
10,000	21.31	23.32	$ 2.01	9.43%
11,000	22.04	24.11	$ 2.07	9.39%
12,000	22.77	24.90	$ 2.13	9.35%
13,000	23.50	25.69	$ 2.19	9.32%
14,000	24.23	26.48	$ 2.25	9.29%
15,000	24.96	27.27	$ 2.31	9.25%
16,000	25.69	28.06	$ 2.37	9.23%
17,000	26.42	28.85	$ 2.43	9.20%
18,000	27.15	29.64	$ 2.49	9.17%
19,000	27.88	30.43	$ 2.55	9.15%
20,000	28.61	31.22	$ 2.61	9.12%
40,000	57.46	61.42	$ 3.96	6.89%
80,000	124.66	131.42	$ 6.76	5.42%
160,000	298.26	311.42	$ 13.16	4.41%
320,000	645.46	671.42	$ 25.96	4.02%
639,000	1,337.69	1,389.17	$ 51.48	3.85%
1,166,000	2,481.28	2,574.92	$ 93.64	3.77%
2,258,000	4,850.92	5,031.92	$ 181.00	3.73%
Average Usage				
59,845	$ 90.80	$ 96.15	$ 5.35	5.89%
Median Usage				
40,501	$ 58.30	$ 62.30	$ 4.00	6.85%

Present Rates:		
Monthly Minimum:		$ 14.01
Gallons in Minimum		-
Charge Per 1,000 Gallons		
Up to	25,000	$ 0.73
Up to	80,000	$ 1.68
Up to	999,999,999	$ 2.17
Over	1,000,000,000	$ 2.17

Proposed Rates:		
Monthly Minimum:		$ 15.42
Gallons in Minimum		-
Charge Per 1,000 Gallons		
Up to	25,000	$ 0.79
Up to	80,000	$ 1.75
Up to	999,999,999	$ 2.25
Over	1,000,000,000	$ 2.25

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 1 1/2 Inch Residential (P1M1A)

Exhibit
Schedule H-4
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Witness: Kozoman

Usage	Present Bill	Proposed Bill	Dollar Increase	Percent Increase
-	$ 28.02	$ 30.83	$ 2.81	10.03%
1,000	28.75	31.62	$ 2.87	9.98%
2,000	29.48	32.41	$ 2.93	9.94%
3,000	30.21	33.20	$ 2.99	9.90%
4,000	30.94	33.99	$ 3.05	9.86%
5,000	31.67	34.78	$ 3.11	9.82%
6,000	32.40	35.57	$ 3.17	9.78%
7,000	33.13	36.36	$ 3.23	9.75%
8,000	33.86	37.15	$ 3.29	9.72%
9,000	34.59	37.94	$ 3.35	9.68%
10,000	35.32	38.73	$ 3.41	9.65%
11,000	36.05	39.52	$ 3.47	9.63%
12,000	36.78	40.31	$ 3.53	9.60%
13,000	37.51	41.10	$ 3.59	9.57%
14,000	38.24	41.89	$ 3.65	9.54%
15,000	38.97	42.68	$ 3.71	9.52%
16,000	39.70	43.47	$ 3.77	9.50%
17,000	40.43	44.26	$ 3.83	9.47%
18,000	41.16	45.05	$ 3.89	9.45%
19,000	41.89	45.84	$ 3.95	9.43%
20,000	42.62	46.63	$ 4.01	9.41%
40,000	71.47	76.83	$ 5.36	7.50%
80,000	138.67	146.83	$ 8.16	5.88%
161,000	314.44	329.08	$ 14.64	4.66%
321,000	661.64	689.08	$ 27.44	4.15%
666,000	1,410.29	1,465.33	$ 55.04	3.90%
Average Usage				
181,715	$ 359.39	$ 375.69	$ 16.30	4.53%
Median Usage				
103,000	$ 188.58	$ 198.58	$ 10.00	5.30%

Present Rates:		
Monthly Minimum:		$ 28.02
Gallons in Minimum		-
Charge Per 1,000 Gallons		
Up to	25,000	$ 0.73
Up to	80,000	$ 1.68
Up to	999,999,999	$ 2.17
Over	1,000,000,000	$ 2.17

Proposed Rates:		
Monthly Minimum:		$ 30.83
Gallons in Minimum		-
Charge Per 1,000 Gallons		
Up to	25,000	$ 0.79
Up to	80,000	$ 1.75
Up to	999,999,999	$ 2.25
Over	1,000,000,000	$ 2.25

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 2 Inch Residential (P1M1A)

Exhibit
Schedule H-4
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Witness: Kozoman

Usage	Present Bill	Proposed Bill	Dollar Increase	Percent Increase
-	$ 44.83	$ 49.32	$ 4.49	10.02%
1,000	45.56	50.11	$ 4.55	9.99%
2,000	46.29	50.90	$ 4.61	9.96%
3,000	47.02	51.69	$ 4.67	9.93%
4,000	47.75	52.48	$ 4.73	9.91%
5,000	48.48	53.27	$ 4.79	9.88%
6,000	49.21	54.06	$ 4.85	9.86%
7,000	49.94	54.85	$ 4.91	9.83%
8,000	50.67	55.64	$ 4.97	9.81%
9,000	51.40	56.43	$ 5.03	9.79%
10,000	52.13	57.22	$ 5.09	9.76%
11,000	52.86	58.01	$ 5.15	9.74%
12,000	53.59	58.80	$ 5.21	9.72%
13,000	54.32	59.59	$ 5.27	9.70%
14,000	55.05	60.38	$ 5.33	9.68%
15,000	55.78	61.17	$ 5.39	9.66%
16,000	56.51	61.96	$ 5.45	9.64%
17,000	57.24	62.75	$ 5.51	9.63%
18,000	57.97	63.54	$ 5.57	9.61%
19,000	58.70	64.33	$ 5.63	9.59%
20,000	59.43	65.12	$ 5.69	9.57%
40,000	88.28	95.32	$ 7.04	7.97%
80,000	155.48	165.32	$ 9.84	6.33%
160,000	329.08	345.32	$ 16.24	4.93%
322,000	680.62	709.82	$ 29.20	4.29%
656,000	1,405.40	1,461.32	$ 55.92	3.98%

Average Usage				
133,501	$ 271.58	$ 285.70	$ 14.12	5.20%
Median Usage				
74,501	$ 146.24	$ 155.70	$ 9.46	6.47%

Present Rates:

Monthly Minimum:		$ 44.83
Gallons in Minimum		-
Charge Per 1,000 Gallons		
Up to	25,000	$ 0.73
Up to	80,000	$ 1.68
Up to	999,999,999	$ 2.17
Over	1,000,000,000	$ 2.17

Proposed Rates:

Monthly Minimum:		$ 49.32
Gallons in Minimum		-
Charge Per 1,000 Gallons		
Up to	25,000	$ 0.79
Up to	80,000	$ 1.75
Up to	999,999,999	$ 2.25
Over	1,000,000,000	$ 2.25

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 5/8 Inch Residential (P1M1B) Mummy Mountain

Exhibit
Schedule H-4
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Witness: Kozoman

Usage		Present Bill		Proposed Bill		Dollar Increase	Percent Increase
-	$	9.00	$	9.26	$	0.26	2.89%
1,000		9.00		10.05	$	1.05	11.67%
2,000		10.74		10.84	$	0.10	0.93%
3,000		12.48		11.63	$	(0.85)	-6.81%
4,000		14.22		12.42	$	(1.80)	-12.66%
5,000		15.96		13.21	$	(2.75)	-17.23%
6,000		17.70		14.00	$	(3.70)	-20.90%
7,000		19.44		14.79	$	(4.65)	-23.92%
8,000		21.18		15.58	$	(5.60)	-26.44%
9,000		22.92		16.37	$	(6.55)	-28.58%
10,000		24.66		17.16	$	(7.50)	-30.41%
11,000		26.40		17.95	$	(8.45)	-32.01%
12,000		28.14		18.74	$	(9.40)	-33.40%
13,000		29.88		19.53	$	(10.35)	-34.64%
14,000		31.62		20.32	$	(11.30)	-35.74%
15,000		33.36		21.11	$	(12.25)	-36.72%
16,000		35.10		21.90	$	(13.20)	-37.61%
17,000		36.84		22.69	$	(14.15)	-38.41%
18,000		38.58		23.48	$	(15.10)	-39.14%
19,000		40.32		24.27	$	(16.05)	-39.81%
20,000		42.06		25.06	$	(17.00)	-40.42%
40,000		76.86		55.26	$	(21.60)	-28.10%
80,000		146.46		125.26	$	(21.20)	-14.47%
191,000		339.60		375.01	$	35.41	10.43%
Average Usage							
48,250	$	91.22	$	69.70	$	(21.52)	-23.59%
Median Usage							
11,001	$	26.40	$	17.95	$	(8.45)	-32.01%

Present Rates:

Monthly Minimum:		$	9.00
Gallons in Minimum			1,000
Charge Per 1,000 Gallons			
Up to	999,999,999	$	1.74
Up to	999,999,999	$	1.74
Up to	999,999,999	$	1.74
Over	1,000,000,000	$	1.74

Proposed Rates:

Monthly Minimum:		$	9.26
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	25,000	$	0.79
Up to	80,000	$	1.75
Up to	999,999,999	$	2.25
Over	1,000,000,000	$	2.25

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 1 Inch Residential (P1M1B) Mummy Mountain

Exhibit
Schedule H-4
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Witness: Kozoman

Usage	Present Bill	Proposed Bill	Dollar Increase	Percent Increase
-	$ 9.75	$ 15.42	$ 5.67	58.15%
1,000	9.75	16.21	$ 6.46	66.26%
2,000	11.49	17.00	$ 5.51	47.95%
3,000	13.23	17.79	$ 4.56	34.47%
4,000	14.97	18.58	$ 3.61	24.11%
5,000	16.71	19.37	$ 2.66	15.92%
6,000	18.45	20.16	$ 1.71	9.27%
7,000	20.19	20.95	$ 0.76	3.76%
8,000	21.93	21.74	$ (0.19)	-0.87%
9,000	23.67	22.53	$ (1.14)	-4.82%
10,000	25.41	23.32	$ (2.09)	-8.23%
11,000	27.15	24.11	$ (3.04)	-11.20%
12,000	28.89	24.90	$ (3.99)	-13.81%
13,000	30.63	25.69	$ (4.94)	-16.13%
14,000	32.37	26.48	$ (5.89)	-18.20%
15,000	34.11	27.27	$ (6.84)	-20.05%
16,000	35.85	28.06	$ (7.79)	-21.73%
17,000	37.59	28.85	$ (8.74)	-23.25%
18,000	39.33	29.64	$ (9.69)	-24.64%
19,000	41.07	30.43	$ (10.64)	-25.91%
20,000	42.81	31.22	$ (11.59)	-27.07%
40,000	77.61	61.42	$ (16.19)	-20.86%
80,000	147.21	131.42	$ (15.79)	-10.73%
160,000	286.41	311.42	$ 25.01	8.73%
324,000	571.77	680.42	$ 108.65	19.00%
601,000	1,053.75	1,303.67	$ 249.92	23.72%
-				
-				
-				
Average Usage				
98,970	$ 180.22	$ 174.10	$ (6.12)	-3.39%
Median Usage				
73,501	$ 135.90	$ 120.05	$ (15.85)	-11.67%

Present Rates:

Monthly Minimum:		$	9.75
Gallons in Minimum			1,000
Charge Per 1,000 Gallons			
Up to	999,999,999	$	1.74
Up to	999,999,999	$	1.74
Up to	999,999,999	$	1.74
Over	1,000,000,000	$	1.74

Proposed Rates:

Monthly Minimum:		$	15.42
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	25,000	$	0.79
Up to	80,000	$	1.75
Up to	999,999,999	$	2.25
Over	1,000,000,000	$	2.25

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 1 1/2 Inch Residential (P1M1B) Mummy Mountain

Exhibit
Schedule H-4
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Witness: Kozoman

Usage	Present Bill	Proposed Bill	Dollar Increase	Percent Increase
-	$ 14.00	$ 30.83	$ 16.83	120.21%
1,000	14.00	31.62	$ 17.62	125.86%
2,000	15.74	32.41	$ 16.67	105.91%
3,000	17.48	33.20	$ 15.72	89.93%
4,000	19.22	33.99	$ 14.77	76.85%
5,000	20.96	34.78	$ 13.82	65.94%
6,000	22.70	35.57	$ 12.87	56.70%
7,000	24.44	36.36	$ 11.92	48.77%
8,000	26.18	37.15	$ 10.97	41.90%
9,000	27.92	37.94	$ 10.02	35.89%
10,000	29.66	38.73	$ 9.07	30.58%
11,000	31.40	39.52	$ 8.12	25.86%
12,000	33.14	40.31	$ 7.17	21.64%
13,000	34.88	41.10	$ 6.22	17.83%
14,000	36.62	41.89	$ 5.27	14.39%
15,000	38.36	42.68	$ 4.32	11.26%
16,000	40.10	43.47	$ 3.37	8.40%
17,000	41.84	44.26	$ 2.42	5.78%
18,000	43.58	45.05	$ 1.47	3.37%
19,000	45.32	45.84	$ 0.52	1.15%
20,000	47.06	46.63	$ (0.43)	-0.91%
40,000	81.86	76.83	$ (5.03)	-6.14%
80,000	151.46	146.83	$ (4.63)	-3.06%
165,000	299.36	338.08	$ 38.72	12.93%
315,000	560.36	675.58	$ 115.22	20.56%

Average Usage				
87,555	$ 164.61	$ 163.83	$ (0.78)	-0.47%
Median Usage				
64,501	$ 124.49	$ 119.71	$ (4.78)	-3.84%

Present Rates:

Monthly Minimum:		$ 14.00
Gallons in Minimum		1,000
Charge Per 1,000 Gallons		
Up to	999,999,999	$ 1.74
Up to	999,999,999	$ 1.74
Up to	999,999,999	$ 1.74
Over	1,000,000,000	$ 1.74

Proposed Rates:

Monthly Minimum:		$ 30.83
Gallons in Minimum		-
Charge Per 1,000 Gallons		
Up to	25,000	$ 0.79
Up to	80,000	$ 1.75
Up to	999,999,999	$ 2.25
Over	1,000,000,000	$ 2.25

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 2 Inch Residential (P1M1B) Mummy Mountain

Exhibit
Schedule H-4
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Witness: Kozoman

Usage		Present Bill		Proposed Bill		Dollar Increase	Percent Increase
-	$	25.75	$	49.32	$	23.57	91.53%
1,000		25.75		50.11	$	24.36	94.60%
2,000		27.49		50.90	$	23.41	85.16%
3,000		29.23		51.69	$	22.46	76.84%
4,000		30.97		52.48	$	21.51	69.45%
5,000		32.71		53.27	$	20.56	62.86%
6,000		34.45		54.06	$	19.61	56.92%
7,000		36.19		54.85	$	18.66	51.56%
8,000		37.93		55.64	$	17.71	46.69%
9,000		39.67		56.43	$	16.76	42.25%
10,000		41.41		57.22	$	15.81	38.18%
11,000		43.15		58.01	$	14.86	34.44%
12,000		44.89		58.80	$	13.91	30.99%
13,000		46.63		59.59	$	12.96	27.79%
14,000		48.37		60.38	$	12.01	24.83%
15,000		50.11		61.17	$	11.06	22.07%
16,000		51.85		61.96	$	10.11	19.50%
17,000		53.59		62.75	$	9.16	17.09%
18,000		55.33		63.54	$	8.21	14.84%
19,000		57.07		64.33	$	7.26	12.72%
20,000		58.81		65.12	$	6.31	10.73%
40,000		93.61		95.32	$	1.71	1.83%
80,000		163.21		165.32	$	2.11	1.29%
162,000		305.89		349.82	$	43.93	14.36%
332,000		601.69		732.32	$	130.63	21.71%
Average Usage							
111,949	$	218.80	$	237.21	$	18.40	8.41%
Median Usage							
84,501	$	171.04	$	175.45	$	4.41	2.58%

Present Rates:			
Monthly Minimum:		$	25.75
Gallons in Minimum			1,000
Charge Per 1,000 Gallons			
Up to	999,999,999	$	1.74
Up to	999,999,999	$	1.74
Up to	999,999,999	$	1.74
Over	1,000,000,000	$	1.74

Proposed Rates:			
Monthly Minimum:		$	49.32
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	25,000	$	0.79
Up to	80,000	$	1.75
Up to	999,999,999	$	2.25
Over	1,000,000,000	$	2.25

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 5/8 Inch Commercial (P2M1A)

Exhibit
Schedule H-4
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Witness: Kozoman

Usage		Present Bill		Proposed Bill		Dollar Increase	Percent Increase
-	$	8.41	$	9.26	$	0.85	10.11%
1,000		9.58		10.52	$	0.94	9.81%
2,000		10.75		11.78	$	1.03	9.58%
3,000		11.92		13.04	$	1.12	9.40%
4,000		13.09		14.30	$	1.21	9.24%
5,000		14.26		15.56	$	1.30	9.12%
6,000		15.43		16.82	$	1.39	9.01%
7,000		16.60		18.08	$	1.48	8.92%
8,000		17.77		19.34	$	1.57	8.84%
9,000		18.94		20.60	$	1.66	8.76%
10,000		20.11		21.86	$	1.75	8.70%
11,000		21.28		23.12	$	1.84	8.65%
12,000		22.45		24.38	$	1.93	8.60%
13,000		23.62		25.64	$	2.02	8.55%
14,000		24.79		26.90	$	2.11	8.51%
15,000		25.96		28.16	$	2.20	8.47%
16,000		27.13		29.42	$	2.29	8.44%
17,000		28.30		30.68	$	2.38	8.41%
18,000		29.47		31.94	$	2.47	8.38%
19,000		30.64		33.20	$	2.56	8.36%
20,000		31.81		34.46	$	2.65	8.33%
40,000		55.21		59.66	$	4.45	8.06%
80,000		102.01		110.06	$	8.05	7.89%
204,000		247.09		266.30	$	19.21	7.77%
-		8.41		9.26	$	0.85	10.11%
-		8.41		9.26	$	0.85	10.11%
Average Usage							
5,971	$	15.40	$	16.78	$	1.39	9.01%
Median Usage							
-	$	8.41	$	9.26	$	0.85	10.11%

Present Rates:			
Monthly Minimum:		$	8.41
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	400,000	$	1.17
Up to	999,999,999	$	1.46
Up to	999,999,999	$	1.46
Over	1,000,000,000	$	1.46

Proposed Rates:			
Monthly Minimum:		$	9.26
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	400,000	$	1.26
Up to	999,999,999	$	1.57
Up to	999,999,999	$	1.57
Over	1,000,000,000	$	1.57

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 1 Inch Commercial (P2M1A)

Exhibit
Schedule H-4
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Witness: Kozoman

Usage	Present Bill	Proposed Bill	Dollar Increase	Percent Increase
-	$ 14.01	$ 15.42	$ 1.41	10.06%
1,000	15.18	16.68	$ 1.50	9.88%
2,000	16.35	17.94	$ 1.59	9.72%
3,000	17.52	19.20	$ 1.68	9.59%
4,000	18.69	20.46	$ 1.77	9.47%
5,000	19.86	21.72	$ 1.86	9.37%
6,000	21.03	22.98	$ 1.95	9.27%
7,000	22.20	24.24	$ 2.04	9.19%
8,000	23.37	25.50	$ 2.13	9.11%
9,000	24.54	26.76	$ 2.22	9.05%
10,000	25.71	28.02	$ 2.31	8.98%
11,000	26.88	29.28	$ 2.40	8.93%
12,000	28.05	30.54	$ 2.49	8.88%
13,000	29.22	31.80	$ 2.58	8.83%
14,000	30.39	33.06	$ 2.67	8.79%
15,000	31.56	34.32	$ 2.76	8.75%
16,000	32.73	35.58	$ 2.85	8.71%
17,000	33.90	36.84	$ 2.94	8.67%
18,000	35.07	38.10	$ 3.03	8.64%
19,000	36.24	39.36	$ 3.12	8.61%
20,000	37.41	40.62	$ 3.21	8.58%
40,000	60.81	65.82	$ 5.01	8.24%
80,000	107.61	116.22	$ 8.61	8.00%
160,000	201.21	217.02	$ 15.81	7.86%
361,000	436.38	470.28	$ 33.90	7.77%
664,000	867.45	933.90	$ 66.45	7.66%
-				

Average Usage				
70,880	$ 96.94	$ 104.73	$ 7.79	8.04%
Median Usage				
29,501	$ 48.53	$ 52.59	$ 4.07	8.38%

Present Rates:

Monthly Minimum:		$ 14.01
Gallons in Minimum		-
Charge Per 1,000 Gallons		
Up to	400,000	$ 1.17
Up to	999,999,999	$ 1.46
Up to	999,999,999	$ 1.46
Over	1,000,000,000	$ 1.46

Proposed Rates:

Monthly Minimum:		$ 15.42
Gallons in Minimum		-
Charge Per 1,000 Gallons		
Up to	400,000	$ 1.26
Up to	999,999,999	$ 1.57
Up to	999,999,999	$ 1.57
Over	1,000,000,000	$ 1.57

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 1 1/2 Inch Commercial (P2M1A)

Exhibit
Schedule H-4
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Witness: Kozoman

Usage		Present Bill		Proposed Bill		Dollar Increase	Percent Increase
-	$	28.02	$	30.83	$	2.81	10.03%
1,000		29.19		32.09	$	2.90	9.93%
2,000		30.36		33.35	$	2.99	9.85%
3,000		31.53		34.61	$	3.08	9.77%
4,000		32.70		35.87	$	3.17	9.69%
5,000		33.87		37.13	$	3.26	9.63%
6,000		35.04		38.39	$	3.35	9.56%
7,000		36.21		39.65	$	3.44	9.50%
8,000		37.38		40.91	$	3.53	9.44%
9,000		38.55		42.17	$	3.62	9.39%
10,000		39.72		43.43	$	3.71	9.34%
11,000		40.89		44.69	$	3.80	9.29%
12,000		42.06		45.95	$	3.89	9.25%
13,000		43.23		47.21	$	3.98	9.21%
14,000		44.40		48.47	$	4.07	9.17%
15,000		45.57		49.73	$	4.16	9.13%
16,000		46.74		50.99	$	4.25	9.09%
17,000		47.91		52.25	$	4.34	9.06%
18,000		49.08		53.51	$	4.43	9.03%
19,000		50.25		54.77	$	4.52	9.00%
20,000		51.42		56.03	$	4.61	8.97%
40,000		74.82		81.23	$	6.41	8.57%
80,000		121.62		131.63	$	10.01	8.23%
160,000		215.22		232.43	$	17.21	8.00%
341,000		426.99		460.49	$	33.50	7.85%
682,000		907.74		977.57	$	69.83	7.69%
Average Usage							
99,279	$	144.18	$	155.92	$	11.75	8.15%
Median Usage							
61,501	$	99.98	$	108.32	$	8.35	8.35%

Present Rates:			
Monthly Minimum:		$	28.02
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	400,000	$	1.17
Up to	999,999,999	$	1.46
Up to	999,999,999	$	1.46
Over	1,000,000,000	$	1.46
Proposed Rates:			
Monthly Minimum:		$	30.83
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	400,000	$	1.26
Up to	999,999,999	$	1.57
Up to	999,999,999	$	1.57
Over	1,000,000,000	$	1.57

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 2 Inch Commercial (P2M1A)

Exhibit
Schedule H-4
Page 13
Witness: Kozoman

Usage	Present Bill	Proposed Bill	Dollar Increase	Percent Increase
-	$ 44.83	$ 49.32	$ 4.49	10.02%
1,000	46.00	50.58	$ 4.58	9.96%
2,000	47.17	51.84	$ 4.67	9.90%
3,000	48.34	53.10	$ 4.76	9.85%
4,000	49.51	54.36	$ 4.85	9.80%
5,000	50.68	55.62	$ 4.94	9.75%
6,000	51.85	56.88	$ 5.03	9.70%
7,000	53.02	58.14	$ 5.12	9.66%
8,000	54.19	59.40	$ 5.21	9.61%
9,000	55.36	60.66	$ 5.30	9.57%
10,000	56.53	61.92	$ 5.39	9.53%
11,000	57.70	63.18	$ 5.48	9.50%
12,000	58.87	64.44	$ 5.57	9.46%
13,000	60.04	65.70	$ 5.66	9.43%
14,000	61.21	66.96	$ 5.75	9.39%
15,000	62.38	68.22	$ 5.84	9.36%
16,000	63.55	69.48	$ 5.93	9.33%
17,000	64.72	70.74	$ 6.02	9.30%
18,000	65.89	72.00	$ 6.11	9.27%
19,000	67.06	73.26	$ 6.20	9.25%
20,000	68.23	74.52	$ 6.29	9.22%
40,000	91.63	99.72	$ 8.09	8.83%
80,000	138.43	150.12	$ 11.69	8.44%
160,000	232.03	250.92	$ 18.89	8.14%
320,000	419.23	452.52	$ 33.29	7.94%
641,000	864.69	931.69	$ 67.00	7.75%
1,219,000	1,708.57	1,839.15	$ 130.58	7.64%
1,220,000	1,710.03	1,840.72	$ 130.69	7.64%
1,826,000	2,594.79	2,792.14	$ 197.35	7.61%
Average Usage				
218,311	$ 300.25	$ 324.39	$ 24.14	8.04%
Median Usage				
194,000	$ 271.81	$ 293.76	$ 21.95	8.08%

Present Rates:

Monthly Minimum:		$	44.83
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	400,000	$	1.17
Up to	999,999,999	$	1.46
Up to	999,999,999	$	1.46
Over	1,000,000,000	$	1.46

Proposed Rates:

Monthly Minimum:		$	49.32
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	400,000	$	1.26
Up to	999,999,999	$	1.57
Up to	999,999,999	$	1.57
Over	1,000,000,000	$	1.57

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 3 Inch Commercial (P2M1A)

Exhibit
Schedule H-4
Page 14
Witness: Kozoman

Usage	Present Bill	Proposed Bill	Dollar Increase	Percent Increase
-	$ 84.06	$ 92.47	$ 8.41	10.00%
1,000	85.23	93.73	$ 8.50	9.97%
2,000	86.40	94.99	$ 8.59	9.94%
3,000	87.57	96.25	$ 8.68	9.91%
4,000	88.74	97.51	$ 8.77	9.88%
5,000	89.91	98.77	$ 8.86	9.85%
6,000	91.08	100.03	$ 8.95	9.83%
7,000	92.25	101.29	$ 9.04	9.80%
8,000	93.42	102.55	$ 9.13	9.77%
9,000	94.59	103.81	$ 9.22	9.75%
10,000	95.76	105.07	$ 9.31	9.72%
11,000	96.93	106.33	$ 9.40	9.70%
12,000	98.10	107.59	$ 9.49	9.67%
13,000	99.27	108.85	$ 9.58	9.65%
14,000	100.44	110.11	$ 9.67	9.63%
15,000	101.61	111.37	$ 9.76	9.61%
16,000	102.78	112.63	$ 9.85	9.58%
17,000	103.95	113.89	$ 9.94	9.56%
18,000	105.12	115.15	$ 10.03	9.54%
19,000	106.29	116.41	$ 10.12	9.52%
20,000	107.46	117.67	$ 10.21	9.50%
40,000	130.86	142.87	$ 12.01	9.18%
80,000	177.66	193.27	$ 15.61	8.79%
190,000	306.36	331.87	$ 25.51	8.33%
289,000	422.19	456.61	$ 34.42	8.15%
774,000	1,098.10	1,183.65	$ 85.55	7.79%
1,393,000	2,001.84	2,155.48	$ 153.64	7.67%
5,114,000	7,434.50	7,997.45	$ 562.95	7.57%
Average Usage				
415,461	$ 574.63	$ 620.74	$ 46.11	8.02%
Median Usage				
12,501	$ 98.69	$ 108.22	$ 9.54	9.66%

Present Rates:		
Monthly Minimum:		$ 84.06
Gallons in Minimum		-
Charge Per 1,000 Gallons		
Up to	400,000	$ 1.17
Up to	999,999,999	$ 1.46
Up to	999,999,999	$ 1.46
Over	1,000,000,000	$ 1.46
Proposed Rates:		
Monthly Minimum:		$ 92.47
Gallons in Minimum		-
Charge Per 1,000 Gallons		
Up to	400,000	$ 1.26
Up to	999,999,999	$ 1.57
Up to	999,999,999	$ 1.57
Over	1,000,000,000	$ 1.57

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Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 4 Inch Commercial (P2M1A)

Exhibit
Schedule H-4
Page 15
Witness: Kozoman

Usage	Present Bill	Proposed Bill	Dollar Increase	Percent Increase
-	$ 140.10	$ 154.11	$ 14.01	10.00%
1,000	141.27	155.37	$ 14.10	9.98%
2,000	142.44	156.63	$ 14.19	9.96%
3,000	143.61	157.89	$ 14.28	9.94%
4,000	144.78	159.15	$ 14.37	9.93%
5,000	145.95	160.41	$ 14.46	9.91%
6,000	147.12	161.67	$ 14.55	9.89%
7,000	148.29	162.93	$ 14.64	9.87%
8,000	149.46	164.19	$ 14.73	9.86%
9,000	150.63	165.45	$ 14.82	9.84%
10,000	151.80	166.71	$ 14.91	9.82%
11,000	152.97	167.97	$ 15.00	9.81%
12,000	154.14	169.23	$ 15.09	9.79%
13,000	155.31	170.49	$ 15.18	9.77%
14,000	156.48	171.75	$ 15.27	9.76%
15,000	157.65	173.01	$ 15.36	9.74%
16,000	158.82	174.27	$ 15.45	9.73%
17,000	159.99	175.53	$ 15.54	9.71%
18,000	161.16	176.79	$ 15.63	9.70%
19,000	162.33	178.05	$ 15.72	9.68%
20,000	163.50	179.31	$ 15.81	9.67%
40,000	186.90	204.51	$ 17.61	9.42%
80,000	233.70	254.91	$ 21.21	9.08%
100,000	257.10	280.11	$ 23.01	8.95%

Present Rates:

Monthly Minimum:		$	140.10
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	400,000	$	1.17
Up to	999,999,999	$	1.46
Up to	999,999,999	$	1.46
Over	1,000,000,000	$	1.46

Proposed Rates:

Monthly Minimum:		$	154.11
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	400,000	$	1.26
Up to	999,999,999	$	1.57
Up to	999,999,999	$	1.57
Over	1,000,000,000	$	1.57

Average Usage				
-	$ 140.10	$ 154.11	$ 14.01	10.00%
Median Usage				
-	$ 140.10	$ 154.11	$ 14.01	10.00%

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 6 Inch Commercial (P2M1A)

Exhibit
Schedule H-4
Page 16
Witness: Kozoman

Usage	Present Bill	Proposed Bill	Dollar Increase	Percent Increase
-	$ 280.20	$ 308.22	$ 28.02	10.00%
1,000	281.37	309.48	$ 28.11	9.99%
2,000	282.54	310.74	$ 28.20	9.98%
3,000	283.71	312.00	$ 28.29	9.97%
4,000	284.88	313.26	$ 28.38	9.96%
5,000	286.05	314.52	$ 28.47	9.95%
6,000	287.22	315.78	$ 28.56	9.94%
7,000	288.39	317.04	$ 28.65	9.93%
8,000	289.56	318.30	$ 28.74	9.93%
9,000	290.73	319.56	$ 28.83	9.92%
10,000	291.90	320.82	$ 28.92	9.91%
11,000	293.07	322.08	$ 29.01	9.90%
12,000	294.24	323.34	$ 29.10	9.89%
13,000	295.41	324.60	$ 29.19	9.88%
14,000	296.58	325.86	$ 29.28	9.87%
15,000	297.75	327.12	$ 29.37	9.86%
16,000	298.92	328.38	$ 29.46	9.86%
17,000	300.09	329.64	$ 29.55	9.85%
18,000	301.26	330.90	$ 29.64	9.84%
19,000	302.43	332.16	$ 29.73	9.83%
20,000	303.60	333.42	$ 29.82	9.82%
40,000	327.00	358.62	$ 31.62	9.67%
80,000	373.80	409.02	$ 35.22	9.42%
153,000	459.21	501.00	$ 41.79	9.10%
312,000	645.24	701.34	$ 56.10	8.69%
632,000	1,086.92	1,176.46	$ 89.54	8.24%
1,054,000	1,703.04	1,839.00	$ 135.96	7.98%
3,410,000	5,142.80	5,537.92	$ 395.12	7.68%
6,365,000	9,457.10	10,177.27	$ 720.17	7.62%
Average Usage				
1,561,292	$ 2,443.69	$ 2,635.45	$ 191.76	7.85%
Median Usage				
474,000	$ 856.24	$ 928.40	$ 72.16	8.43%

Present Rates:			
Monthly Minimum:		$	280.20
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	400,000	$	1.17
Up to	999,999,999	$	1.46
Up to	999,999,999	$	1.46
Over	1,000,000,000	$	1.46
Proposed Rates:			
Monthly Minimum:		$	308.22
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	400,000	$	1.26
Up to	999,999,999	$	1.57
Up to	999,999,999	$	1.57
Over	1,000,000,000	$	1.57

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 3 Inch Turf (P2M1T)

Exhibit
Schedule H-4
Page 17
Witness: Kozoman

Usage	Present Bill	Proposed Bill	Dollar Increase	Percent Increase
-	$ 84.06	$ 92.47	$ 8.41	10.00%
1,000	84.96	93.47	8.51	10.02%
2,000	85.86	94.47	8.61	10.03%
3,000	86.76	95.47	8.71	10.04%
4,000	87.66	96.47	8.81	10.05%
5,000	88.56	97.47	8.91	10.06%
6,000	89.46	98.47	9.01	10.07%
7,000	90.36	99.47	9.11	10.08%
8,000	91.26	100.47	9.21	10.09%
9,000	92.16	101.47	9.31	10.10%
10,000	93.06	102.47	9.41	10.11%
11,000	93.96	103.47	9.51	10.12%
12,000	94.86	104.47	9.61	10.13%
13,000	95.76	105.47	9.71	10.14%
14,000	96.66	106.47	9.81	10.15%
15,000	97.56	107.47	9.91	10.16%
16,000	98.46	108.47	10.01	10.17%
17,000	99.36	109.47	10.11	10.18%
18,000	100.26	110.47	10.21	10.18%
19,000	101.16	111.47	10.31	10.19%
20,000	102.06	112.47	10.41	10.20%
40,000	120.06	132.47	12.41	10.34%
80,000	156.06	172.47	16.41	10.52%
100,000	174.06	192.47	18.41	10.58%
2,341,000	2,190.96	2,433.47	242.51	11.07%
5,295,000	4,849.56	5,387.47	537.91	11.09%
11,483,000	10,418.76	11,575.47	1,156.71	11.10%
Average Usage				
6,726,800	$ 6,138.18	$ 6,819.27	681.09	11.10%
Median Usage				
9,109,000	$ 8,282.16	$ 9,201.47	$ 919.31	11.10%

Present Rates:			
Monthly Minimum:		$	84.06
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	999,999,999	$	0.90
Up to	999,999,999	$	0.90
Up to	999,999,999	$	0.90
Over	1,000,000,000	$	0.90
Proposed Rates:			
Monthly Minimum:		$	92.47
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	999,999,999	$	1.00
Up to	999,999,999	$	1.00
Up to	999,999,999	$	1.00
Over	1,000,000,000	$	1.00

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 3 Inch Turf (P4M1T)

Exhibit
Schedule H-4
Page 18
Witness: Kozoman

Usage	Present Bill	Proposed Bill	Dollar Increase	Percent Increase
-	$ 84.06	$ 92.47	$ 8.41	10.00%
1,000	84.96	93.47	$ 8.51	10.02%
2,000	85.86	94.47	$ 8.61	10.03%
3,000	86.76	95.47	$ 8.71	10.04%
4,000	87.66	96.47	$ 8.81	10.05%
5,000	88.56	97.47	$ 8.91	10.06%
6,000	89.46	98.47	$ 9.01	10.07%
7,000	90.36	99.47	$ 9.11	10.08%
8,000	91.26	100.47	$ 9.21	10.09%
9,000	92.16	101.47	$ 9.31	10.10%
10,000	93.06	102.47	$ 9.41	10.11%
11,000	93.96	103.47	$ 9.51	10.12%
12,000	94.86	104.47	$ 9.61	10.13%
13,000	95.76	105.47	$ 9.71	10.14%
14,000	96.66	106.47	$ 9.81	10.15%
15,000	97.56	107.47	$ 9.91	10.16%
16,000	98.46	108.47	$ 10.01	10.17%
17,000	99.36	109.47	$ 10.11	10.18%
18,000	100.26	110.47	$ 10.21	10.18%
19,000	101.16	111.47	$ 10.31	10.19%
20,000	102.06	112.47	$ 10.41	10.20%
40,000	120.06	132.47	$ 12.41	10.34%
80,000	156.06	172.47	$ 16.41	10.52%
100,000	174.06	192.47	$ 18.41	10.58%
335,000	385.56	427.47	$ 41.91	10.87%
607,000	630.36	699.47	$ 69.11	10.96%
1,406,000	1,349.46	1,498.47	$ 149.01	11.04%

Average Usage				
812,955	$ 815.72	$ 905.42	$ 89.71	11.00%
Median Usage				
607,000	$ 630.36	$ 699.47	$ 69.11	10.96%

Present Rates:		
Monthly Minimum:		$ 84.06
Gallons in Minimum		-
Charge Per 1,000 Gallons		
Up to	999,999,999	$ 0.90
Up to	999,999,999	$ 0.90
Up to	999,999,999	$ 0.90
Over	1,000,000,000	$ 0.90
Proposed Rates:		
Monthly Minimum:		$ 92.47
Gallons in Minimum		-
Charge Per 1,000 Gallons		
Up to	999,999,999	$ 1.00
Up to	999,999,999	$ 1.00
Up to	999,999,999	$ 1.00
Over	1,000,000,000	$ 1.00

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: Paradise Valley Country Club (P2PVC)
6 Inch

Exhibit
Schedule H-4
Page 19
Witness: Kozoman

Usage	Present Bill	Proposed Bill	Dollar Increase	Percent Increase
-	$ 12,817.00	$ 12,817.00	$ -	0.00%
1,000	12,817.00	12,817.00	$ -	0.00%
2,000	12,817.00	12,817.00	$ -	0.00%
3,000	12,817.00	12,817.00	$ -	0.00%
4,000	12,817.00	12,817.00	$ -	0.00%
5,000	12,817.00	12,817.00	$ -	0.00%
6,000	12,817.00	12,817.00	$ -	0.00%
7,000	12,817.00	12,817.00	$ -	0.00%
8,000	12,817.00	12,817.00	$ -	0.00%
9,000	12,817.00	12,817.00	$ -	0.00%
10,000	12,817.00	12,817.00	$ -	0.00%
11,000	12,817.00	12,817.00	$ -	0.00%
12,000	12,817.00	12,817.00	$ -	0.00%
13,000	12,817.00	12,817.00	$ -	0.00%
14,000	12,817.00	12,817.00	$ -	0.00%
15,000	12,817.00	12,817.00	$ -	0.00%
16,000	12,817.00	12,817.00	$ -	0.00%
17,000	12,817.00	12,817.00	$ -	0.00%
18,000	12,817.00	12,817.00	$ -	0.00%
19,000	12,817.00	12,817.00	$ -	0.00%
20,000	12,817.00	12,817.00	$ -	0.00%
40,000	12,817.00	12,817.00	$ -	0.00%
80,000	12,817.00	12,817.00	$ -	0.00%
100,000	12,817.00	12,817.00	$ -	0.00%
5,852,000	12,817.00	12,817.00	$ -	0.00%
11,462,000	12,817.00	12,817.00	$ -	0.00%
21,949,000	12,817.00	12,817.00	$ -	0.00%
Average Usage				
16,921,917	$ 12,817.00	$ 12,817.00	$ -	0.00%
Median Usage				
15,880,000	$ 12,817.00	$ 12,817.00	$ -	0.00%

Present Rates:			
Monthly Minimum:		$	12,817.00
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	999,999,999	$	-
Up to	999,999,999	$	-
Up to	999,999,999	$	-
Over	1,000,000,000	$	-

Proposed Rates:			
Monthly Minimum:		$	12,817.00
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	999,999,999	$	-
Up to	999,999,999	$	-
Up to	999,999,999	$	-
Over	1,000,000,000	$	-

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 5/8 Inch OWU/OPA (P5M1A)

Exhibit
Schedule H-4
Page 20
Witness: Kozoman

Usage	Present Bill	Proposed Bill	Dollar Increase	Percent Increase
-	$ 8.41	$ 9.26	$ 0.85	10.11%
1,000	9.73	10.72	$ 0.99	10.17%
2,000	11.05	12.18	$ 1.13	10.23%
3,000	12.37	13.64	$ 1.27	10.27%
4,000	13.69	15.10	$ 1.41	10.30%
5,000	15.01	16.56	$ 1.55	10.33%
6,000	16.33	18.02	$ 1.69	10.35%
7,000	17.65	19.48	$ 1.83	10.37%
8,000	18.97	20.94	$ 1.97	10.38%
9,000	20.29	22.40	$ 2.11	10.40%
10,000	21.61	23.86	$ 2.25	10.41%
11,000	22.93	25.32	$ 2.39	10.42%
12,000	24.25	26.78	$ 2.53	10.43%
13,000	25.57	28.24	$ 2.67	10.44%
14,000	26.89	29.70	$ 2.81	10.45%
15,000	28.21	31.16	$ 2.95	10.46%
16,000	29.53	32.62	$ 3.09	10.46%
17,000	30.85	34.08	$ 3.23	10.47%
18,000	32.17	35.54	$ 3.37	10.48%
19,000	33.49	37.00	$ 3.51	10.48%
20,000	34.81	38.46	$ 3.65	10.49%
40,000	61.21	67.66	$ 6.45	10.54%
80,000	114.01	126.06	$ 12.05	10.57%
100,000	140.41	155.26	$ 14.85	10.58%
-				

	Present Bill	Proposed Bill	Dollar Increase	Percent Increase
Average Usage				
887	$ 9.58	$ 10.56	$ 0.97	10.17%
Median Usage				
2,501	$ 11.71	$ 12.91	$ 1.20	10.25%

Present Rates:

Monthly Minimum:		$ 8.41
Gallons in Minimum		-
Charge Per 1,000 Gallons		
Up to	999,999,999	$ 1.32
Up to	999,999,999	$ 1.32
Up to	999,999,999	$ 1.32
Over	1,000,000,000	$ 1.32

Proposed Rates:

Monthly Minimum:		$ 9.26
Gallons in Minimum		-
Charge Per 1,000 Gallons		
Up to	999,999,999	$ 1.46
Up to	999,999,999	$ 1.46
Up to	999,999,999	$ 1.46
Over	1,000,000,000	$ 1.46

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 1 Inch OWU/OPA (P5M1A)

Exhibit
Schedule H-4
Page 21
Witness: Kozoman

Usage	Present Bill	Proposed Bill	Dollar Increase	Percent Increase
-	$ 14.01	$ 15.42	$ 1.41	10.06%
1,000	15.33	16.88	$ 1.55	10.11%
2,000	16.65	18.34	$ 1.69	10.15%
3,000	17.97	19.80	$ 1.83	10.18%
4,000	19.29	21.26	$ 1.97	10.21%
5,000	20.61	22.72	$ 2.11	10.24%
6,000	21.93	24.18	$ 2.25	10.26%
7,000	23.25	25.64	$ 2.39	10.28%
8,000	24.57	27.10	$ 2.53	10.30%
9,000	25.89	28.56	$ 2.67	10.31%
10,000	27.21	30.02	$ 2.81	10.33%
11,000	28.53	31.48	$ 2.95	10.34%
12,000	29.85	32.94	$ 3.09	10.35%
13,000	31.17	34.40	$ 3.23	10.36%
14,000	32.49	35.86	$ 3.37	10.37%
15,000	33.81	37.32	$ 3.51	10.38%
16,000	35.13	38.78	$ 3.65	10.39%
17,000	36.45	40.24	$ 3.79	10.40%
18,000	37.77	41.70	$ 3.93	10.41%
19,000	39.09	43.16	$ 4.07	10.41%
20,000	40.41	44.62	$ 4.21	10.42%
40,000	66.81	73.82	$ 7.01	10.49%
80,000	119.61	132.22	$ 12.61	10.54%
145,000	205.41	227.12	$ 21.71	10.57%
303,000	413.97	457.80	$ 43.83	10.59%
505,000	680.61	752.72	$ 72.11	10.59%

Average Usage				
45,542	$ 74.12	$ 81.91	$ 7.79	10.50%
Median Usage				
3,001	$ 17.97	$ 19.80	$ 1.83	10.18%

Present Rates:

Monthly Minimum:		$ 14.01
Gallons in Minimum		-
Charge Per 1,000 Gallons		
Up to	999,999,999	$ 1.32
Up to	999,999,999	$ 1.32
Up to	999,999,999	$ 1.32
Over	1,000,000,000	$ 1.32

Proposed Rates:

Monthly Minimum:		$ 15.42
Gallons in Minimum		-
Charge Per 1,000 Gallons		
Up to	999,999,999	$ 1.46
Up to	999,999,999	$ 1.46
Up to	999,999,999	$ 1.46
Over	1,000,000,000	$ 1.46

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 2 Inch OWU/OPA (P5M 0

Exhibit
Schedule H-4
Page 22
Witness: Kozoman

Usage		Present Bill		Proposed Bill		Dollar Increase	Percent Increase
-	$	44.83	$	49.32	$	4.49	10.02%
1,000		46.15		50.78	$	4.63	10.03%
2,000		47.47		52.24	$	4.77	10.05%
3,000		48.79		53.70	$	4.91	10.06%
4,000		50.11		55.16	$	5.05	10.08%
5,000		51.43		56.62	$	5.19	10.09%
6,000		52.75		58.08	$	5.33	10.10%
7,000		54.07		59.54	$	5.47	10.12%
8,000		55.39		61.00	$	5.61	10.13%
9,000		56.71		62.46	$	5.75	10.14%
10,000		58.03		63.92	$	5.89	10.15%
11,000		59.35		65.38	$	6.03	10.16%
12,000		60.67		66.84	$	6.17	10.17%
13,000		61.99		68.30	$	6.31	10.18%
14,000		63.31		69.76	$	6.45	10.19%
15,000		64.63		71.22	$	6.59	10.20%
16,000		65.95		72.68	$	6.73	10.20%
17,000		67.27		74.14	$	6.87	10.21%
18,000		68.59		75.60	$	7.01	10.22%
19,000		69.91		77.06	$	7.15	10.23%
20,000		71.23		78.52	$	7.29	10.23%
40,000		97.63		107.72	$	10.09	10.33%
80,000		150.43		166.12	$	15.69	10.43%
123,000		207.19		228.90	$	21.71	10.48%
-							

Average Usage							
21,000	$	72.55	$	79.98	$	7.43	10.24%
Median Usage							
9,501	$	57.37	$	63.19	$	5.82	10.14%

Present Rates:

Monthly Minimum:		$	44.83
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	999,999,999	$	1.32
Up to	999,999,999	$	1.32
Up to	999,999,999	$	1.32
Over	1,000,000,000	$	1.32

Proposed Rates:

Monthly Minimum:		$	49.32
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	999,999,999	$	1.46
Up to	999,999,999	$	1.46
Up to	999,999,999	$	1.46
Over	1,000,000,000	$	1.46

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 5/8 Inch Fire (P6M1A) 0

Exhibit
Schedule H-4
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Witness: Kozoman

Usage	Present Bill	Proposed Bill	Dollar Increase	Percent Increase
-	$ 5.00	$ 5.00	$ -	0.00%
1,000	5.00	5.00	$ -	0.00%
2,000	5.00	5.00	$ -	0.00%
3,000	5.00	5.00	$ -	0.00%
4,000	5.00	5.00	$ -	0.00%
5,000	5.00	5.00	$ -	0.00%
6,000	5.00	5.00	$ -	0.00%
7,000	5.00	5.00	$ -	0.00%
8,000	5.00	5.00	$ -	0.00%
9,000	5.00	5.00	$ -	0.00%
10,000	5.00	5.00	$ -	0.00%
11,000	5.00	5.00	$ -	0.00%
12,000	5.00	5.00	$ -	0.00%
13,000	5.00	5.00	$ -	0.00%
14,000	5.00	5.00	$ -	0.00%
15,000	5.00	5.00	$ -	0.00%
16,000	5.00	5.00	$ -	0.00%
17,000	5.00	5.00	$ -	0.00%
18,000	5.00	5.00	$ -	0.00%
19,000	5.00	5.00	$ -	0.00%
20,000	5.00	5.00	$ -	0.00%
40,000	5.00	5.00	$ -	0.00%
80,000	5.00	5.00	$ -	0.00%
100,000	5.00	5.00	$ -	0.00%
Average Usage				
136	$ 5.00	$ 5.00	$ -	0.00%
Median Usage				
-	$ 5.00	$ 5.00	$ -	0.00%

Present Rates:			
Monthly Minimum:		$	5.00
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	999,999,999	$	-
Up to	999,999,999	$	-
Up to	999,999,999	$	-
Over	1,000,000,000	$	-

Proposed Rates:			
Monthly Minimum:		$	5.00
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	999,999,999	$	-
Up to	999,999,999	$	-
Up to	999,999,999	$	-
Over	1,000,000,000	$	-

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 3/4 Inch Fire (P6M1A) 0

Exhibit
Schedule H-4
Page 24
Witness: Kozoman

Usage	Present Bill	Proposed Bill	Dollar Increase	Percent Increase
-	$ 5.00	$ 5.00	$ -	0.00%
1,000	5.00	5.00	$ -	0.00%
2,000	5.00	5.00	$ -	0.00%
3,000	5.00	5.00	$ -	0.00%
4,000	5.00	5.00	$ -	0.00%
5,000	5.00	5.00	$ -	0.00%
6,000	5.00	5.00	$ -	0.00%
7,000	5.00	5.00	$ -	0.00%
8,000	5.00	5.00	$ -	0.00%
9,000	5.00	5.00	$ -	0.00%
10,000	5.00	5.00	$ -	0.00%
11,000	5.00	5.00	$ -	0.00%
12,000	5.00	5.00	$ -	0.00%
13,000	5.00	5.00	$ -	0.00%
14,000	5.00	5.00	$ -	0.00%
15,000	5.00	5.00	$ -	0.00%
16,000	5.00	5.00	$ -	0.00%
17,000	5.00	5.00	$ -	0.00%
18,000	5.00	5.00	$ -	0.00%
19,000	5.00	5.00	$ -	0.00%
20,000	5.00	5.00	$ -	0.00%
40,000	5.00	5.00	$ -	0.00%
80,000	5.00	5.00	$ -	0.00%
100,000	5.00	5.00	$ -	0.00%

Average Usage				
-	$ 5.00	$ 5.00	$ -	0.00%
Median Usage				
-	$ 5.00	$ 5.00	$ -	0.00%

Present Rates:

Monthly Minimum:		$	5.00
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	999,999,999	$	-
Up to	999,999,999	$	-
Up to	999,999,999	$	-
Over	1,000,000,000	$	-

Proposed Rates:

Monthly Minimum:		$	5.00
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	999,999,999	$	-
Up to	999,999,999	$	-
Up to	999,999,999	$	-
Over	1,000,000,000	$	-

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 1 Inch Fire (P6M1A) 0

Exhibit
Schedule H-4
Page 25
Witness: Kozoman

Usage		Present Bill		Proposed Bill		Dollar Increase	Percent Increase
-	$	5.00	$	5.00	$	-	0.00%
1,000		5.00		5.00	$	-	0.00%
2,000		5.00		5.00	$	-	0.00%
3,000		5.00		5.00	$	-	0.00%
4,000		5.00		5.00	$	-	0.00%
5,000		5.00		5.00	$	-	0.00%
6,000		5.00		5.00	$	-	0.00%
7,000		5.00		5.00	$	-	0.00%
8,000		5.00		5.00	$	-	0.00%
9,000		5.00		5.00	$	-	0.00%
10,000		5.00		5.00	$	-	0.00%
11,000		5.00		5.00	$	-	0.00%
12,000		5.00		5.00	$	-	0.00%
13,000		5.00		5.00	$	-	0.00%
14,000		5.00		5.00	$	-	0.00%
15,000		5.00		5.00	$	-	0.00%
16,000		5.00		5.00	$	-	0.00%
17,000		5.00		5.00	$	-	0.00%
18,000		5.00		5.00	$	-	0.00%
19,000		5.00		5.00	$	-	0.00%
20,000		5.00		5.00	$	-	0.00%
40,000		5.00		5.00	$	-	0.00%
80,000		5.00		5.00	$	-	0.00%
100,000		5.00		5.00	$	-	0.00%

Present Rates:			
Monthly Minimum:		$	5.00
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	999,999,999	$	-
Up to	999,999,999	$	-
Up to	999,999,999	$	-
Over	1,000,000,000	$	-

Proposed Rates:			
Monthly Minimum:		$	5.00
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	999,999,999	$	-
Up to	999,999,999	$	-
Up to	999,999,999	$	-
Over	1,000,000,000	$	-

Average Usage							
-	$	5.00	$	5.00	$	-	0.00%
Median Usage							
-	$	5.00	$	5.00	$	-	0.00%

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 2 Inch Fire (P6M1A) 0

Exhibit
Schedule H-4
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Witness: Kozoman

Usage		Present Bill		Proposed Bill		Dollar Increase	Percent Increase
-	$	5.00	$	5.00	$	-	0.00%
1,000		5.00		5.00	$	-	0.00%
2,000		5.00		5.00	$	-	0.00%
3,000		5.00		5.00	$	-	0.00%
4,000		5.00		5.00	$	-	0.00%
5,000		5.00		5.00	$	-	0.00%
6,000		5.00		5.00	$	-	0.00%
7,000		5.00		5.00	$	-	0.00%
8,000		5.00		5.00	$	-	0.00%
9,000		5.00		5.00	$	-	0.00%
10,000		5.00		5.00	$	-	0.00%
11,000		5.00		5.00	$	-	0.00%
12,000		5.00		5.00	$	-	0.00%
13,000		5.00		5.00	$	-	0.00%
14,000		5.00		5.00	$	-	0.00%
15,000		5.00		5.00	$	-	0.00%
16,000		5.00		5.00	$	-	0.00%
17,000		5.00		5.00	$	-	0.00%
18,000		5.00		5.00	$	-	0.00%
19,000		5.00		5.00	$	-	0.00%
20,000		5.00		5.00	$	-	0.00%
40,000		5.00		5.00	$	-	0.00%
80,000		5.00		5.00	$	-	0.00%
100,000		5.00		5.00	$	-	0.00%
Average Usage							
14	$	5.00	$	5.00	$	-	0.00%
Median Usage							
-	$	5.00	$	5.00	$	-	0.00%

Present Rates:

Monthly Minimum:		$	5.00
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	999,999,999	$	-
Up to	999,999,999	$	-
Up to	999,999,999	$	-
Over	1,000,000,000	$	-

Proposed Rates:

Monthly Minimum:		$	5.00
Gallons in Minimum			-
Charge Per 1,000 Gallons			
Up to	999,999,999	$	-
Up to	999,999,999	$	-
Up to	999,999,999	$	-
Over	1,000,000,000	$	-

Arizona-American Water Company /Paradise Valley Water District
Bill Comparison Present and Proposed Rates
Meter Size and Zone: 3 Inch Irrigation (P7M1A)

Exhibit
Schedule H-4
Page 27
Witness: Kozoman

Usage	Present Bill	Proposed Bill	Dollar Increase	Percent Increase
-	$ 84.06	$ 92.47	$ 8.41	10.00%
1,000	85.38	93.93	$ 8.55	10.01%
2,000	86.70	95.39	$ 8.69	10.02%
3,000	88.02	96.85	$ 8.83	10.03%
4,000	89.34	98.31	$ 8.97	10.04%
5,000	90.66	99.77	$ 9.11	10.05%
6,000	91.98	101.23	$ 9.25	10.06%
7,000	93.30	102.69	$ 9.39	10.06%
8,000	94.62	104.15	$ 9.53	10.07%
9,000	95.94	105.61	$ 9.67	10.08%
10,000	97.26	107.07	$ 9.81	10.09%
11,000	98.58	108.53	$ 9.95	10.09%
12,000	99.90	109.99	$ 10.09	10.10%
13,000	101.22	111.45	$ 10.23	10.11%
14,000	102.54	112.91	$ 10.37	10.11%
15,000	103.86	114.37	$ 10.51	10.12%
16,000	105.18	115.83	$ 10.65	10.13%
17,000	106.50	117.29	$ 10.79	10.13%
18,000	107.82	118.75	$ 10.93	10.14%
19,000	109.14	120.21	$ 11.07	10.14%
20,000	110.46	121.67	$ 11.21	10.15%
40,000	136.86	150.87	$ 14.01	10.24%
80,000	189.66	209.27	$ 19.61	10.34%
100,000	216.06	238.47	$ 22.41	10.37%

Present Rates:

Monthly Minimum:		$ 84.06
Gallons in Minimum		-
Charge Per 1,000 Gallons		
Up to	999,999,999	$ 1.32
Up to	999,999,999	$ 1.32
Up to	999,999,999	$ 1.32
Over	1,000,000,000	$ 1.32

Proposed Rates:

Monthly Minimum:		$ 92.47
Gallons in Minimum		-
Charge Per 1,000 Gallons		
Up to	999,999,999	$ 1.46
Up to	999,999,999	$ 1.46
Up to	999,999,999	$ 1.46
Over	1,000,000,000	$ 1.46

Average Usage				
-	$ 84.06	$ 92.47	$ 8.41	10.00%
Median Usage				
-	$ 84.06	$ 92.47	$ 8.41	10.00%

Arizona-American Water Company /Paradise Valley Water District
Test Year 12 Months Ended December 2004
Other Meter: Sales for Resale

Various Meter Sizes

Exhibit
Schedule H-4
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Witness: Kozoman

Line No.	Meter Size & Number			Proposed Rates Annual Totals
1				
2	5/8			58
3	3/4			
4	1			120
5	1.5			
6	2			48
7	3			
8	4			
9	6			
10	TOTAL			226
11				
12	Monthly Minimum Rates			
13	5/8		$	9.26
14	3/4		$	9.62
15	1		$	15.42
16	1.5		$	30.83
17	2		$	49.32
18	3		$	92.47
19	4		$	154.11
20	6		$	308.22
21				
22	Revenues from Monthly Minimums Rates			
23	5/8		$	537.08
24	3/4		$	-
25	1		$	1,850.40
26	1.5		$	-
27	2		$	2,367.36
28	3		$	-
29	4		$	-
30	6		$	-
31	TOTAL		$	4,754.84
32				
33	Quantity of Water Sold in 1,000's of Gallons			
34	Total			6,780
35	Commodity Rate		$	1.46
36	Revenues from			
37	Commodity Rates			$9,899
38	(Line 34 times Line 35)			
39	TOTAL REVENUES		$	14,654
40	(Line 31 + Line 36)	Average Number of Customers		18.83
41		Average Usage		565
42	Dollar Change from Present Rates			
43				$1,383.22
44	Percentage Change from Present Rates			
45				10.42%

ıa-American Water Company /Paradise Valley Water C
Test Year 12 Months Ended December 2004
Meter Size and Zone: 5/8 Inch Residential (P1M1A)

Exhibit
Schedule H-5
Page 1
Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumulative Billing	MidPoint Usage
-	-	1,631	1,631	-
1	1,000	926	2,557	501
1,001	2,000	1,045	3,602	1,501
2,001	3,000	1,112	4,714	2,501
3,001	4,000	1,183	5,897	3,501
4,001	5,000	1,142	7,039	4,501
5,001	6,000	1,079	8,118	5,501
6,001	7,000	1,119	9,237	6,501
7,001	8,000	975	10,212	7,501
8,001	9,000	935	11,147	8,501
9,001	10,000	954	12,101	9,501
10,001	11,000	762	12,863	10,501
11,001	12,000	753	13,616	11,501
12,001	13,000	704	14,320	12,501
13,001	14,000	624	14,944	13,501
14,001	15,000	563	15,507	14,501
15,001	16,000	525	16,032	15,501
16,001	17,000	498	16,530	16,501
17,001	18,000	451	16,981	17,501
18,001	19,000	478	17,459	18,501
19,001	20,000	444	17,903	19,501
39,001	40,000	172	23,307	39,501
79,001	80,000	45	26,590	79,501
160,000	160,000	5	27,666	160,000
321,000	321,000	1	27,820	321,000
332,000	332,000	1	27,821	332,000
337,000	337,000	1	27,822	337,000
398,000	398,000	1	27,823	398,000

	27,823	Median
Average Usage	22,193	Billing
Median Usage	11,500	13,912
Average # Customer	2,319	

›na-American Water Company /Paradise Valley Water Di:
Test Year 12 Months Ended December 2004
Meter Size and Zone: 3/4 Inch Residential (P1M1A)

Exhibit
Schedule H-5
Page 2
Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumulative Billing	MidPoint Usage
-	-	95	95	-
1	1,000	31	126	501
1,001	2,000	20	146	1,501
2,001	3,000	17	163	2,501
3,001	4,000	14	177	3,501
4,001	5,000	10	187	4,501
5,001	6,000	1	188	5,501
6,001	7,000	1	189	6,501
7,001	8,000	3	192	7,501
8,001	9,000	1	193	8,501
9,001	10,000	1	194	9,501
10,001	11,000	-	194	10,501
11,001	12,000	-	194	11,501
12,001	13,000	-	194	12,501
13,001	14,000	-	194	13,501
14,001	15,000	-	194	14,501
15,001	16,000	-	194	15,501
16,001	17,000	-	194	16,501
17,001	18,000	-	194	17,501
18,001	19,000	-	194	18,501
19,001	20,000	-	194	19,501
39,001	40,000	-	196	39,501
79,001	80,000	-	197	79,501
134,000	134,000	1	200	134,000

Totals	200	Median
Average Usage	3,473	Billing
Median Usage	1,000	100
Average # Customers	17	

na-American Water Company /Paradise Valley Water D
Test Year 12 Months Ended December 2004
Meter Size and Zone: 1 Inch Residential (P1M1A)

Exhibit
Schedule H-5
Page 3
Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumulative Billing	MidPoint Usage
-	-	550	550	-
1	1,000	142	692	501
1,001	2,000	135	827	1,501
2,001	3,000	164	991	2,501
3,001	4,000	199	1,190	3,501
4,001	5,000	257	1,447	4,501
5,001	6,000	259	1,706	5,501
6,001	7,000	265	1,971	6,501
7,001	8,000	330	2,301	7,501
8,001	9,000	336	2,637	8,501
9,001	10,000	374	3,011	9,501
10,001	11,000	349	3,360	10,501
11,001	12,000	382	3,742	11,501
12,001	13,000	366	4,108	12,501
13,001	14,000	355	4,463	13,501
14,001	15,000	365	4,828	14,501
15,001	16,000	330	5,158	15,501
16,001	17,000	369	5,527	16,501
17,001	18,000	316	5,843	17,501
18,001	19,000	268	6,111	18,501
19,001	20,000	287	6,398	19,501
39,001	40,000	195	11,215	39,501
79,001	80,000	113	17,047	79,501
160,000	160,000	22	21,300	160,000
320,000	320,000	4	22,575	320,000
639,000	639,000	1	22,714	639,000
1,166,000	1,166,000	1	22,731	1,166,000
2,258,000	2,258,000	1	22,738	2,258,000

Totals	22,738	Median
Average Usage	59,845	Billing
Median Usage	40,501	11,369
Average # Customers	1,895	

ona-American Water Company /Paradise Valley Water Di:
Test Year 12 Months Ended December 2004
Meter Size and Zone: 1 1/2 Inch Residential (P1M1A)

Exhibit
Schedule H-5
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Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumulative Billing	MidPoint Usage
-	-	3	3	-
1	1,000	11	14	501
1,001	2,000	4	18	1,501
2,001	3,000	-	18	2,501
3,001	4,000	-	18	3,501
4,001	5,000	-	18	4,501
5,001	6,000	1	19	5,501
6,001	7,000	-	19	6,501
7,001	8,000	1	20	7,501
8,001	9,000	-	20	8,501
9,001	10,000	-	20	9,501
10,001	11,000	1	21	10,501
11,001	12,000	-	21	11,501
12,001	13,000	-	21	12,501
13,001	14,000	1	22	13,501
14,001	15,000	3	25	14,501
15,001	16,000	5	30	15,501
16,001	17,000	1	31	16,501
17,001	18,000	1	32	17,501
18,001	19,000	2	34	18,501
19,001	20,000	-	34	19,501
39,001	40,000	1	44	39,501
79,001	80,000	-	49	79,501
161,000	161,000	1	71	161,000
321,000	321,000	1	95	321,000
666,000	666,000	1	110	666,000
	Totals	114	Median	
	Average Usage	181,715	Billing	
	Median Usage	103,000	57	
	Average # Customers	10		

ıa-American Water Company /Paradise Valley Water I
Test Year 12 Months Ended December 2004
Meter Size and Zone: 2 Inch Residential (P1M1A)

Exhibit
Schedule H-5
Page 5
Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumulative Billing	MidPoint Usage
-	-	149	149	-
1	1,000	8	157	501
1,001	2,000	13	170	1,501
2,001	3,000	11	181	2,501
3,001	4,000	11	192	3,501
4,001	5,000	7	199	4,501
5,001	6,000	18	217	5,501
6,001	7,000	14	231	6,501
7,001	8,000	10	241	7,501
8,001	9,000	3	244	8,501
9,001	10,000	9	253	9,501
10,001	11,000	12	265	10,501
11,001	12,000	9	274	11,501
12,001	13,000	7	281	12,501
13,001	14,000	13	294	13,501
14,001	15,000	12	306	14,501
15,001	16,000	13	319	15,501
16,001	17,000	9	328	16,501
17,001	18,000	9	337	17,501
18,001	19,000	6	343	18,501
19,001	20,000	11	354	19,501
39,001	40,000	4	529	39,501
79,001	80,000	6	737	79,501
160,000	160,000	3	1,006	160,000
322,000	322,000	1	1,250	322,000
656,000	656,000	1	1,394	656,000
		-	1,414	-
		-	1,414	-
Totals		1,414	Median Billing	
Average Usage		133,501		
Median Usage		74,501	707	
Average # Customers		118		

ɔna-American Water Company /Paradise Valley Water Di:
Test Year 12 Months Ended December 2004
Meter Size and Zone: 5/8 Inch Residential (P1M1B) Mummy Mountain

Exhibit
Schedule H-5
Page 6
Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumulative Billing	MidPoint Usage
-	-	-	-	-
1	1,000	-	-	501
1,001	2,000	-	-	1,501
2,001	3,000	-	-	2,501
3,001	4,000	-	-	3,501
4,001	5,000	1	1	4,501
5,001	6,000	-	1	5,501
6,001	7,000	3	4	6,501
7,001	8,000	-	4	7,501
8,001	9,000	1	5	8,501
9,001	10,000	-	5	9,501
10,001	11,000	1	6	10,501
11,001	12,000	1	7	11,501
12,001	13,000	1	8	12,501
13,001	14,000	-	8	13,501
14,001	15,000	1	9	14,501
15,001	16,000	1	10	15,501
16,001	17,000	-	10	16,501
17,001	18,000	1	11	17,501
18,001	19,000	1	12	18,501
19,001	20,000	1	13	19,501
39,001	40,000	-	13	39,501
79,001	80,000	-	19	79,501
191,000	191,000	1	24	191,000
Totals		24	Median	

Average Usage	48,250	Billing
Median Usage	11,001	12
Average # Customers	2	

na-American Water Company /Paradise Valley Water Di
Test Year 12 Months Ended December 2004
Meter Size and Zone: 1 Inch Residential (P1M1B) Mummy Mountain

Exhibit
Schedule H-5
Page 7
Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumulative Billing	MidPoint Usage
-	-	23	23	-
1	1,000	2	25	501
1,001	2,000	8	33	1,501
2,001	3,000	6	39	2,501
3,001	4,000	8	47	3,501
4,001	5,000	3	50	4,501
5,001	6,000	3	53	5,501
6,001	7,000	-	53	6,501
7,001	8,000	3	56	7,501
8,001	9,000	1	57	8,501
9,001	10,000	2	59	9,501
10,001	11,000	3	62	10,501
11,001	12,000	2	64	11,501
12,001	13,000	1	65	12,501
13,001	14,000	3	68	13,501
14,001	15,000	2	70	14,501
15,001	16,000	4	74	15,501
16,001	17,000	1	75	16,501
17,001	18,000	2	77	17,501
18,001	19,000	3	80	18,501
19,001	20,000	1	81	19,501
39,001	40,000	3	120	39,501
79,001	80,000	2	204	79,501
160,000	160,000	1	309	160,000
324,000	324,000	1	375	324,000
601,000	601,000	1	385	601,000
		-	385	-
		-	385	-
	-	-	385	-
Totals		385	Median	
Average Usage		98,970	Billing	
Median Usage		73,501	193	
Average # Customers		32		

a-American Water Company /Paradise Valley Water
Test Year 12 Months Ended December 2004
Meter Size and Zone: 1 1/2 Inch Residential (P1M1B) Mummy Mountain

Exhibit
Schedule H-5
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Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumulative Billing	MidPoint Usage
-	-	3	3	-
1	1,000	4	7	501
1,001	2,000	-	7	1,501
2,001	3,000	-	7	2,501
3,001	4,000	3	10	3,501
4,001	5,000	-	10	4,501
5,001	6,000	2	12	5,501
6,001	7,000	1	13	6,501
7,001	8,000	-	13	7,501
8,001	9,000	2	15	8,501
9,001	10,000	2	17	9,501
10,001	11,000	6	23	10,501
11,001	12,000	2	25	11,501
12,001	13,000	1	26	12,501
13,001	14,000	6	32	13,501
14,001	15,000	-	32	14,501
15,001	16,000	2	34	15,501
16,001	17,000	3	37	16,501
17,001	18,000	3	40	17,501
18,001	19,000	1	41	18,501
19,001	20,000	3	44	19,501
39,001	40,000	2	90	39,501
79,001	80,000	-	125	79,501
165,000	165,000	1	190	165,000
315,000	315,000	1	230	315,000
Totals		230	Median	
Average Usage		87,555	Billing	
Median Usage		64,501	115	
Average # Customers		19		

izona-American Water Company /Paradise Valley Water Distı
Test Year 12 Months Ended December 2004
Meter Size and Zone: 2 Inch Residential (P1M1B) Mummy Mountain

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Schedule H-5
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Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumul-ative Billing	MidPoint Usage
-	-	2	2	-
1	1,000	-	2	501
1,001	2,000	2	4	1,501
2,001	3,000	1	5	2,501
3,001	4,000	-	5	3,501
4,001	5,000	-	5	4,501
5,001	6,000	-	5	5,501
6,001	7,000	1	6	6,501
7,001	8,000	-	6	7,501
8,001	9,000	2	8	8,501
9,001	10,000	1	9	9,501
10,001	11,000	1	10	10,501
11,001	12,000	-	10	11,501
12,001	13,000	2	12	12,501
13,001	14,000	-	12	13,501
14,001	15,000	-	12	14,501
15,001	16,000	2	14	15,501
16,001	17,000	1	15	16,501
17,001	18,000	-	15	17,501
18,001	19,000	1	16	18,501
19,001	20,000	1	17	19,501
39,001	40,000	1	28	39,501
79,001	80,000	-	52	79,501
162,000	162,000	1	86	162,000
332,000	332,000	1	102	332,000
		-	108	-
Totals		108	Median	
Average Usage		111,949	Billing	
Median Usage		84,501	54	
Average # Customers		9		

ona-American Water Company /Paradise Valley Water Dis
Test Year 12 Months Ended December 2004
Meter Size and Zone: 5/8 Inch Commercial (P2M1A)

Exhibit
Schedule H-5
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Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumulative Billing	MidPoint Usage
-	-	285	285	-
1	1,000	14	299	501
1,001	2,000	11	310	1,501
2,001	3,000	22	332	2,501
3,001	4,000	13	345	3,501
4,001	5,000	13	358	4,501
5,001	6,000	10	368	5,501
6,001	7,000	5	373	6,501
7,001	8,000	7	380	7,501
8,001	9,000	5	385	8,501
9,001	10,000	2	387	9,501
10,001	11,000	2	389	10,501
11,001	12,000	3	392	11,501
12,001	13,000	3	395	12,501
13,001	14,000	-	395	13,501
14,001	15,000	2	397	14,501
15,001	16,000	2	399	15,501
16,001	17,000	5	404	16,501
17,001	18,000	-	404	17,501
18,001	19,000	5	409	18,501
19,001	20,000	1	410	19,501
39,001	40,000	1	426	39,501
79,001	80,000	-	442	79,501
204,000	204,000	1	447	204,000
		-	447	-
	-	-	447	-
Totals		447	Median	
Average Usage		5,971	Billing	
Median Usage		-	224	
Average # Customers		37		

zona-American Water Company /Paradise Valley Water Dist
Test Year 12 Months Ended December 2004
Meter Size and Zone: 1 Inch Commercial (P2M1A)

Exhibit
Schedule H-5
Page 11
Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumulative Billing	MidPoint Usage
-	-	29	29	-
1	1,000	8	37	501
1,001	2,000	4	41	1,501
2,001	3,000	10	51	2,501
3,001	4,000	14	65	3,501
4,001	5,000	11	76	4,501
5,001	6,000	4	80	5,501
6,001	7,000	13	93	6,501
7,001	8,000	7	100	7,501
8,001	9,000	10	110	8,501
9,001	10,000	13	123	9,501
10,001	11,000	13	136	10,501
11,001	12,000	12	148	11,501
12,001	13,000	6	154	12,501
13,001	14,000	11	165	13,501
14,001	15,000	9	174	14,501
15,001	16,000	5	179	15,501
16,001	17,000	3	182	16,501
17,001	18,000	6	188	17,501
18,001	19,000	6	194	18,501
19,001	20,000	3	197	19,501
39,001	40,000	-	275	39,501
79,001	80,000	3	343	79,501
160,000	160,000	2	423	160,000
361,000	361,000	1	485	361,000
664,000	664,000	1	490	664,000
	-	-	490	-
Totals		490	Median	
Average Usage		70,880	Billing	
Median Usage		29,501	245	
Average # Customers		41		

›na-American Water Company /Paradise Valley Water Di:
Test Year 12 Months Ended December 2004
Meter Size and Zone: 1 1/2 Inch Commercial (P2M1A)

Exhibit
Schedule H-5
Page 12
Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumul-ative Billing	MidPoint Usage
-	-	35	35	-
1	1,000	-	35	501
1,001	2,000	7	42	1,501
2,001	3,000	6	48	2,501
3,001	4,000	1	49	3,501
4,001	5,000	-	49	4,501
5,001	6,000	3	52	5,501
6,001	7,000	4	56	6,501
7,001	8,000	2	58	7,501
8,001	9,000	4	62	8,501
9,001	10,000	2	64	9,501
10,001	11,000	3	67	10,501
11,001	12,000	2	69	11,501
12,001	13,000	2	71	12,501
13,001	14,000	4	75	13,501
14,001	15,000	3	78	14,501
15,001	16,000	1	79	15,501
16,001	17,000	1	80	16,501
17,001	18,000	2	82	17,501
18,001	19,000	1	83	18,501
19,001	20,000	1	84	19,501
39,001	40,000	1	107	39,501
79,001	80,000	-	143	79,501
160,000	160,000	1	212	160,000
341,000	341,000	1	248	341,000
682,000	682,000	1	261	682,000
	-	-	262	-
Totals		262	Median	

Average Usage	99,279	Billing
Median Usage	61,501	131
Average # Customers	22	

na-American Water Company /Paradise Valley Water Di
Test Year 12 Months Ended December 2004
Meter Size and Zone: 2 Inch Commercial (P2M1A)

Exhibit
Schedule H-5
Page 13
Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumulative Billing	MidPoint Usage
-	-	101	101	-
1	1,000	5	106	501
1,001	2,000	2	108	1,501
2,001	3,000	4	112	2,501
3,001	4,000	2	114	3,501
4,001	5,000	3	117	4,501
5,001	6,000	2	119	5,501
6,001	7,000	-	119	6,501
7,001	8,000	3	122	7,501
8,001	9,000	3	125	8,501
9,001	10,000	1	126	9,501
10,001	11,000	3	129	10,501
11,001	12,000	4	133	11,501
12,001	13,000	2	135	12,501
13,001	14,000	2	137	13,501
14,001	15,000	4	141	14,501
15,001	16,000	2	143	15,501
16,001	17,000	3	146	16,501
17,001	18,000	2	148	17,501
18,001	19,000	5	153	18,501
19,001	20,000	4	157	19,501
39,001	40,000	5	221	39,501
79,001	80,000	4	341	79,501
160,000	160,000	2	527	160,000
320,000	320,000	2	814	320,000
641,000	641,000	2	1,198	641,000
1,219,000	1,219,000	1	1,374	1,219,000
1,220,000	1,220,000	1	1,375	1,220,000
1,826,000	1,826,000	1	1,393	1,826,000
		-	1,393	-
		-	1,393	-
		-	1,393	-
Totals		1,171	Median	
Average Usage		218,311	Billing	
Median Usage		194,000	586	
Average # Customers		98		

ona-American Water Company /Paradise Valley Water Dis
Test Year 12 Months Ended December 2004
Meter Size and Zone: 3 Inch Commercial (P2M1A)

Exhibit
Schedule H-5
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Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumulative Billing	MidPoint Usage
-	-	35	35	-
1	1,000	5	40	501
1,001	2,000	2	42	1,501
2,001	3,000	8	50	2,501
3,001	4,000	2	52	3,501
4,001	5,000	1	53	4,501
5,001	6,000	4	57	5,501
6,001	7,000	1	58	6,501
7,001	8,000	2	60	7,501
8,001	9,000	2	62	8,501
9,001	10,000	2	64	9,501
10,001	11,000	3	67	10,501
11,001	12,000	-	67	11,501
12,001	13,000	3	70	12,501
13,001	14,000	2	72	13,501
14,001	15,000	2	74	14,501
15,001	16,000	2	76	15,501
16,001	17,000	2	78	16,501
17,001	18,000	-	78	17,501
18,001	19,000	-	78	18,501
19,001	20,000	-	78	19,501
39,001	40,000	-	89	39,501
79,001	80,000	-	101	79,501
190,000	190,000	1	112	190,000
289,000	289,000	1	116	289,000
774,000	774,000	1	118	774,000
1,393,000	1,393,000	1	127	1,393,000
5,114,000	5,114,000	1	139	5,114,000
		-	139	-
	-	-	139	-
Totals		139	Median	

Average Usage	415,461	Billing
Median Usage	12,501	70
Average # Customers	12	

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na-American Water Company /Paradise Valley Water D
Test Year 12 Months Ended December 2004
Meter Size and Zone: 4 Inch Commercial (P2M1A)

Exhibit
Schedule H-5
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Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumulative Billing	MidPoint Usage
-	-	12	12	-
1	1,000	-	12	501
1,001	2,000	-	12	1,501
2,001	3,000	-	12	2,501
3,001	4,000	-	12	3,501
4,001	5,000	-	12	4,501
5,001	6,000	-	12	5,501
6,001	7,000	-	12	6,501
7,001	8,000	-	12	7,501
8,001	9,000	-	12	8,501
9,001	10,000	-	12	9,501
10,001	11,000	-	12	10,501
11,001	12,000	-	12	11,501
12,001	13,000	-	12	12,501
13,001	14,000	-	12	13,501
14,001	15,000	-	12	14,501
15,001	16,000	-	12	15,501
16,001	17,000	-	12	16,501
17,001	18,000	-	12	17,501
18,001	19,000	-	12	18,501
19,001	20,000	-	12	19,501
39,001	40,000	-	12	39,501
79,001	80,000	-	12	79,501
99,001	100,000	-	12	99,501
	-	-	12	-
Totals		12	Median	

Average Usage	-	Billing
Median Usage	-	6
Average # Customers	1	

na-American Water Company /Paradise Valley Water D
Test Year 12 Months Ended December 2004
Meter Size and Zone: 6 Inch Commercial (P2M1A)

Exhibit
Schedule H-5
Page 16
Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumul-ative Billing	MidPoint Usage
-	-	1	1	-
1	1,000	-	1	501
1,001	2,000	-	1	1,501
2,001	3,000	-	1	2,501
3,001	4,000	-	1	3,501
4,001	5,000	-	1	4,501
5,001	6,000	-	1	5,501
6,001	7,000	-	1	6,501
7,001	8,000	-	1	7,501
8,001	9,000	-	1	8,501
9,001	10,000	-	1	9,501
10,001	11,000	-	1	10,501
11,001	12,000	-	1	11,501
12,001	13,000	-	1	12,501
13,001	14,000	-	1	13,501
14,001	15,000	-	1	14,501
15,001	16,000	-	1	15,501
16,001	17,000	-	1	16,501
17,001	18,000	-	1	17,501
18,001	19,000	-	1	18,501
19,001	20,000	-	1	19,501
39,001	40,000	-	1	39,501
79,001	80,000	-	1	79,501
153000	153,000	1	2	153,000
312000	312,000	1	15	312,000
632000	632,000	1	29	632,000
1054000	1,054,000	1	36	1,054,000
3410000	3,410,000	1	37	3,410,000
6365000	6,365,000	1	48	6,365,000
	-	-	48	-
Totals		48	Median	
Average Usage		1,561,292	Billing	
Median Usage		474,000	24	
Average # Customers		4		

:ona-American Water Company /Paradise Valley Water Dis
Test Year 12 Months Ended December 2004
Meter Size and Zone: 3 Inch Turf (P2M1T)

Exhibit
Schedule H-5
Page 17
Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumulative Billing	MidPoint Usage
-	-	-	-	-
1	1,000	-	-	501
1,001	2,000	-	-	1,501
2,001	3,000	-	-	2,501
3,001	4,000	-	-	3,501
4,001	5,000	-	-	4,501
5,001	6,000	-	-	5,501
6,001	7,000	-	-	6,501
7,001	8,000	-	-	7,501
8,001	9,000	-	-	8,501
9,001	10,000	-	-	9,501
10,001	11,000	-	-	10,501
11,001	12,000	-	-	11,501
12,001	13,000	-	-	12,501
13,001	14,000	-	-	13,501
14,001	15,000	-	-	14,501
15,001	16,000	-	-	15,501
16,001	17,000	-	-	16,501
17,001	18,000	-	-	17,501
18,001	19,000	-	-	18,501
19,001	20,000	-	-	19,501
39,001	40,000	-	-	39,501
79,001	80,000	-	-	79,501
99,001	100,000	-	-	99,501
2,341,000	2,341,000	1	1	2,341,000
5,295,000	5,295,000	1	3	5,295,000
11,483,000	11,483,000	1	8	11,483,000
	Totals	10	Median	
Average Usage		6,726,800	Billing	
Median Usage		9,109,000	5	
Average # Customers		1		

izona-American Water Company /Paradise Valley Water Distr
Test Year 12 Months Ended December 2004
Meter Size and Zone: 3 Inch Turf (P4M1T)

Exhibit
Schedule H-5
Page 18
Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumulative Billing	MidPoint Usage
-	-	-	-	-
1	1,000	-	-	501
1,001	2,000	-	-	1,501
2,001	3,000	-	-	2,501
3,001	4,000	-	-	3,501
4,001	5,000	-	-	4,501
5,001	6,000	-	-	5,501
6,001	7,000	-	-	6,501
7,001	8,000	-	-	7,501
8,001	9,000	-	-	8,501
9,001	10,000	-	-	9,501
10,001	11,000	-	-	10,501
11,001	12,000	-	-	11,501
12,001	13,000	-	-	12,501
13,001	14,000	-	-	13,501
14,001	15,000	-	-	14,501
15,001	16,000	-	-	15,501
16,001	17,000	-	-	16,501
17,001	18,000	-	-	17,501
18,001	19,000	-	-	18,501
19,001	20,000	-	-	19,501
39,001	40,000	-	1	39,501
79,001	80,000	-	3	79,501
99,001	100,000	-	3	99,501
335,000	335,000	2	5	335,000
607,000	607,000	1	6	607,000
1,406,000	1,406,000	1	8	1,406,000

Totals	11	Median
Average Usage	812,955	Billing
Median Usage	607,000	6
Average # Customers	1	

ona-American Water Company /Paradise Valley Water Di:
Test Year 12 Months Ended December 2004
Meter Size and Zone: Paradise Valley Country Club (P2PVC)
6 Inch

Exhibit
Schedule H-5
Page 19
Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumulative Billing	MidPoint Usage
-	-	-	-	-
1	1,000	-	-	501
1,001	2,000	-	-	1,501
2,001	3,000	-	-	2,501
3,001	4,000	-	-	3,501
4,001	5,000	-	-	4,501
5,001	6,000	-	-	5,501
6,001	7,000	-	-	6,501
7,001	8,000	-	-	7,501
8,001	9,000	-	-	8,501
9,001	10,000	-	-	9,501
10,001	11,000	-	-	10,501
11,001	12,000	-	-	11,501
12,001	13,000	-	-	12,501
13,001	14,000	-	-	13,501
14,001	15,000	-	-	14,501
15,001	16,000	-	-	15,501
16,001	17,000	-	-	16,501
17,001	18,000	-	-	17,501
18,001	19,000	-	-	18,501
19,001	20,000	-	-	19,501
39,001	40,000	-	-	39,501
79,001	80,000	-	-	79,501
99,001	100,000	-	-	99,501
5,852,000	5,852,000	1	1	5,852,000
11,462,000	11,462,000	1	5	11,462,000
21,949,000	21,949,000	1	8	21,949,000

Totals	12	Median
Average Usage	16,921,917	Billing
Median Usage	15,880,000	6
Average # Customers	1	

:ona-American Water Company /Paradise Valley Water Dis
Test Year 12 Months Ended December 2004
Meter Size and Zone: 5/8 Inch OWU/OPA (P5M1A)

Exhibit
Schedule H-5
Page 20
Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumulative Billing	MidPoint Usage
-	-	29	29	-
1	1,000	7	36	501
1,001	2,000	9	45	1,501
2,001	3,000	2	47	2,501
3,001	4,000	4	51	3,501
4,001	5,000	-	51	4,501
5,001	6,000	2	53	5,501
6,001	7,000	-	53	6,501
7,001	8,000	-	53	7,501
8,001	9,000	-	53	8,501
9,001	10,000	-	53	9,501
10,001	11,000	-	53	10,501
11,001	12,000	-	53	11,501
12,001	13,000	-	53	12,501
13,001	14,000	-	53	13,501
14,001	15,000	-	53	14,501
15,001	16,000	-	53	15,501
16,001	17,000	-	53	16,501
17,001	18,000	-	53	17,501
18,001	19,000	-	53	18,501
19,001	20,000	-	53	19,501
39,001	40,000	-	53	39,501
79,001	80,000	-	53	79,501
99,001	100,000	-	53	99,501
	-	-	53	-
Totals		53	Median	
Average Usage		887	Billing	
Median Usage		2,501	27	
Average # Customers		4		

:ona-American Water Company /Paradise Valley Water Dis
Test Year 12 Months Ended December 2004
Meter Size and Zone: 1 Inch OWU/OPA (P5M1A)

Exhibit
Schedule H-5
Page 21
Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumulative Billing	MidPoint Usage
-	-	43	43	-
1	1,000	8	51	501
1,001	2,000	8	59	1,501
2,001	3,000	1	60	2,501
3,001	4,000	3	63	3,501
4,001	5,000	1	64	4,501
5,001	6,000	1	65	5,501
6,001	7,000	2	67	6,501
7,001	8,000	-	67	7,501
8,001	9,000	1	68	8,501
9,001	10,000	1	69	9,501
10,001	11,000	3	72	10,501
11,001	12,000	-	72	11,501
12,001	13,000	-	72	12,501
13,001	14,000	1	73	13,501
14,001	15,000	4	77	14,501
15,001	16,000	1	78	15,501
16,001	17,000	3	81	16,501
17,001	18,000	-	81	17,501
18,001	19,000	-	81	18,501
19,001	20,000	1	82	19,501
39,001	40,000	-	85	39,501
79,001	80,000	-	90	79,501
145,000	145,000	1	98	145,000
303,000	303,000	1	106	303,000
505,000	505,000	1	109	505,000
		-	109	-
	-	-	109	-
Totals		109	Median	
Average Usage		45,542	Billing	
Median Usage		3,001	55	
Average # Customers		9		

:ona-American Water Company /Paradise Valley Water Dis
Test Year 12 Months Ended December 2004
Meter Size and Zone: 2 Inch OWU/OPA (P5M1A)

Exhibit
Schedule H-5
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Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumulative Billing	MidPoint Usage
-	-	-	-	-
1	1,000	-	-	501
1,001	2,000	1	1	1,501
2,001	3,000	-	1	2,501
3,001	4,000	-	1	3,501
4,001	5,000	-	1	4,501
5,001	6,000	6	7	5,501
6,001	7,000	7	14	6,501
7,001	8,000	3	17	7,501
8,001	9,000	3	20	8,501
9,001	10,000	4	24	9,501
10,001	11,000	2	26	10,501
11,001	12,000	3	29	11,501
12,001	13,000	4	33	12,501
13,001	14,000	1	34	13,501
14,001	15,000	-	34	14,501
15,001	16,000	-	34	15,501
16,001	17,000	-	34	16,501
17,001	18,000	-	34	17,501
18,001	19,000	-	34	18,501
19,001	20,000	-	34	19,501
39,001	40,000	-	36	39,501
79,001	80,000	-	41	79,501
123,000	123,000	1	44	123,000
	-	-	44	-
Totals		44		

		Median Billing
Average Usage	21,000	
Median Usage	9,501	22
Average # Customers	4	

ıa-American Water Company /Paradise Valley Water [
Test Year 12 Months Ended December 2004
Meter Size and Zone: 5/8 Inch Fire (P6M1A)

Exhibit
Schedule H-5
Page 23
Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumul-ative Billing	MidPoint Usage
-	-	728	728	-
1	1,000	2	730	501
1,001	2,000	-	730	1,501
2,001	3,000	1	731	2,501
3,001	4,000	-	731	3,501
4,001	5,000	-	731	4,501
5,001	6,000	-	731	5,501
6,001	7,000	-	731	6,501
7,001	8,000	1	732	7,501
8,001	9,000	-	732	8,501
9,001	10,000	-	732	9,501
10,001	11,000	-	732	10,501
11,001	12,000	-	732	11,501
12,001	13,000	-	732	12,501
13,001	14,000	-	732	13,501
14,001	15,000	-	732	14,501
15,001	16,000	-	732	15,501
16,001	17,000	-	732	16,501
17,001	18,000	-	732	17,501
18,001	19,000	-	732	18,501
19,001	20,000	-	732	19,501
39,001	40,000	-	732	39,501
79,001	80,000	-	732	79,501
99,001	100,000	-	732	99,501
		-	732	-
	-	-	732	-

Totals	732	Median
Average Usage	136	Billing
Median Usage	-	366
Average # Customers	61	

ɔna-American Water Company /Paradise Valley Water Di:
Test Year 12 Months Ended December 2004
Meter Size and Zone: 3/4 Inch Fire (P6M1A)

Exhibit
Schedule H-5
Page 24
Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumulative Billing	MidPoint Usage
-	-	11	11	-
1	1,000	-	11	501
1,001	2,000	-	11	1,501
2,001	3,000	-	11	2,501
3,001	4,000	-	11	3,501
4,001	5,000	-	11	4,501
5,001	6,000	-	11	5,501
6,001	7,000	-	11	6,501
7,001	8,000	-	11	7,501
8,001	9,000	-	11	8,501
9,001	10,000	-	11	9,501
10,001	11,000	-	11	10,501
11,001	12,000	-	11	11,501
12,001	13,000	-	11	12,501
13,001	14,000	-	11	13,501
14,001	15,000	-	11	14,501
15,001	16,000	-	11	15,501
16,001	17,000	-	11	16,501
17,001	18,000	-	11	17,501
18,001	19,000	-	11	18,501
19,001	20,000	-	11	19,501
39,001	40,000	-	11	39,501
79,001	80,000	-	11	79,501
99,001	100,000	-	11	99,501
	-	-	11	-
Totals		11	Median	

Average Usage	-	Billing
Median Usage	-	6
Average # Customers	1	

:ona-American Water Company /Paradise Valley Water Dis
Test Year 12 Months Ended December 2004
Meter Size and Zone: 1 Inch Fire (P6M1A)

Exhibit
Schedule H-5
Page 25
Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumulative Billing	MidPoint Usage
-	-	24	24	-
1	1,000	-	24	501
1,001	2,000	-	24	1,501
2,001	3,000	-	24	2,501
3,001	4,000	-	24	3,501
4,001	5,000	-	24	4,501
5,001	6,000	-	24	5,501
6,001	7,000	-	24	6,501
7,001	8,000	-	24	7,501
8,001	9,000	-	24	8,501
9,001	10,000	-	24	9,501
10,001	11,000	-	24	10,501
11,001	12,000	-	24	11,501
12,001	13,000	-	24	12,501
13,001	14,000	-	24	13,501
14,001	15,000	-	24	14,501
15,001	16,000	-	24	15,501
16,001	17,000	-	24	16,501
17,001	18,000	-	24	17,501
18,001	19,000	-	24	18,501
19,001	20,000	-	24	19,501
39,001	40,000	-	24	39,501
79,001	80,000	-	24	79,501
99,001	100,000	-	24	99,501
	-	-	24	-
Totals		24	Median	
Average Usage		-	Billing	
Median Usage		-	12	
Average # Customers		2		

na-American Water Company /Paradise Valley Water D
Test Year 12 Months Ended December 2004
Meter Size and Zone: 2 Inch Fire (P6M1A)

Exhibit
Schedule H-5
Page 26
Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumulative Billing	MidPoint Usage
-	-	107	107	-
1	1,000	-	107	501
1,001	2,000	1	108	1,501
2,001	3,000	-	108	2,501
3,001	4,000	-	108	3,501
4,001	5,000	-	108	4,501
5,001	6,000	-	108	5,501
6,001	7,000	-	108	6,501
7,001	8,000	-	108	7,501
8,001	9,000	-	108	8,501
9,001	10,000	-	108	9,501
10,001	11,000	-	108	10,501
11,001	12,000	-	108	11,501
12,001	13,000	-	108	12,501
13,001	14,000	-	108	13,501
14,001	15,000	-	108	14,501
15,001	16,000	-	108	15,501
16,001	17,000	-	108	16,501
17,001	18,000	-	108	17,501
18,001	19,000	-	108	18,501
19,001	20,000	-	108	19,501
39,001	40,000	-	108	39,501
79,001	80,000	-	108	79,501
99,001	100,000	-	108	99,501
	-	-	108	-
	-	-	108	-
Totals		108	Median	
Average Usage		14	Billing	
Median Usage		-	54	
Average # Customers		9		

:ona-American Water Company /Paradise Valley Water Dis
Test Year 12 Months Ended December 2004
Meter Size and Zone: 3 Inch Irrigation (P7M1A)

Exhibit
Schedule H-5
Page 27
Witness: Kozoman

Usage From:	Usage To:	Total Year	Cumulative Billing	MidPoint Usage
-	-	10	10	-
1	1,000	-	10	501
1,001	2,000	-	10	1,501
2,001	3,000	-	10	2,501
3,001	4,000	-	10	3,501
4,001	5,000	-	10	4,501
5,001	6,000	-	10	5,501
6,001	7,000	-	10	6,501
7,001	8,000	-	10	7,501
8,001	9,000	-	10	8,501
9,001	10,000	-	10	9,501
10,001	11,000	-	10	10,501
11,001	12,000	-	10	11,501
12,001	13,000	-	10	12,501
13,001	14,000	-	10	13,501
14,001	15,000	-	10	14,501
15,001	16,000	-	10	15,501
16,001	17,000	-	10	16,501
17,001	18,000	-	10	17,501
18,001	19,000	-	10	18,501
19,001	20,000	-	10	19,501
39,001	40,000	-	10	39,501
79,001	80,000	-	10	79,501
99,001	100,000	-	10	99,501
	-	-	10	-
Totals		10	Median	
Average Usage		-	Billing	
Median Usage		-	5	
Average # Customers		1		

Arizona-American Water Company /Paradise Valley Water District
Test Year 12 Months Ended December 2004
Various Meter Sizes   Other Meter: Sales for Resale

Exhibit
Schedule H-5
Page 28
Witness: Kozoman

Line No.	Meter Size & Number		Present Rates Annual Totals
1			
2	5/8		58
3	3/4		
4	1		120
5	1.5		
6	2		48
7	3		
8	4		
9	6		
10	TOTAL		226
11			
12	Monthly Minimum Rates		
13	5/8	$	8.41
14	3/4	$	8.74
15	1	$	14.01
16	1.5	$	28.02
17	2	$	44.83
18	3	$	84.06
19	4	$	140.10
20	6	$	280.20
21			
22	Revenues from Monthly Minimums Rates		
23	5/8	$	487.78
24	3/4	$	-
25	1	$	1,681.20
26	1.5	$	-
27	2	$	2,151.84
28	3	$	-
29	4	$	-
30	6	$	-
31	TOTAL	$	4,320.82
32			
33	Quantity of Water Sold in 1,000's of Gallons		
34	Total		6,780
35	Commodity Rate	$	1.32
36	Revenues from		
37	Commodity Rates		$8,950
38	(Line 34 times Line 35)		
39	TOTAL REVENUES	$	13,270
40	(Line 31 + Line 36)	Average Number of Customers	18.83
41		Average Usage	565