BEFORE THE

CALIFORNIA PUBLIC UTILITIES COMMISSION

DIRECT TESTIMONY OF

MICHAEL J. VILBERT

ON BEHALF OF

CALIFORNIA WATER SERVICE COMPANY

APPLICATION NO. A.17-04-___

CONCERNING

COST OF CAPITAL

APRIL 3, 2017

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EXECUTIVE SUMMARY

Dr. Michael J. Vilbert, a Principal at *The Brattle Group*, presents testimony on the cost of capital for California Water Services Company. Dr. Vilbert estimates the cost of capital using a sample of regulated water utilities. Using two versions of the Discounted Cash Flow ("DCF") method and three versions of the Capital Asset Pricing Model ("CAPM"), he estimates each sample company's return on equity ("ROE"). He then calculates each sample company's after-tax weighted-average cost of capital ("ATWACC"). The ATWACC is the most commonly used measure of the cost of capital for use in capital budgeting recommended in standard financial textbooks.

Having estimated the sample's average ATWACC, he then determines the cost of equity for California Water at its requested regulatory capital structure, which has 53.4 percent equity. Although the overall cost of capital is constant within a broad middle range of capital structures, the cost of equity depends upon the distribution of risks between debt and equity investors. The higher the percentage of debt, the greater the financial risk imposed upon the equity investors and the higher will be the required ROE. Because the overall cost of capital is constant across a broad middle range of capital structures, customers are unaffected by changes in capital structure. If the regulatory capital structure were different, the appropriate ROE would be different even though the ATWACC would not change. Therefore, the dollar amount paid by customers is the same as if the Company had a lower return on equity but a higher equity percentage.

Although the Commission has not adopted the ATWACC approach, it is a very useful tool for recognizing differences in financial risk among sample companies as well as between the sample companies and the regulated entity.

Dr. Vilbert discusses the impact of the ongoing uncertainty in financial markets on the cost of capital for regulated companies. Although the yield on government debt is currently very low, the spread between the yield on investment-grade utility bonds and government bonds remains higher than it was prior to the 2008-2009 credit crisis. Utilities cannot raise debt at the same rates as the government, so it is necessary to take the yield on investment grade utility bonds into account when assessing the cost of capital for California Water. It is likely that yields on government debt have been driven down by the Federal Reserve's attempts to stimulate the economy. As a result, government bond yields are not a good benchmark against which to measure of the cost of capital for regulated companies at this time. Consequently, Dr. Vilbert utilizes two scenarios in his CAPM analyses, which attempt to capture the increased cost of capital resulting from the ongoing uncertainty in the capital markets.

Based on the evidence from the sample of regulated water utilities, Dr. Vilbert determines that California Water's cost of equity is 10¾ percent with a range of 10 percent to 11 percent consistent with California Water's regulatory capital structure with a 53.4 percent equity ratio.

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, 201 Mission Street, Suite 2800, San Francisco, CA 94105, USA.

Q2. Please describe your job and educational experience.

A2. I am a Principal of *The Brattle Group*, ("*Brattle*"), an economic, environmental and management consulting firm with offices in Cambridge, Washington D.C., London, San Francisco, Rome, Madrid, New York, Toronto and Sydney. 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. I have been asked by the California Water Service Company ("Cal Water" or the "Company") to estimate the cost of equity that the California Public Utilities Commission (the "Commission" or the "CPUC") should allow the Company an opportunity to earn on the equity financed portion of its rate base. Specifically, I provide return on equity ("ROE") estimates derived from a sample of comparable risk, regulated water utility companies. I also consider the relative risk of Cal Water compared to the sample companies to arrive at my ROE recommendation.

Q4. Please summarize the 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, water, 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 or filed cost of capital testimony before the Arizona Corporation Commission, the Pennsylvania Public Utility Commission, the Public Service Commission of West Virginia, the State Corporation Commission of Virginia, the Public Utilities Commission of Ohio, the Tennessee Regulatory Authority, the Public Service Commission of Wisconsin, the South Dakota Utilities Commission, the California Public Utilities Commission, the Michigan Public Service Commission, the Federal Energy Regulatory Commission ("FERC"), and this Commission. I have testified in Canada before the Canadian National Energy Board, the Alberta Energy and Utilities Board, the Ontario Energy Board, the Quebec Régie de l'énergie, and the Labrador & Newfoundland Board of Commissioners of Public Utilities. I have also testified before this Commission. Attachment A contains more information on my professional qualifications.

Q5. Are you sponsoring any supporting materials?

A5. Yes. I am sponsoring the following attachments to my testimony:

- Attachment A – Resumé of Dr. Michael J. Vilbert, and
- Attachment B – Cost of Equity Estimate Calculations.

Q6. Were these attachments prepared by you or under your direction?

A6. Yes.

Q7. What are the steps in your analysis?

A7. To estimate Cal Water's cost of capital, I analyze a sample of regulated water utilities that have comparable business risk to Cal Water. I estimate the ROE for each sample company using the discounted cash flow ("DCF") and the risk positioning models (i.e., the capital asset pricing model ("CAPM") and Empirical CAPM). The ROE estimates from the risk positioning and DCF models are then combined with the market value capital structure information and the market costs of debt and preferred stock for each sample company to compute each firm's overall cost of capital, i.e., its after-tax weighted-average cost of capital ("ATWACC").

Q8. What is the result of the cost of capital estimation process?

A8. The result of this process is a sample average ATWACC for each cost of equity estimation method. I then evaluate the financial risk of Cal Water compared to the sample companies to determine the recommended cost of equity for a capital structure with 53.4 percent equity, which is the percentage of equity in Cal Water's proposed regulatory capital structure in its filing for this proceeding.[1]

[1] I use capital structure information based upon the long-term sources of capital, i.e., long-term debt, preferred equity and common equity. I do not use short-term debt because companies generally do not finance long-term assets with short-term debt. This approach is consistent with the information that I use for the sample companies.

Specifically, I estimate the cost of equity for the companies in the sample using both cost-of-equity estimation methods. Given the cost of equity estimates for each company and the sample 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 53.4 percent equity. I thus present the cost of equity that is consistent with the sample's market information and Cal Water's regulatory capital structure.

This method automatically avoids problems that can arise when an analyst focuses separately on the individual components of the overall cost of capital. The danger with 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.

Q9. Do you present any other methods to take differences in financial risk into account?

A9. Yes. Other than the ATWACC method, I use the method originally proposed by Professor Robert S. Hamada to account for the differences in financial risk through adjustments to the beta estimate for a firm.[2] I present this method, which I refer to as the Hamada

[2] Hamada, R.S., "The Effect of the Firm's Capital Structure on the Systematic Risk of Common Stock," *The Journal of Finance*, 27(2), 1971, pp. 435-452.

adjustment procedures, for the risk positioning analyses that utilize beta as a measure of systematic market risk.

Q10. How does the ongoing uncertainty in the financial markets affect the cost of capital for a regulated utility such as Cal Water?

A10. The cost of capital is higher than a mechanical implementation of the ROE estimation models may suggest. Although economic conditions have improved since the start of the financial crisis in about mid-2008, uncertainty remains in the capital markets due, in part, to the disappointing rate of economic growth, not only in the U.S., but also worldwide. Worries about the low interest rate outlook in Europe and Japan as well as the United Kingdom's exit from the European Union have added to the concern. In addition, long-term government bond yields had dropped dramatically after the 2008-2009 credit crisis to unusually low levels and remain depressed relative to both historical levels and forecasts of future interest rates. This has resulted in a substantial increase in yield spreads, both for riskier assets as well as for less risky investments such as investment grade-rated utility debt. I discuss the effect of the credit crisis on the cost of capital and its various components, including the long-term risk-free interest rate, in more detail in *Section III* below.

Unfortunately, the uncertainty in the financial markets also affects the results of the estimation models, because both the risk positioning model and the DCF model are based upon the assumption that economic conditions are stable. That assumption is not currently met, so estimating the cost of capital under current conditions is more complicated than it would normally be. Because the uncertainty in the financial markets affects the cost of

capital for all companies, including a regulated utility such as Cal Water, I modify the parameters of the risk positioning model to recognize the effect of the increased uncertainty and risk-aversion in the capital markets, as well as the unsustainable decline in long-term risk-free interest rates, on the cost of capital. Specifically, I analyze two scenarios using different estimates of the market risk premium ("MRP") and risk-free interest rate for use in the risk positioning model. I discuss these scenarios in more detail below

Q11. You mentioned the importance of considering financial risk when evaluating the results of the models. How do you adjust for financial risk?

A11. Both the DCF and the risk-positioning models rely on market data to estimate the cost of equity for the sample companies. Those cost of equity estimates for the sample companies reflect both the business risk and the financial risk of the companies' equity. Business risk is the risk that the company would have if it were financed entirely with equity. Financial risk is the additional risk equity holders carry when a company uses debt to finance some of its assets. The more debt that a company uses, the riskier the company's equity becomes. As explained in more detail below, the procedures I use consider both the business risk and the financial risk of the sample companies in comparison to Cal Water in determining my recommended cost of equity for the Company.

Q12. What is your conclusion on the market-determined cost of capital for Cal Water based upon the results from the samples of regulated companies you selected?

A12. As explained more fully below, the best point estimate of the cost of equity for Cal Water is 10¾ percent for a capital structure with 53.4 percent equity.[3] However, a more complete statement of my conclusion is that the cost of capital models produce a range of estimates from 8.5 to 11.4 percent for the sample.[4] My analysis—including consideration of the various model inputs and assumptions in the context of current capital market conditions—indicates a reasonable range of 10 to 11 percent for the cost of equity capital for a rate-regulated water utility company with that capital structure. My selection of a point estimate for Cal Water is informed by my assessment of Cal Water's risk relative to that of the publicly traded water utility companies in my sample.

Q13. How is the remainder of your testimony organized?

A13. *Section II* formally defines the cost of capital and touches on the principles relating to estimating the cost of capital and the effect of capital structure on the cost of equity. *Section III* discusses the impact of the credit crisis on the cost of capital. *Section IV* 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 sample's returns on equity and overall costs of capital. *Section V* presents the results of these methods applied

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[3] As is the case for all model results and ranges of estimates of the cost of capital discussed herein, this point estimate does not reflect any adjustment to allow recovery of flotation costs. Such adjustments—as applied to the allowed returns of regulated utilities in various jurisdictions—typically range from 15-50 bps.

[4] Note that I round my ROE recommendation to the nearest 25 bps because I do not believe that it is possible to estimate the cost of capital more precisely than that. In some proceedings, such as at FERC, I report the results to two decimal places consistent with the FERC's preferred methodology.

to the sample group and presents the costs of equity implied by the results. I discuss my conclusion on the cost of equity for Cal Water in *Section VI.*

II. COST OF CAPITAL THEORY

A. THE COST OF CAPITAL AND RISK

Q14. Please formally define the "Cost of Capital."

A14. The cost of capital is 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 that 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," as in the definition of the cost of capital itself, refer to the probability-weighted average over all possible outcomes.

The definition of the cost of capital recognizes a tradeoff between risk and return known as the "security market risk-return line," or "security market line" for short, as shown below in Figure 1. The higher the risk, the higher is the cost of capital.

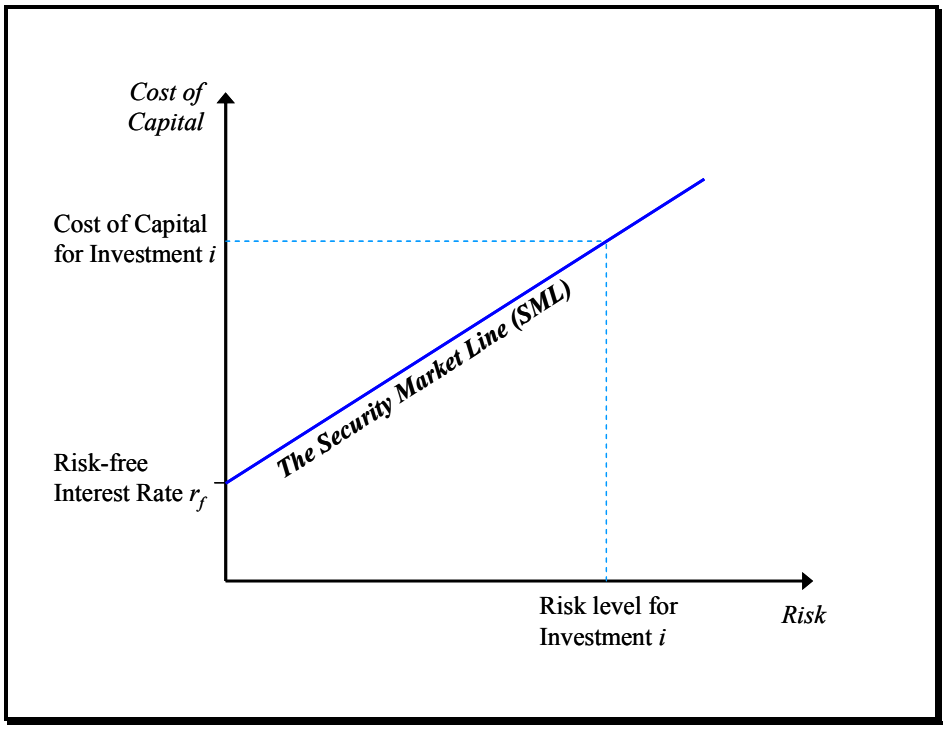

Figure 1: The Security Market Line

Q15. Why is the cost of capital relevant in rate regulation?

A15. It has become routine in U.S. rate regulation to accept the "cost of capital" as the right expected rate of return on utility investments.[5] That practice is viewed as consistent with the U.S. Supreme Court's opinions in *Bluefield Water Works & Improvement Co. v. Public Service Commission of West Virginia*, 262 U.S. 679 (1923), and *Federal Power Commission v. Hope Natural Gas Co.*, 320 U.S. 591 (1944).

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

[5] A formal link between the cost of capital as defined by financial economics and the right expected rate of return for utilities is set forth by Stewart C. Myers, "Application of Finance Theory to Public Utility Rate Cases," *Bell Journal of Economics & Management Science* 3:58-97 (1972).

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 does a disservice not just to investors but, importantly, to customers as well. 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.

In the long run, inadequate returns are likely to cost customers -- and society generally -- far more than is gained in the short run. Inadequate returns lead to inadequate investment, whether for maintenance or for new plant and equipment. The costs of an undercapitalized industry can be far greater than the short-run gains from shortfalls in the allowed cost of capital. Moreover, in capital-intensive industries (such as the water industry), systems that take a long time to decay cannot be fixed overnight because of the time necessary to plan and construct the facilities. Thus, it is in the customers' interest not only to make sure the return investors expect does not exceed the cost of capital, but also to make sure that the return does not fall short of the cost of capital, either.

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

B. Relationship Between Capital Structure and the Cost of Equity

Q16. What did you mean by the "ATWACC" mentioned earlier?

A16. The ATWACC is calculated as the weighted average of the after-tax cost of debt capital and the cost of equity. Specifically, the following equation pertains:

$$ATWACC = r_D \times (1 - T_C) \times \%\ D + r_E \times \%\ E \quad (1)$$

where r_D = market cost of debt,
r_E = market cost of equity,
T_C = corporate income tax rate,
%D = percent debt in the capital structure, and
%E = percent equity in the capital structure.

The ATWACC is commonly referred to as the WACC in financial textbooks and used in investment decisions.[6] The return on equity consistent with the sample's overall cost of capital estimate (the ATWACC), the market cost of debt, the corporate income tax rate, and the amount of debt and common equity in the capital structure can be determined by solving Equation (1) for r_E. Alternatively, if r_E is given and the capital structure is not, one can solve for %E instead. Having determined the ATWACC for the sample companies, I can apply that same ATWACC or an ATWACC adjusted for risk differences to the regulated entity, in this case Cal Water.[7]

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[6] See, for example, Brealey, Myers, and Allen (2017), *Principles of Corporate Finance, 12th Edition*, McGraw-Hill Irwin, New York, pp. 448-453.

[7] I refer to the ATWACC to distinguish it from the WACC used in regulatory proceedings, which is the weighted-average of the after-tax cost of equity and the *pre-tax* cost of debt instead of the after-tax cost of debt.

Q17. Why is the ATWACC relevant to these proceedings?

A17. The ATWACC is one of several procedures in my analysis, but it is important because it allows a comparison between the sample companies' cost of capital estimates and the cost of capital for Cal Water. Two otherwise identical companies with different capital structures will typically have different costs of equity, since the risks to equity holders depend on the financial leverage, i.e., the amount of debt in the capital structure of the company. This makes it difficult to compare cost of equity estimates between companies that have different capital structures and makes it generally incorrect to simply average cost of equity estimates across the sample. However, two otherwise identical companies with different capital structures will generally have comparable ATWACC values.

Q18. How does the ATWACC approach differ from procedures where the cost of equity and the regulatory capital structure are determined separately?

A18. The ATWACC approach avoids inconsistencies that could arise from estimating the cost of equity for each of the sample firms without explicit consideration of the financial risk inherent in the market-value capital structure underlying those costs. If the sample's average cost of equity is used to estimate the cost of equity for the company in question, inconsistencies are likely to arise, because this method makes no direct connection between any differences among the capital structures of the sample firms used to estimate the cost of equity and the regulatory capital structure used to set rates. Consequently, the sample's estimated return on equity does not necessarily correspond to the financial risk faced by investors in the subject company, in this case Cal Water. If the sample's estimated cost of

equity were adopted without consideration of differences in financial risk, it could lead to an inappropriate rate of return.

Q19. Why is it necessary to consider the sample companies' capital structures as well as Cal Water's capital structure in your analysis?

A19. Briefly, the cost of equity and the capital structure are inextricably entwined in that the use of debt increases the financial risk of the company and therefore increases the cost of equity. The more debt, the higher is the cost of equity for a given level of business risk. Rate regulation has in the past often focused on the components of the cost of capital, and in particular, separately on what the "right" cost of equity capital and capital structure should be. The 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 cost of capital is thus the more basic concept. Although the overall cost of capital is constant (ignoring taxes and costs of excessive debt), the distribution of the costs among debt and equity is not. Reporting the average cost of equity estimates from the sample without consideration of the differences in financial risk may result in material errors in the allowed return for Cal Water.

Q20. What is the basis for the development of the ATWACC method?

A20. The ATWACC method, called the weighted-average cost of capital in textbooks, is the fundamental method used by financial economists to measure the cost of capital. It is a standard topic taught in graduate level courses in corporate finance and is based upon the work of Professors Franco Modigliani and Merton Miller. Both professors separately won the Nobel Prize in Economics, in part, for their development of the theories underlying the

method. It is critical to keep in mind that the ATWACC method is a useful tool to assist in the analysis of the cost of capital. All cost of capital witnesses estimate the cost of equity using the DCF or the risk positioning models, and all must interpret the results relative to the risk of the regulated company at issue. The purpose of the ATWACC method is to allow an "apples to apples" comparison of the results of the sample companies by eliminating differences in financial risk due to differences in capital structure. The ATWACC is sometimes mischaracterized in regulatory proceedings and incorrectly criticized, possibly because the critics do not like the method's results, but it is the standard methodology in finance. In particular, it is not inconsistent with the use of rate base measured on the basis of book value.

Q21. What are the methods that account for financial risk through beta?

A21. The Hamada adjustment procedures account for the impact of financial risk recognizing that, under general conditions, the value of a firm can be decomposed into its value with and without a tax shield (Value of Firm = Present Value of Cash Flows without Tax Shield plus Value of Tax Shield).

Assuming that the CAPM is valid, Professor Hamada showed the following relationship between the beta for a firm with no leverage (e.g., 100 percent equity financing) and a firm with leverage is as follows: [8]

$$\beta_L = \beta_U + \frac{D}{E}(1-\tau_c)(\beta_U - \beta_D) \qquad (2)$$

[8] Technically, the relationship requires that there are no additional costs to leverage (i.e., the use of debt) and that the book value capital structure is fixed.

Where β_L is beta associated with the "levered cost of capital"—the required return on assets if the firm's assets are financed with debt and equity—β_U is the beta associated with an unlevered firm—assets are financed with 100% equity and zero debt—, and β_D is the beta on the firm's debt. Finally, τ_c is the corporate income tax rate. Since the beta on an investment grade firm's debt is much lower than the beta of its assets (i.e., $\beta_D < \beta_U$), this equation embodies the fact that increasing financial leverage (and thereby increasing the debt to equity ratio) increases the systematic risk of levered equity (β_L).

An alternative formulation derived by Harris and Pringle (1985) provides the following equation:

$$\beta_L = \beta_U + \frac{D}{E}(\beta_U - \beta_D) \quad (3)$$

Unlike Equation (2), Equation (3) does not include an adjustment for the corporate tax deduction. However, both equations account for the fact that increased financial leverage increases the systematic risk of equity that will be measured by its market beta. Both equations allow an analyst to adjust for differences in financial risk by translating back and forth between β_L and β_U. In principal, Equation (2) is more appropriate for use with regulated utilities, which are typically deemed to maintain a fixed book value capital structure. However, I employ both formulations when adjusting my CAPM and ECAPM estimates for financial risk, and consider the results as sensitivities in my analysis.

It is clear that the beta of debt needs to be determined as an input to either Equation (2), or Equation (3). Rather than estimating debt betas, I note that the standard financial textbook of Professors Berk & DeMarzo report a debt beta of 0.05 for A rated debt and a beta of

0.10 for BBB rated debt[9] while other academic literature has reported debt betas of 0.25.[10] I consider this range of 0.05 to 0.25 to be reasonable for debt betas and the difference in using either assumption has a minimal effect on the estimated ROE.[11]

Once a decision on debt betas is made, the levered equity beta of each sample company can be computed (in this case by *Value Line*) from market data and then translated to an unlevered beta at the company's market value capital structure. The unlevered betas for the sample companies are comparable on an "apples to apples" basis, since they reflect the systematic risk inherent in the assets of the sample companies, independent of their financing. The unlevered betas are averaged to produce an estimate of the industry's unlevered beta. To estimate the cost of equity for the regulated target company, this estimate of unlevered beta can be "re-levered" to the regulated company's capital structure, and CAPM reapplied with this levered beta, which reflects both the business and financial risk of the target company.

Hamada adjustment procedures are ubiquitous among finance practitioners when using the CAPM to estimate discount rates.

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[9] Berk, J. & DeMarzo, P., *Corporate Finance,* 2nd Edition, 2011, Prentice Hall, p. 389.

[10] "Explaining the Rate Spread on Corporate Bonds," Edwin J. Elton, Martin J. Gruber, Deepak Agarwal, and Christopher Mann, *The Journal of Finance*, February 2001, pp. 247-277.

[11] Assuming an A-debt beta of 0.25 would reduce ROE estimates, after the Hamada adjustment procedure, by approximately 25 basis points as compared to assuming a A-debt beta of 0.05. However, using a debt beta of 0.05 would increase the required MRP adjustment as compared to using 0.25.

III. CURRENT ECONOMIC CONDITIONS AND THE COST OF CAPITAL

Q22. What is the topic of this section of your testimony?

A22. This section addresses the current global economic situation and its impact on the prevailing cost of capital.

Q23. Do you believe that capital markets are "back to normal"

A23. No. Although the Federal Reserve has decided to raise the target range for the federal funds rate to ½ to ¾ percent[12] and volatility in the financial markets has lessened, economic conditions are not yet back to normal as measured by their status prior to the 2008-2009 credit crisis. For example, although the spread between U.S. utility bond yields and government bond yields ("yield spread") has narrowed from their peak at the height of the crisis, the yield spread is still elevated relative to the spread before the crisis. This is especially true for lower-rated bonds, including BBB-rated utility bonds. This is, in part, the result of a deliberate policy by the Fed to lower long-term as well as short-term bond yields in an effort to induce investors to move to riskier assets such as stocks.[13]

Q24. Please describe in more detail how the yield spread between U.S. government and utility bonds has changed since the start of the credit crisis.

A24. Although the yield spread on utility bonds has declined somewhat from the height of the 2008-2009 credit crisis, the yield spread still remains elevated in relation to pre-crisis levels

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[12] See Federal Open Market Committee, Press Release, December 14, 2016.

[13] *Id.*

in response to world economic events and the efforts of the Fed. The yield spread on utility bonds, such as Bloomberg's BBB-rated utility bonds, has been substantially higher during most of the past eight years than prior to the credit crisis. For example, since the last major peak in November 2008, the spread between the yield on BBB-rated 20-year utility bonds and the yield on 20-year U.S. government bonds, as shown in Figure 2 below, has ranged from a low of 133 basis points to a high of 408 basis points, compared to a historical average of approximately 120 basis points. Additionally, the average yield spread in 2016 of 218 basis points is highly unusual and has reached higher levels in only three of the past 25 years: in 2008 and 2009 during the credit crisis and in 2002 following the collapse of the tech bubble.

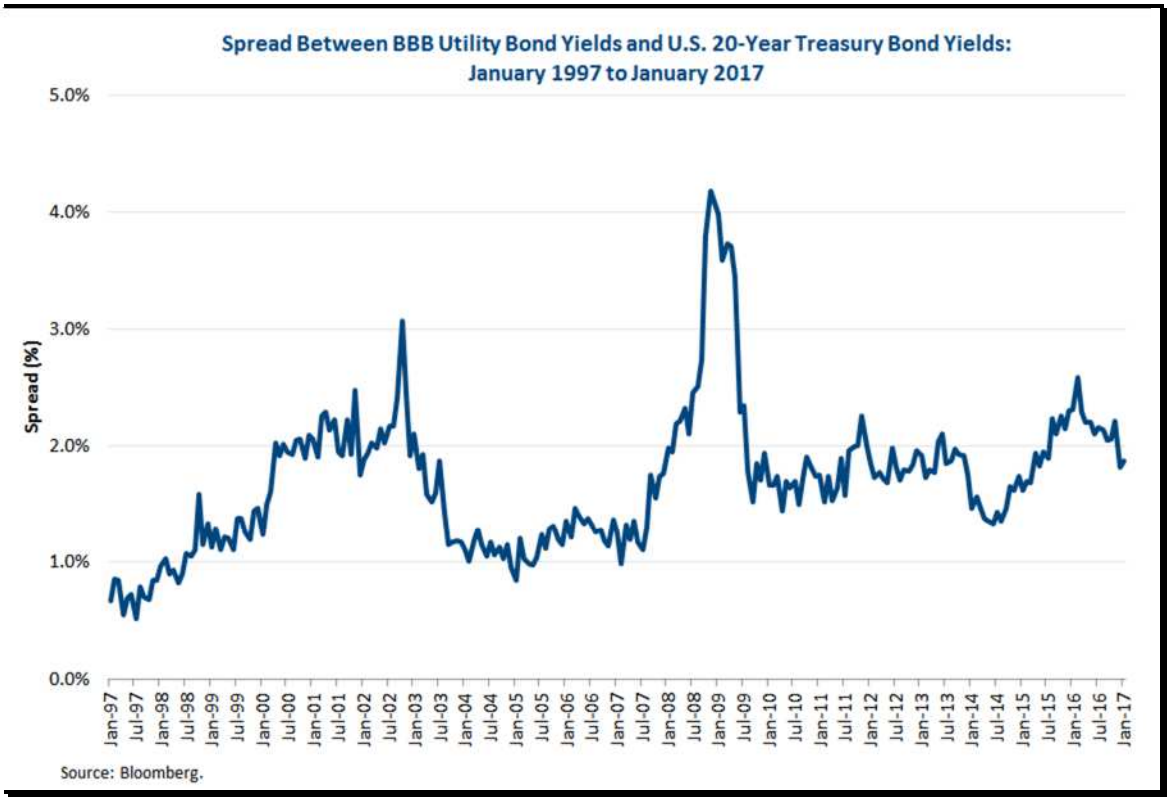

Figure 2

In addition to the spike in the spread between utility and government bond yields, the variability in bond yields is also high. BBB utility 20-year bond yields have varied from a high of 4.80 percent to a low of 3.98 percent for a high-to-low difference of approximately 100 basis points over the period January 2016 to January 2017. Historically, variations in BBB utility bond yields have rarely approached 90 basis points in any 12-month period. Table 1 below presents the yield spreads for 20-year utility bonds over several historical periods. Yield spreads have remained elevated compared to historical averages.

Spreads between U.S. Utility Bond (20 year maturity) and U.S. Government Bond (20 year maturity) - bps			
Periods	A-Rated Utility and Treasury	BBB-Rated Utility and Treasury	Notes
Period 1 - Average Apr-1991 - 2007	93	123	[1]
Period 2 - Average Aug-2008 - Jan-2017	154	201	[2]
Period 3 - Average Jan-2017	139	188	[3]
Period 4 - Average 15-Day (Jan 10, 2017 to Jan 31, 2017)	135	187	[4]
Spread Increase between Period 2 and Period 1	61	78	[5] = [2] - [1]
Spread Increase between Period 3 and Period 1	46	65	[6] = [3] - [1]
Spread Increase between Period 4 and Period 1	**42**	**64**	[7] = [4] - [1]

Sources and Notes:
Spreads for the periods are calculated from Bloomberg's yield data.
Average monthly yields for the indices were retrieved from Bloomberg as of January 31, 2017.

Table 1

Q25. What is the implication of higher than normal yield spreads?

A25. A higher than normal yield spread is one indication of the higher cost of capital prevailing in the capital markets. Investors consider a risk-return tradeoff like the one displayed in Figure 1 above and select investments based upon the desired level of risk. The expected return on debt (i.e., the cost of debt) is higher relative to government bond yields than is normally the case even for regulated utilities. Because debt is less risky than equity, the cost of equity is also higher relative to government bond yields than is usually observed.

If this fact is not recognized, the traditional cost of capital estimation models will underestimate the cost of capital prevailing in the capital markets.

Q26. Haven't the U.S. stock markets reached record highs and interest rates begun to rise recently?

A26. Yes, the U.S. stock market has been trading at Price-to-Earnings ("P/E") levels which are above historical medians and government bond yields have increased since the U.S. presidential election and the Fed's increase of the federal funds rate. This does not mean, however, that economic conditions are fully back to normal. In fact, just as the persistent depressed level of interest rates can introduce a downward bias into the results of the CAPM, elevated P/E ratios can lead to a bias in cost of equity estimates derived using DCF models. Moreover, these two circumstances are related (i.e., artificially low interest rates tend to correlate with elevated P/E ratios) in capital markets.

Q27. Will you please elaborate on how interest rates and P/E ratios are related to DCF estimates of the cost of equity?

A27. The current Price-to-Earnings ("P/E") ratios for many companies' (including water utilities') are higher than is typical historically. Empirically, the P/E ratio increases when interest rates decline. Figure 3 below displays the water utilities' quarterly P/E ratios from 1990 to today.

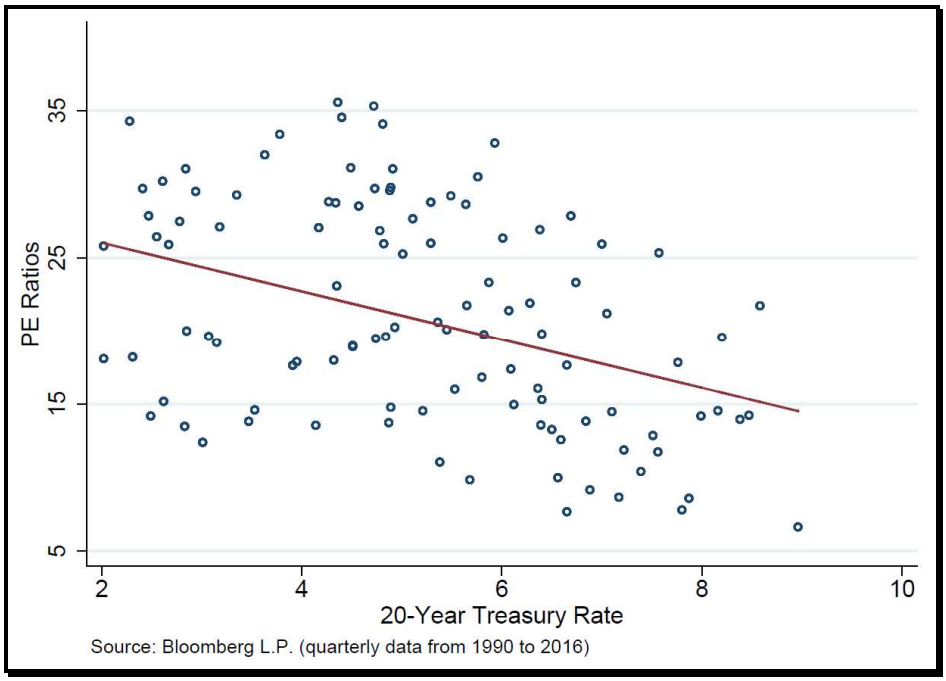

Figure 3: Water Utility PE Ratios and 20-Year Treasury Bond Yields

Q28. How is the relationship between the P/E ratio and the 20-year government bond yield relevant to your analysis?

A28. The dividend yield, calculated as Dividends divided by Price (D/P), is closely related to the P/E ratio as dividends are paid out of earnings. If the P/E ratio is very high (low), then the Earnings-to-Price ratio is low (high) and so is the dividend yield (D/P). The average water utility pays a about 57 percent of its earnings as dividends, so if the P/E ratio increases from, for example, 25 to 30 (a 20% increase), then the Earnings / Price ratios declines by about two-thirds of a percentage point (from 1/25 = 4.00 percent to 1/30 = 3.33 percent) and the dividend yield declines by 0.38 percentage points (57 percent × 0.67 percent). Therefore, if the 20-year government bond yield is artificially depressed and expected to increase, then the dividend yield is likely also artificially depressed and expected to increase. Consequently, the results from the standard dividend discount

models estimated in the current environment of high P/E ratios and low interest rates are likely to underestimate the cost of equity that will prevail going forward as interest rates rise.

Q29. What further evidence can you provide that U.S. medium- and long-term government bond yields remain depressed?

A29. Annual yields on long-term U.S. government bonds have continued to be lower than historical values. For instance, the historical average of annual yields on long-term government bonds was 5.23 percent from 1926 to 2010, but the long-term government bond yield declined to just 2.68 percent in 2015.[14] Although the U.S. Federal Reserve has discontinued its large-scale asset purchases program, which pushed down yields on medium- and long-term U.S. government bonds, it still holds over $4.4 trillion in assets from this purchasing program.[15] Until there is an intended unwinding of these holdings, uncertainty will persist.

Furthermore, elevated levels of uncertainty in the global capital markets continue to affect the U.S. economy, which remains sensitive to those disruptions. In other words, major capital markets globally have not yet returned to their pre-credit crisis status, and they continue to affect the U.S. capital markets. The accommodative stance by the European

[14] See Duff & Phelps's Ibbotson *SBBI 2016 Valuation Yearbook*.

[15] Board of Governors of the Federal Reserve System, Credit and Liquidity Programs and the Balance Sheet, as of December 28, 2016.

Central Bank (ECB), which targets a *negative* 0.4% interest rate,[16] and the Bank of Japan, which has maintained negative yields on government bonds since early 2016,[17] represent a divergent approach from that currently of the Fed, which halted its asset purchases and has recently decided on a modest increase in interest rates. According to the most recent press release following the December 2016 meeting of the U.S. Federal Reserve Bank's Federal Open Market Committee (FOMC), the FOMC "expects that economic conditions will evolve in a manner that will warrant only gradual increases in the federal funds rate,"[18] despite the ongoing economic uncertainty in the EU, United Kingdom, and Japan. It is unclear whether the ECB and other central banks will choose to cut already negative interest rates further or whether the Fed might abandon its plans to raise the federal funds target rate even gradually in 2017. Meanwhile, the ECB has held its own target interest rate low while continuing its asset purchase program, now at 80 billion euros (monthly), to promote economic activity. These actions reflect increased uncertainty about the outlook for Eurozone economies, and Brexit may very likely exacerbate the problems. The low interest rate outlook for European and Japanese markets—coupled with the volatility and uncertainty that investors face in global capital markets—are driving bond investors to seek potential upside in the U.S. debt market, pushing yields down. In fact, the yield on the benchmark 10-year U.S. Treasury bond closed at a historic low yield of 1.367 percent

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[16] European Central Bank, Key ECB Interest Rates, https://www.ecb.europa.eu/stats/monetary/rates/html/index.en.html (last visited Dec. 13, 2016).

[17] See Takashi Nakamichi and Rachel Rosenthal, "Bank of Japan Sets Bond-Rate Target in Policy Revamp," *WALL ST. J.*, September 21, 2016, http://www.wsj.com/articles/boj-changes-policy-framework-after-review-of-measures-1474432869.

[18] See Federal Open Market Committee, Press Release, December 14, 2016.

during the weeks following the Brexit vote,[19] underscoring investors' lack of confidence in the global economy.

Q30. Do you expect interest rates and treasury yields to rise in the future?

A30. Yes. The current yield on the 20-year U.S. Treasury bond has increased to 2.75 percent since the Federal Reserve announced its increase to the federal funds rate and the yield on the 10-year U.S. Treasury note is 2.44 percent,[20] but these rates are still much lower than the historical averages. Projections from the December 2016 meeting indicate that the Federal Reserve expects to increase federal funds rates another 75 basis points by the end of 2017, placing more upward pressure on long-term government bond yields.[21] Additionally, according to the *Blue Chip Economic Indicators* report dated March 10, 2017, the consensus economic projections for the yield on 10-year U.S. Treasury notes are 3.7 percent on average in 2019 to 2023 and 3.9 percent on average from 2024 to 2028.[22] These forecasts are substantially higher than the current yield on 10-year U.S. government notes.[23] This highlights the fact that current long-term and medium-term U.S. government bond yields are low both relative to historical levels, as well as compared to consensus forecasts of future rates. The unusually low current long-term government bond yields

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[19] See Min Zeng and Christopher Whittall, "U.S. 10-Year Treasury Yield Closes at Record Low," *WALL ST. J.*, July 5, 2016, http://www.wsj.com/articles/government-bond-yields-in-u-s-europe-hit-historic-lows-1467731411.

[20] Average yields of the 15 trading days ending January 31, 2017.

[21] See Federal Open Market Committee, Economic projections of Federal Reserve Board members and Federal Reserve Bank presidents under their individual assessments of projected appropriate monetary policy, December 14, 2016, Figure 2.

[22] See *Blue Chip Economic Indicators*, dated March 10, 2017, page 14.

[23] See Workpaper # 1 to Table No. 9 in the Tables and Workpapers accompanying my testimony.

must be considered when evaluating the results of my risk-positioning model, because the downward bias in the long-term risk-free interest rate will inappropriately lower the sample companies' ROE estimates generated by the CAPM method.

Q31. Can you summarize how the economic developments discussed above have affected the return on equity and debt that investors require?

A31. Investors have been dramatically affected by the credit crisis, and companies such as Cal Water rely on these investors to support efficient business operations. Many have lost their jobs, their homes and/or their savings. Many cannot retire as early as hoped or planned. Furthermore, uncertainty in the capital markets remains high due in part to the ongoing concern over the global economy. Finally, due to the major bond-purchase programs initiated by the U.S. Fed, long-term U.S. government bond yields have been driven down and are currently low relative to historical levels. Interest rates are also low in foreign markets. Interest rates are forecast to increase but will still be lower than the historical average. As a result, yield spreads on utility debt, including top-rated instruments, are higher than prior to the credit crisis. The evidence presented above demonstrates that the required level of return is higher today than it was prior to the crisis for all risky investments, and this is true even for lower than average risk investments such as regulated utilities.

Q32. How do you adjust your cost of capital estimation methods to correct for current economic conditions?

A32. While I do not adjust the DCF method, I do take the current elevated level of stock market price-to-earnings ratio into account when evaluating the results of the DCF models. For the

risk positioning method, I recognize the unusually large yield spreads on utility debt by adding a "yield spread adjustment" to the current long-term risk-free rate. This has the effect of increasing the intercept of the Security Market Line displayed in Figure 4 above. I also present results from the risk-positioning model by increasing the MRP over the 6.9 percent base level MRP. This has the effect of increasing the slope of the Security Market Line displayed in Figure 4 below. I present a sensitivity test of the effect of an increase in the MRP to 7.9 percent, and yield spread adjustments of 40 basis points ("bps"). Table 2 below lists the parameters of these two scenarios.

	Scenario 1	Scenario 2
Risk-Free Interest Rate	4.0%	3.8%
Market Equity Risk Premium	6.9%	7.9%

Table 2

Q33. How do you estimate the increase in MRP needed to adjust for sustained increased risk aversion in capital markets?

A33. Estimating the MRP is always imprecise and controversial. Measuring the change in MRP due to the current economic situation is likely to be no different, but it is still necessary to estimate the MRP as carefully as possible given the change in economic conditions. Fortunately, there is a way to provide a quantitative benchmark for the required increase in MRP based upon a paper by Edwin J. Elton, et al., which documents that the yield spread on corporate bonds is normally a combination of a default premium, a tax premium, and a systematic risk premium.[24] As displayed in Table 1 above, the yield spreads for A-rated

[24] Elton, et al, *op. cit*.

and BBB-rated utility debt have currently increased substantially compared to the average for the period 1991-2007.

Q34. How do you use the information in Table 1 concerning the increase in yield spreads to estimate the increase in the MRP?

A34. Table 1 shows that average yield spreads for A-rated and BBB-rated utility debt have increased by about 40 bps and 65 bps respectively for 20-year maturities. This means that investors require a higher return on investment grade utility debt relative to the return on U.S. Government debt than before the credit crisis. Some of the increase in yield spread for A-rated debt may be due to an increase in default risk, (although this is more likely a component of the larger increase in BBB-rated utility spreads).[25] The increase in A-rated utility yield spread is due to a combination of an increase in the systematic risk premium on A-rated debt and the downward pressure on the yield of risk-free debt due to the flight to safety. The increase in the default risk premium for A-rated debt is undoubtedly very small because A-rated utility debt has not been at the center of the wave of defaults based upon collateralized mortgage debt. This means that the vast majority of the increase in yield spreads is due to a combination of the increased systematic risk premium and the downward pressure on the yields of government debt. In other words, either the MRP has increased or the risk-free rate is under estimated, or, alternatively, both have changed. In my analysis, to be conservative, I assume that there has been an approximate 40 bps

[25] Although there is no increase in tax premium due to coupon payments, there may be some increase due to a small tax effect resulting from the probability of increased capital gains taxes when the debt matures.

increase in utility spreads, due to either an increase in the MRP (which drives the increase in systematic risk premium), or to downward pressure on the risk-free rate.

Q35. How do you allocate the increase in the yield spread (not due to the estimated increase in default risk) to the increase in systematic risk or to the under estimation of the risk-free rate due to downward pressure on government bond yields?

A35. There is no precise way to allocate the increase in yield spread between an increase in systematic risk or in recognition of the under estimation of the risk-free rate arising from downward pressure on government bond yields. However, assuming a debt beta of 0.25[26] means that an increase in the MRP of one percentage point translates into a ¼ percentage point increase in the risk premium on debt (i.e. 0.25 (beta) times 1 percentage point (increase in MRP) = ¼ percentage point). A 40 bps increase in the yield spread is therefore consistent with a 160 bps increase in the MRP (i.e., 40bps/0.25 debt beta) if there were no under estimation of the risk free rate. Alternatively, with a 15 bps under estimation of the risk-free rate, a 40 bps increase in the utility yield spread would be consistent with a one percent increase in the MRP (i.e., 40 bps less 15 bps = 25 bps/0.25 = 100 bps).

The greater the increase in yield spread assumed to be attributed to an increase in systematic risk, the larger must be the corresponding increase in the MRP and the smaller the effect of the downward pressure on the risk-free rate. As illustrated above, if all of the non-default increase in the yield spread were due to the increase in systematic risk, the

[26] Elton, *et al*. estimate the average beta on BBB-rated corporate debt as 0.26 over the period of their study, and A-rated debt will have a slightly lower beta than BBB-rated debt.

MRP would have to increase by 1.6 percentage points (i.e., 40 bps = 0.25 (beta) times 1.6 percentage points (increase in MRP)). Alternatively, a 40 bps increase in the yield spread is also consistent with a 40 bps under estimation of the risk-free rate, assuming that none of the change in yield spread is driven by an increase in systematic risk. The latter sensitivity would reduce the 40 bps increase in the risk-free rate by 25 bps per 100 bps increase in the MRP.

Q36. Would the estimate of the effect of an increase in the MRP be different if the estimate of the beta of an A-rated bond were different

A36. Yes. If the beta of an A-rated bond were higher, the increase in the systematic risk premium in the yield spread for each one percentage point increase in the MRP would be smaller. Alternatively, if the beta of an A-rated bond were lower, the increase in the systematic risk premium in the yield spread for each on percentage point increase in the MRP would be larger.[27] However, I believe that a beta estimate of 0.25 for A-rated utility debt is reasonable for this purpose, because the debt of any company is less risky than its equity. A beta estimate of 0.25 for A-rated utility debt is likely to be conservative, especially when compared to an average estimated equity beta of 0.72 (sample average of the *Value Line* betas). Moreover, a beta estimate of 0.25 is no doubt conservative because if the estimated beta were lower (as is likely) then the increase in the MRP necessary to result in a 40 bps increase in the yield spread would be higher. As noted above, the average estimated beta for BBB-rated debt was 0.26 at the time of the Elton et al study, and A-rated debt will have

[27] As noted above, the Berk and DeMarzo textbook reports average debt betas for A-rated debt to be 0.05.

a lower estimated beta. Even if the average beta for BBB-rated debt is higher today than at the time of the Elton et al study, it is likely that an estimate of 0.25 for A-rated debt is reasonable.

Q37. Would you provide a graph of how the scenarios you consider affect the Security Market Line?

A37. Yes. See Figure 4 below.

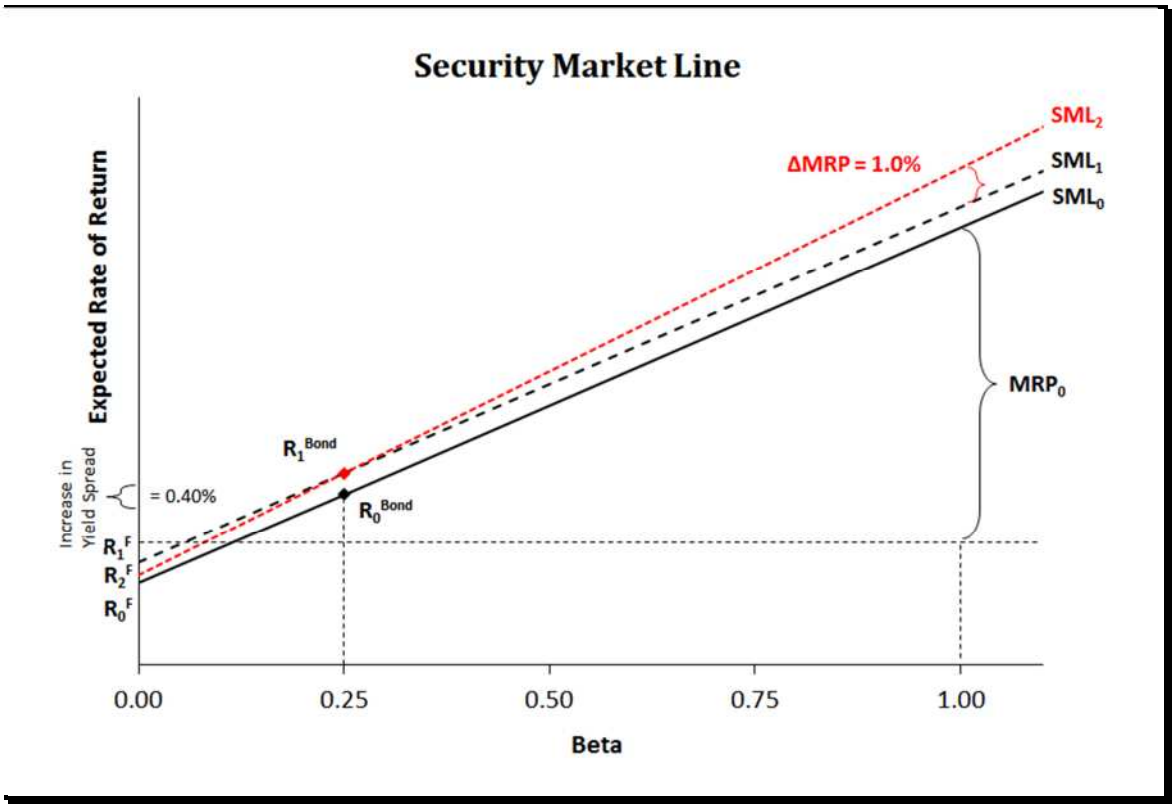

Figure 4

IV. COST OF CAPITAL METHODOLOGY

Q38. How is this section of your testimony organized?

A38. As noted in *Section II*, I estimate the cost of capital using a sample of comparable risk regulated water utility 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 Cal Water's regulatory capital structure for both benchmark samples.

A. THE REGULATED WATER UTILITY SAMPLE

Q39. How did you select your sample of water utilities?

A39. My goal was to create a sample of companies whose primary business is the regulated water utility industry with business risk generally similar to that of Cal Water. To construct this sample, I started with the universe of eleven water utilities tracked by *Value Line Investment Survey, Plus Edition* as of January 31, 2017. The companies are American States Water Co., American Water Works, Aqua America Inc., California Water Service Group, Connecticut Water Service Inc., Middlesex Water Co., SJW Corp., and York Water Co. I exclude three companies – Artesian Res. Corp., Consolidated Water, and Global Resources Inc. – because they do not have a credit rating.

Q40. Please characterize an ideal regulated water utility sample.

A40. The overall cost of capital for a part of a company depends on the risk of the business in which the part is engaged and 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.

The ideal sample would be a number of companies that are publicly traded "pure plays" in the water production, storage, treatment, transmission, and distribution lines of business. "Pure play" is an investment term referring to companies with operations only in one line of business. Publicly traded firms (i.e., 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.[28]

Q41. What are your standard sample selection criteria?

A41. My standard sample selection procedures require that the samples companies have the following:

- a high percentage of revenues from regulated operations;
- at least $300 million in annual revenues for the last available year of financial data;
- no significant merger activity in the previous five years; and

[28] See *Section V.A* for an expanded discussion of the sample companies.

- no recent dividend cuts or other activity that could cause the growth rates or beta estimates to be biased.

For this proceeding, I relax the screening requirement requiring at least $300 million in annual revenues because three of the sample companies would fail that requirement, resulting in a sample of only five companies. Table 3 lists the companies included in the water sample and highlights some of their important characteristics.

Company	Annual Revenues (USD million)	Regulated Assets	Market Cap. 2016 Q3 (USD million)	Betas	S&P Credit Rating (2016)	Long Term Growth Est.
	[1]	[2]	[3]	[4]	[5]	[6]
Amer. States Water	$439	R	$1,446	0.75	A+	5.9%
Amer. Water Works	$3,283	R	$13,661	0.65	A	7.9%
Aqua America	$820	R	$5,449	0.70	A-	5.6%
California Water	$597	R	$1,531	0.75	A+	10.3%
Conn. Water Services	$98	R	$556	0.65	A	4.8%
Middlesex Water	$132	R	$571	0.75	A	5.4%
SJW Corp.	$348	R	$892	0.75	BBB+	0.0%
York Water Co. (The)	$47	R	$380	0.75	A-	6.8%
Average	$721		$3,061	0.72		5.8%

Sources and Notes:
[1]: Bloomberg as of January 31, 2017. Most recent reported four quarters.
[2]: See Table No. MJV-WATER-2. Key:
R - Regulated (More than 80% of assets regulated).
[3]: See Table No. MJV-WATER-3 Panels A through L.
[4]: See Workpaper # 1 to Table No. MJV-WATER-10.
[5]: S&P Credit Ratings from Research Insight as of 2016 Q4.
[6]: See Table No. MJV-WATER-5.

Table 3: The Water Sample

B. CAPITAL STRUCTURE & THE COST OF DEBT

1. Market-Value Capital Structure

Q42. Please describe why and how you calculate the market values of common equity, preferred equity and debt.

A42. For reasons discussed above, 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 because different capital structures imply different levels of financial risk. This requires estimates of the market values of common equity, preferred equity and debt, and the current market costs of preferred equity and debt. 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.

Q43. How do you estimate the market value capital structures?

A43. 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 15 trading days of each year to calculate the market value of equity for the end of 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.[29] This procedure matches the estimated beta to the degree of financial risk present during its estimation period. In the DCF analyses, I use the

[29] *Value Line* uses five years of weekly historical return data to estimate its forecasted betas.

average closing stock price over the 15 trading days ending on the day that the earnings-growth-rate forecasts were obtained from Bloomberg.[30]

I estimate the market value of debt at its book value, but I adjust it by the difference between the "estimated fair (market) value" and the "carrying cost" of long-term debt. These values are reported in each company's 10-K.[31] The market value of preferred stock for the sample companies is set equal to its book value 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.

2. Market Costs of Debt and Preferred Equity

Q44. How do you estimate the current market cost of debt?

A44. The market cost of debt for each company is set equal to the 15-day average yield, as reported by Bloomberg, on an index of public utility bonds with the same S&P corporate credit rating.[32] The DCF analyses use the yield based on the current credit rating, whereas the risk positioning analyses use the current yield of a utility bond that corresponds to the

[30] Bloomberg is a professional database providing both present and historical information on equities, fixed-income securities, indices, financial derivatives, currencies, and commodities for U.S. and international markets. It also provides company financial and risk profiles, including analysts' forecasts of future growth prospects.

[31] The book value of debt from Bloomberg includes all interest-bearing financial obligations that are not current and includes capitalized leases and mandatory redeemable preferred and trust preferred securities in accordance with Financial Accounting Standards Board. See Bloomberg's definition of long-term debt for additional detail.

[32] See Panel A of Workpaper #2 to Table No. MJV-11.

five-year average debt rating of each company. This matches consistently the horizon of information used to estimate a company's beta.

Q45. How do you estimate the market cost of preferred equity?

A45. For each company with preferred stock, the cost of preferred equity is set equal to the yield on an index of utility debt as reported by Bloomberg corresponding to the S&P rating of that company's debt.

3. Risk-Free Interest Rate Estimate

Q46. What is the risk-free rate?

A46. The risk-free rate is the interest rate that can be earned with certainty. A common measure of this rate is the return on the government's Treasury bills or bonds. This rate is usually significantly below the rate that other borrowers pay for debt.

Q47. How do you obtain the estimates of the risk-free interest rates used in your analysis?

A47. I start with *Blue Chip's* forecast of 10-year Government bond yields and adjust it to a 20-year U.S. Government bond yield by using the average historical spread of 20-year bonds over 10-year bonds over the last 27 years of 50 bps. The result is a forecast 20-year risk-free rate of 3.60 percent. Table No. MJV-WATER-9 of Attachment B displays this information.

Q48. What value do you use for the long-term risk-free interest rates?

A48. I use a value of 3.60 percent for the long-term risk-free interest rate as the benchmark risk-free interest rate in the risk premium analyses. Table No. MJV-WATER-9 and Workpaper #1 to Table No. MJV-WATER-9 provide the details of my calculations.

C. COST OF EQUITY METHODS

Q49. How do you estimate the cost of equity for your sample companies?

A49. 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.

1. The cost of capital is an expected rate of return, so it cannot be directly observed; it must be inferred from available evidence.
2. Because the cost of capital is determined in capital markets (e.g., the New York Stock Exchange), data from those markets provide the best evidence from which to infer it.
3. Because 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.

Q50. How does the above definition help in cost of capital estimation?

A50. 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 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 CAPM is an example. While both approaches can work equally well if conditions are right, one may be preferable to the other under a given set of circumstances. In particular, approaches that rely on the entire security market line (e.g., the risk positioning model) are less sensitive to deviations from the assumptions that underlie the model, all else equal. In this proceeding, I examine sample evidence from both the DCF and risk positioning models.

1. The Risk Positioning Approach

Q51. Please explain the risk positioning method.

A51. The risk positioning method estimates the cost of equity as the sum of a current interest rate and a company specific 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 regulatory authority 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.

Q52. How are the "more formal" applications of risk positioning approach implemented?

A52. The first step is to specify the current values of the parameters that determine the security market line. The second is to determine the security's or the investment's relative risk. The third is to specify exactly how the parameters combine to produce the security market line, so the company's cost of equity can be calculated based on its relative risk. All of these elements and how they relate are usefully formulated in the framework of the CAPM.

a) The Capital Asset Pricing Model

Q53. Please start with the CAPM, by describing the model.

A53. 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 market risk premium. The CAPM is the longest standing

and most widely used of these theories. The CAPM states that the cost of capital for an investment, *s*, (e.g., a particular common stock) is given by the following equation:

$$k_s = r_f + \beta_s \times MRP \quad (4)$$

where k_s is the cost of capital for investment *s*; r_f is the risk-free rate, β_s is the beta risk measure for the investment *s*; 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 that offered by safe securities. It says that the security market line starts at the risk-free interest rate (that is the return on a zero-risk security, the y-axis intercept in Figure 1, 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.

b) The Empirical Capital Asset Pricing Model

Q54. What other equity risk premium model do you use?

A54. 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. Many variations on the original CAPM theory have been proposed to explain this phenomenon, but the finding can also be used to estimate the cost of capital directly, using beta to measure relative risk without simultaneously relying on the CAPM.

The second model makes use of these empirical findings. It estimates the cost of capital with the equation, where α is the "alpha" adjustment of the risk-return line, a constant,

$$k_s = r_f + \alpha + \beta_s \times (MRP - \alpha) \quad (5)$$

and the other symbols are defined as above. I label this model the Empirical Capital Asset Pricing Model, or "ECAPM." The alpha adjustment has the effect of increasing the intercept but reducing the slope of the security market line in Figure 4, which results in a security market line that more closely matches the results of empirical tests.

Q55. Why is it appropriate for you to use the empirical CAPM?

A55. Although the CAPM is still the most widely used cost of capital estimation model, it has not been completely satisfactory as an empirical model; however, the ECAPM directly address its shortcomings. The ECAPM recognizes the consistent empirical observation that the CAPM underestimates (overestimates) the cost of capital for low (high) beta stocks. In other words, the ECAPM recognizes that the actual slope of the risk-return tradeoff is flatter than predicted and the intercept higher, based upon repeated empirical tests of the CAPM. The alpha parameter (α) in the ECAPM adjusts for this fact. Figure 5 depicts the difference between the CAPM and the relationship identified in the empirical studies.

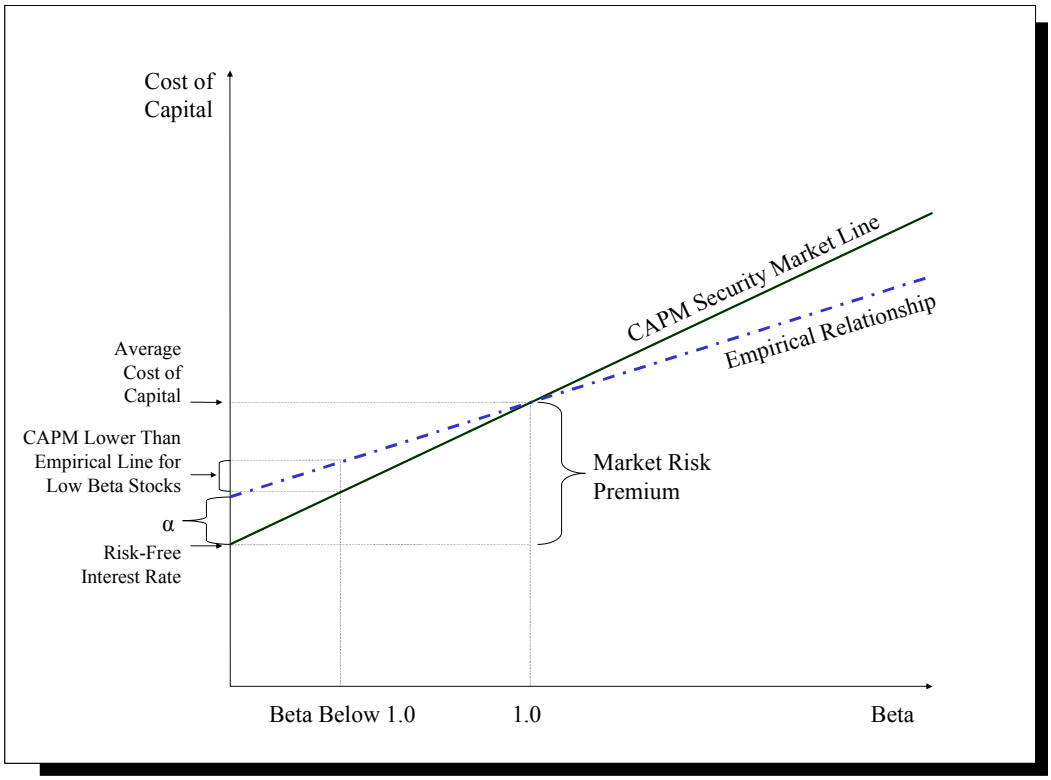

Figure 5

Research supports values for α of one to seven percent when using a short-term interest rate. I use baseline values of α of 0.5 percent for the long-term risk-free rate. For the long-term risk-free rate, the corresponding values for α are 0, 0.5 and 1.5 percent. 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 that has been extensively tested. Thus, I do not need to make the same degree of refinement when I use the long-term risk-free rate.

2. Discounted Cash Flow Method

Q56. Please describe the discounted cash flow approach.

A56. 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:

$$P = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \frac{D_3}{(1+k)^3} + \cdots + \frac{D_T}{(1+k)^T} \qquad (6)$$

where "P" is the market price of the stock; "D_t" is the dividend cash flow expected at the end of period t (i.e., subscript period 1, 2, 3 or T in the equation); "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.

Often, when the DCF is applied in regulatory proceedings, very strong (i.e., unrealistic) assumptions are used that yield a simplification of the standard formula, which then can be rearranged to estimate the cost of capital. Specifically, the model assumes that investors expect a dividend stream that will grow *forever* at a steady rate, so the market price of the stock is the result of a very simple formula,

$$P = \frac{D_1}{(k-g)} \tag{7}$$

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 (5) is a simplified version of equation (4) that can be solved to yield the well-known "DCF formula" for the cost of capital:

$$\begin{aligned} k &= \frac{D_1}{P} + g \\ &= \frac{D_0 \times (1+g)}{P} + g \end{aligned} \tag{8}$$

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 (6) says that if equation (5) holds, the cost of capital equals the expected dividend yield plus the (perpetual) expected (forever constant) 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., unrealistic) assumptions.

Q57. Are there other versions of the DCF models besides the "simple" one?

A57. Yes. The constant growth rate DCF model requires that dividends and earnings grow at the same rate for companies that earn their cost of equity on average.[33] It is inconsistent

[33] 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 more

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

I consider a variant of the DCF model that relies on slightly less strong assumptions, in that it allows for varying dividend growth rates in the near term before assuming a perpetual growth rate beginning in year eleven. I use the forecast growth of GDP as the forecast of the long-term growth rate, i.e. year eleven on. This is a "multistage" variant of the DCF method.

Q58. What are the merits of the DCF approach?

A58. The DCF approach is conceptually sound if its assumptions are met, but it can run into difficulty in practice because those assumptions are so strong,[34] and hence so unlikely to correspond to reality. Dividends, earnings and prices are unlikely to grow at a constant

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slowly than earnings, each year the company invests a bigger fraction of earnings, which results in an increased growth rate of earnings. 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.

[34] In this context, "strong" means that the assumption is unlikely to match reality and that it also has a substantial impact on the model's results.

rate literally forever. Two conditions are also 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 growth of dividends, and the growth rate(s) used in that formula must match current investor expectations.

Q59. Is estimating the "right" dividend growth rate the most difficult part for the implementation of the DCF approach?

A59. 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. However, 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. In general, a better estimate of the growth rate is obtained by using forward-looking analyst forecasts, which take into account current and expected company characteristics, and this is the method I use in my analysis.

As discussed above, there is great uncertainty in the capital markets. In addition, the water industry is going through a period characterized by a need for large capital investments, caused by the aging state of the infrastructure and more stringent water safety and

purification requirements.[35] Coupled with the rising construction costs of utility infrastructure, this creates uncertainty about future conditions and diverging expectations.

Q60. Are there other important considerations regarding the implementation of the DCF models for water utilities?

A60. Yes. Some water utilities have engaged in share buybacks, which means that they have distributed cash to shareholders through means other than dividends. Therefore, a model that relies only on dividends underestimates how much cash shareholders have received. In particular, the dividend yield is lower than the cash yield, and as a result, the estimated return on equity is too low.

Q61. Please explain how you determine the implications of share buybacks.

A61. A review of the sample companies' annual reports and news announcements shows that three companies have recently engaged in share buybacks: American Water Works, Aqua America, and York Water. Of these, American Water Works and York Water have ongoing share buyback programs. For each of these companies, I determine the magnitude of the share buyback and the horizon over which the buybacks have been announced to occur. I then calculate the total cash flows expected per share including buybacks, and use that figure rather than the dividend-only yield to determine the DCF-based ROE. In doing so, I take care that share buybacks are modeled only for the first few years, based on the announced parameters and recent activity of on-going programs. Conservatively, I do not

[35] See Regulatory Research Associates, Water Advisory, "Water 2016 Capital Expenditure Update," October 28, 2016.

assume any cash distributions via repurchases except where the companies have explicitly announced on-going programs in their annual reports, even though investors may expect them even without an explicit announcement, especially for companies that have engaged in such buybacks in the recent past. Having determined the cash yield and the period during which it is relevant, I can calculate the DCF-based results using the modified model and find the differences provided in Table 4 below.[36]

[36] Note that the DCF ROE calculations for this analysis are illustrative and not intended to serve as estimates for the proxy group companies. My actual estimates for the proxy group companies, which more precisely model quarterly expected dividends and appropriately account for differences in financial leverage, but do not take account of share buybacks, are provided in Attachment B to my testimony.

Company	Ticker	Single Stage DCF ROE: Dividend stream (no buybacks) [1]	Single Stage DCF ROE: Dividend stream (with buybacks) [2]	Single Stage DCF ROE: Difference [3]	Multi-Stage DCF ROE: Dividend stream (no buybacks) [4]	Multi-Stage DCF ROE: Dividend stream (with buybacks) [5]	Multi-Stage DCF ROE: Difference [6]
Amer. States Water	AWR	NA	NA	NA	NA	NA	NA
Amer. Water Works	AWK	10.1%	10.8%	0.69%	7.0%	7.3%	0.31%
Aqua America	WTR	NA	NA	NA	NA	NA	NA
California Water	CWT	NA	NA	NA	NA	NA	NA
Conn. Water Services	CTWS	NA	NA	NA	NA	NA	NA
Middlesex Water	MSEX	NA	NA	NA	NA	NA	NA
SJW Corp.	SJW	NA	NA	NA	NA	NA	NA
York Water Co. (The)	YORW	8.7%	9.2%	0.54%	6.4%	6.7%	0.29%
Average		9.4%	10.0%	**0.61%**	6.7%	7.0%	**0.30%**

Notes:
[1]-[2]: Buybacks Analysis Workpaper #1, Panels A and B.
[3]: [2]-[1]
[4]-[5]: Buybacks Analysis Workpaper #2, Panels A and B.
[6]: [5]-[4]
NA signifies that the company does not have any indication of future buybacks.
AWR and WTR both had buyback programs that were completed by end of year 2016.

Table 4: Illustration of the Effect of Company Buybacks on ROE

Q62. What conclusions do you draw from this analysis?

A62. Based on the analysis above, it is clear that the reliance on dividends as the only source of cash that accrue to shareholders creates a downward bias in the cost of equity estimates obtained from the dividend discount model. Specifically, the average downward bias for affected companies is 61 basis points in the single-stage DCF and 30 basis points in the multi-stage DCF. While I do not attempt to correct for this bias via any specific numerical adjustments, I do consider it when evaluating the range of reasonable cost of equity estimates based on the model results.

V. CAL WATER'S COST OF CAPITAL

A. COST OF CAPITAL ESTIMATES FOR THE SAMPLE

Q63. What are the parameters of the two scenarios you considered in your risk positioning analyses?

A63. Table 2 above displays the parameters for the two scenarios. The motivation for the scenarios is the empirical observation that both the yield spread is higher and the market volatility is higher than normal. The increased yield spread could be the result of an increase in the MRP or downward pressure on the yield of risk-free bonds due to a flight to quality or a combination of the two factors. I reduce the adjustment to the risk-free rate when I use a higher estimate of the MRP, as illustrated in Table 2.

Q64. Would you please illustrate how the parameters in the scenarios affect the Security Market Line?

A64. Yes. Figure 4 displays the adjustments for Scenario 2 of the three scenarios. The adjustments I incorporated in my risk positioning models are modest attempts to take the downward bias in the risk-free rate and the increase in the MRP into account. However, I rely on standard beta estimates in both scenarios. Note that for each one percent increase in the market risk premium, I reduce the yield spread added by ¼ percent. The choice of ¼ percentage point is based on an estimated beta of corporate bonds of 0.25.[37]

[37] For example, Edwin J. Elton, Martin J. Gruber, Deepak Agrawal and Christopher Mann, Explaining the Rate Spread on Corporate Bonds, *The Journal of Finance* LVI, 2001 footnote 32 report bond betas range from 0.12 to 0.76 with the average BBB-rated bond having a beta of 0.26.

Q65. What are the risk positioning results from the sample?

A65. Table 5 below displays the ATWACC estimates and the corresponding ROE estimates at a capital structure with 53.4 percent equity for the sample. The Sources and Notes section of Table 5 displays the risk-free rate and MRP corresponding to the two scenarios.

Estimated Return on Equity	Scenario 1 [1]	Scenario 2 [2]
Full Sample		
Financial Risk Adjusted Method		
CAPM	10.3%	10.9%
ECAPM (α = 0.5%)	10.5%	11.1%
ECAPM (α = 1.5%)	10.8%	11.4%
Hamada Adjustment Without Taxes		
CAPM	10.0%	10.6%
ECAPM (α = 0.5%)	10.0%	10.6%
ECAPM (α = 1.5%)	10.2%	10.8%
Hamada Adjustment With Taxes		
CAPM	9.6%	10.2%
ECAPM (α = 0.5%)	9.7%	10.3%
ECAPM (α = 1.5%)	9.9%	10.5%
Sources and Notes:		
Scenario 1: Long-Term Risk Free Rate of 4.00%, Long-Term Market Risk Premium of 6.90%.		
Scenario 2: Long-Term Risk Free Rate of 3.75%, Long-Term Market Risk Premium of 7.90%.		

Table 5: Risk Positioning Results – Water Sample

Q66. How do the ATWACC estimates in Table 5 compare to the traditional utility weighted average cost of capital ("WACC")?

A66. The traditional utility WACC is the weighted-average of the after-tax cost of equity and the pre-tax cost of debt. The ATWACC is the weighted-average of the after-tax cost of both debt and equity. In addition, the ATWACC relies on the market cost of debt, but the utility WACC uses the embedded cost of debt. At this time, the embedded cost of debt is higher than the market cost of debt so the ATWACC is lower than the WACC due to the use of embedded debt costs in addition to the effect of using the after-tax cost of debt.

Q67. What conclusions do you draw from the equity risk premium results?

A67. Of the equity risk premium 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 written evidence considers by using the ECAPM). Conversely, the ECAPM numbers deserve the most weight, because this method adjusts for the empirical findings. The ROE reflect Cal Water's current regulatory capital structure of 53.4 percent equity. For the water utilities sample, the ROE estimates range from 9.6 to 11.4 percent.

Q68. What are the DCF estimates for the sample?

A68. Following the procedures outlined earlier, simple and multistage DCF estimates of the cost of equity are obtained for the water utilities and are presented in Table 6 below.[38] Because the analysts' 5-year growth rate forecasts are in general higher than the forecast growth rate for GDP, the simple DCF estimates are higher than the multistage DCF estimates. For the water utilities sample, the simple DCF ROE estimate is 11.4 percent. The multistage DCF estimate is lower at 8.5 percent.

	Cost of Equity
Full Sample	
Simple	11.4%
Multi-Stage	8.5%

Table 6: DCF Results – Water Sample

[38] See *Section III.B* of above for details of DCF estimation.

Q69. Are there any issues with IBES or *Value Line* growth rate estimates for our proxy group companies at this time?

A69. Yes. For Middlesex Water Co., SJW Corp., and York Water Co., IBES does not provide a consensus growth rate estimate.[39] Therefore, the short-term (4 year) growth rate estimates for these companies are based solely on *Value Line* data.

B. COST OF CAPITAL RECOMMENDATION FOR CAL WATER

Q70. Please review results of the cost of capital calculations that inform your recommended ROE for the Company.

A70. For the water utilities sample, the ROE estimates using the risk-positioning and DCF methods range from 8.5 to 11.4 percent.

Q71. How do these results take the ongoing uncertainty in the capital markets into account?

A71. I incorporated the effects of the uncertainty in the capital markets with sensitivity tests of an increase in the MRP of 0 and 1 percent with increases in the risk-free rate of 0.40 and 0.15 percent, respectively for the two scenarios as displayed in Table 2 above. As discussed above, the 40 bps increase to the risk-free rate is associated with no adjustment to the MRP, and the 100 bps MRP adjustment is associated with the 15 bps adjustment to the risk-free

[39] Certain sources that report IBES estimates—including Yahoo! Finance—do currently show growth rates projections for these companies. However, my analysis of detailed information on the individual estimates underlying the IBES consensus provided by Thomson Reuters (via their Eikon subscription data service) reveals that these growth rates are based on "stale" estimates that were originally made some years ago and have not been updated since.

rate. This is a difficult and somewhat subjective process, but I believe that I have been conservative in my adjustment to the risk-positioning model to incorporate the effects of the ongoing market uncertainty. Additionally, I base my estimates largely on the most conservative of the two scenarios that I examine.

Q72. What is your estimate of the cost of capital for the water sample?

A72. I believe that a reasonable range for the cost of capital for a regulated water utility with a capital structure including 53.4 percent equity is 10 to 11 percent.

Q73. Why doesn't your recommended range for the sample cover all of the estimates displayed in Table 5 and Table 6?

A73. I provide an estimate of a reasonable range based upon the reliability of the data. I do not try to include all of the resulting estimates in the range because I regard some of the estimates as more reliable than others. For example, the estimates based upon the CAPM are not as reliable as those based upon the ECAPM, because the CAPM estimates do not account for the empirical observation that low (high) beta stocks have higher (lower) costs of capital than estimated by the CAPM. Similarly, I believe the DCF estimates are susceptible to downward bias due to the presence of stock buybacks in the water industry, as well as the elevated P/E ratios in the current low interest rate environment. This is particularly true for the multi-stage DCF result, which is also susceptible to downward bias owing to the unusually low GDP growth forecasts.

Q74. What are the risk factors for Cal Water relative to the sample you examine?

A74. Cal Water's service territory consists of many small systems that are Class C or D systems on a stand-alone basis. The Company also has about 600 wells and is responsible for insuring the water quality in all of them. The Company has few backup sources of water and is vulnerable to drought. The Company does have a Water Revenue Adjustment Mechanism and a Marginal Cost Balancing Account, but it also has a large net balance in those accounts, which it is recovering at a very slow rate. The balance does earn a return, but the return is based upon a 90-day commercial paper rate even though full recovery is likely to extend over several years. A long-term obligation is not normally financed with 90-day commercial paper.

The Company also faces asymmetric risk in that the Company can be denied a rate increase in the second and third year after a general rate case if it earned more than the allowed ROE in the first year. However, there is no opportunity to increase returns is earnings are less than the allowed ROE. Thus, there is no room to compensate for a below average return in one year with an above average return the following year.

The Company also forecasts relatively large capital expenditures going forward to meet the requirements of the California Water Plan. Companies with large capital expenditures are riskier because of regulatory risk and because of the pressure that such expenditures place on a company's credit rating.

Q75. What is the California Water Plan?

A75. The Company, as well as other utilities in California, will be making large capital investments in order to upgrade existing infrastructure and to comply with higher purification standards. In the long-term, these capital investments will improve the reliability and efficiency of the water infrastructure in California, and it is critical that the major infrastructure investment necessary for regulated utilities not be hampered by inadequate allowed rates of return.

Q76. Have you analyzed Cal Water's capital expenditures?

A76. Yes. The Company has provided me with information regarding its recent historical and forecast future investments in utility plant assets. To compare the Cal Water's historical expenditures to investment levels for the publicly-traded sample companies, I normalized the annual capital expenditures of each company by its gross property plant and equipment ("PP&E") balances. This provides a measure of how substantial each company's investment is relative to its existing plant assets, and allows for a meaningful comparison of capital expenditures among the companies. As shown in Table 7, Cal Water's capital expenditures were similar to the sample average (when expressed as a percentage of gross plant) for the years 2011-2013. However, in 2014 and 2015, Cal Water expanded its plant assets by a substantially larger percentage than the average sample company, and in 2015 its capital expenditures exceeded those of any of the proxy companies as a share of gross plant.

		CapEx / Gross PP&E					
		2011	2012	2013	2014	2015	2016
		[1]	[2]	[3]	[4]	[5]	[6]
Amer. States Water	[a]	6.1%	5.0%	6.6%	4.8%	5.5%	7.7%
Amer. Water Works	[b]	6.4%	6.0%	5.9%	5.5%	6.3%	6.6%
Aqua America	[c]	7.2%	6.9%	5.8%	5.8%	6.0%	5.9%
California Water	[d]	6.1%	6.1%	5.6%	5.7%	7.1%	8.5%
Conn. Water Services	[e]	4.8%	4.1%	5.1%	6.5%	6.4%	8.2%
Middlesex Water	[f]	4.5%	4.0%	3.5%	3.8%	4.2%	7.1%
SJW Corp.	[g]	5.3%	8.0%	6.0%	6.3%	6.1%	7.6%
York Water Co. (The)	[h]	3.4%	4.2%	3.3%	4.6%	4.3%	3.9%
Sample Average	[i]	5.5%	5.5%	5.2%	5.4%	5.7%	6.9%
California Water	[j]	5.5%	5.6%	5.2%	6.3%	7.9%	

Sources and Notes:
[a] - [h]: Capital IQ.
[i]: Average([a] - [h])
[j]: California Water provided data and CPUC Annual Reports.
[j][6]: CPUC Annual Report for 2016 not yet available.

Table 7: Historical Capital Expenditures

Q77. What has been the recent trend in Cal Water's level of investment?

Cal Water's capital expenditures have generally increased along with those of the water industry in general.

A77. Figure 6 plots the trajectory of capital structures for Cal Water and the sample companies, with each company's spending indexed to its 2011 levels. The figure demonstrates that Cal Water's spending has increased more than most of the sample companies during 2011-2015. This corresponds to the fact that Cal Water's capital expenditures have become higher (relative to gross plant) than those of the sample companies, and suggests elevated business risk for the Company relative to the sample.

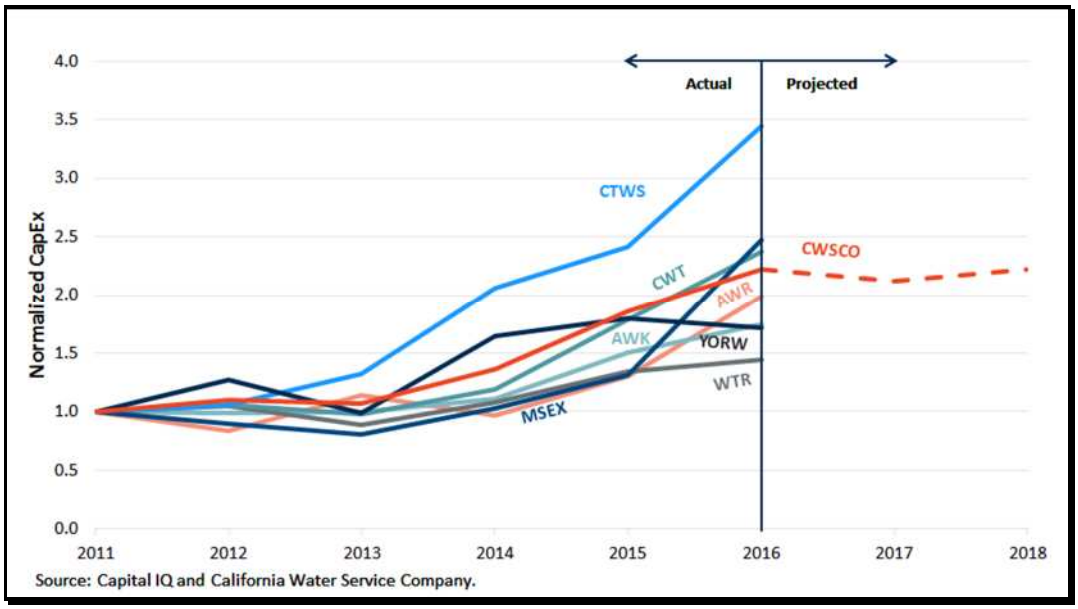

Figure 6: Normalized Capital Expenditure Investments

Q78. What is your conclusion regarding the cost of equity for Cal Water?

A78. As noted above, I believe that Cal Water is of somewhat elevated business risk relative to the water sample. Therefore, I recommend that its allowed ROE be placed in the upper half of my reasonable range of the reasonable range. My analysis suggests that the best point estimate for the cost of equity for Cal Water is 10¾ percent. This estimate reflects my analysis of Cal Water's business and financial risk, as well as the water sample cost of equity estimates resulting from the DCF and risk positioning models.

Q79. Does your recommendation include any consideration for recovery of flotation costs associated with Cal Water's equity issuances?

A79. No, it does not. While it is appropriate that Cal Water be allowed to recover underwriting fees and any other costs associated with its debt or equity issuances as part of its cost of service, neither my cost of equity estimates for the water utility sample nor my recommended allowed ROE for Cal Water includes any adjustment for such flotation costs.

In my experience, it is not uncommon for regulators to provide an upward adjustment to the allowed ROE in the 15 to 50 basis points range to provide for the recovery of flotation costs.

Q80. Does this conclude your written evidence?

A80. Yes, it does.

ATTACHMENT A:

QUALIFICATIONS OF MICHAEL J. VILBERT

Dr. Michael J. Vilbert is a Principal in the The Brattle Group's San Francisco office and has more than 20 years of experience as an economic consultant. He 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. In the area of regulatory economics, he has testified or submitted testimony on the cost of capital for regulated companies in the water, electric, natural gas and petroleum industries in the U.S. and Canada. His testimony has addressed the effect of regulatory policies such as decoupling or must-run generation on a regulated company's cost of capital and the appropriate way to estimate the cost of capital for companies organized as Master Limited Partnerships. He analyzed issues associated with situations imposing asymmetric risk on utilities, the prudence of purchased power contracts, the economics of energy conservation programs, the appropriate incentives for investment in electric transmission assets and the effect of long-term purchased power agreements on the financial risk of a company. He has served as a neutral arbitrator in a contract dispute and analyzed the effectiveness of a company's electric power supply auction. He has also estimated economic damages and analyzed the business purpose and economic substance of tax related transactions, valued assets in arbitration for purchase at the end of the contract, estimated the stranded costs of resulting from the deregulation of electric generation and from the municipalization of an electric utility's distribution assets and addressed the appropriate regulatory accounting for depreciation and goodwill.

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

- Dr. Vilbert served as the consulting expert in several cases for the U.S. Department of Justice and the Internal Revenue Service regarding the business purpose and economic substance of a series of tax related transactions. These projects required the analysis of a complex series of financial transactions including the review of voluminous documentary evidence and required expertise in financial theory, financial market as well as accounting and financial statement analysis.

- In a securities fraud case, Dr. Vilbert designed and created a model to value the private placement stock of a drug store chain as 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 that 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 electric 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 testified as well as assisted in the preparation of testimony and the development of estimation models in numerous cost-of-capital cases for natural gas pipeline, water utility and electric utility clients before the Federal Energy Regulatory Commission ("FERC") and state regulatory commissions. These have spanned standard estimation techniques (e.g., Discounted Cash Flow and Risk Positioning models). He has 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 in its allowed cost of capital for major disallowances stemming from QF contract management.

- Dr. Vilbert 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 utility's 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 cost of service for the authority required estimation of the 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 a determination of the railroad's cost of capital. He also helped 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 shipper products, improved cost analysis and evaluation of bottlenecks in the system.

- For a utility in the Southeast, Dr. Vilbert quantified 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 ratepayers 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 forecasted 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 a 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.

- Dr. Vilbert evaluated the appropriate "bareboat" charter rate for an oil drilling platform for the renewal period following the end of a long-term lease. The evaluation required analysis of the market for oil drilling platforms around the world including trends in construction and labor costs and the demand for platforms in varying geographical environments.

- Dr. Vilbert and Dr. Villadsen, also of The Brattle Group, evaluated the offer to purchase the assets of Pentex Alaska Natural Gas Company, LLC on behalf of the Western Finance Group for presentation to the Board of the Alaska Industrial Development and Export Authority. The report compared the proposed purchase price with selected trading and transaction multiples of comparable companies.

PRESENTATIONS

"Moving Toward Value in Utility Compensation – Shareholder Value Concept," with A. Lawrence Kolbe, California PUC Workshop, June 13, 2016.

"Natural Gas Pipeline FERC ROE," INGAA Rate of Return Seminar, with Mike Tolleth, March 23, 2016.

"The Cost of Capital for Alabama Power Company," Public Service Commission public meeting, July 17, 2013.

"An Empirical Study of the Impact of Decoupling on the Cost of Capital," Center for Research in Regulated Industries, Shawnee on Delaware, PA, May 17, 2013.

"Point – Counterpoint: The Regulatory Compact and Pipeline Competition," with (Jonathan Lesser, Continental Economics), Energy Bar Association, Western Meeting, February 22, 2013

"Introduction to Retail Rates," presented to California Water Services Company, 18-19 November 2010.

"Impact of the Ongoing Economic Crisis on the Cost of Capital of the U.S. Utility Sector", National Association of Water Companies: New York Chapter, Albany, NY, May 21, 2009.

"Impact of the Ongoing Economic Crisis on the Cost of Capital of the U.S. Utility Sector", New York Public Service Commission, Albany, NY, April 20, 2009.

"Current Issues in Explaining the Cost of Capital to Utility Commissions" Cost of Capital Seminar, Philadelphia, PA, 2008.

"Revisiting the Development of Proxy Groups and Relative Risk Analysis," Society of Utility and Regulatory Financial Analysts: 39th Financial Forum, April 2007.

"Current Issues in Estimating the Cost of Capital," *EEI Electric Rates Advanced Course*, Madison, WI, 2006, 2007, 2008, 2009, 2010 and 2011.

"Current Issues in Cost of Capital," with Bente Villadsen, *EEI Electric Rates Advanced Course*, Madison, WI, 2005.

"Cost of Capital - Explaining to the Commission - Different ROEs for Different Parts of the Business," *EEI Economic Regulation & Competition Analysts Meeting*, May 2, 2005.

"Cost of Capital Estimation: Issues and Answers," *MidAmerican Regulatory Finance Conference*, Des Moines, IA, April 7, 2005.

"Utility Distribution Cost of Capital," *EEI Electric Rates Advanced Course*, Madison, WI, July 2004.

"Not Your Father's Rate of Return Methodology," *Utility Commissioners/Wall Street Dialogue*, NY, May 2004.

"Issues for Cost of Capital Estimation," with Bente Villadsen, *Edison Electric Institute Cost of Capital Conference*, Chicago, IL, February 2004.

"Utility Distribution Cost of Capital," *EEI Electric Rates Advanced Course*, Bloomington, IN, 2002, 2003.

ARTICLES

"Effect on the Cost of Capital of Ratemaking that Relaxes the Linkage between Revenue and kWh Sales: An Updated Empirical Investigation of the Electric Industry," Michael J. Vilbert, Joseph B. Wharton, Shirley Zhang, and James Hall, *The Brattle Group,* November 2016.

"The Impact of Revenue Decoupling on the Cost of Capital for Electric Utilities: An Empirical Investigation," prepared for The Energy Foundation by Michael J. Vilbert, Joseph B. Wharton, Charles Gibbons, Melanie Rosenberg, and Yang Wei Neo, March 20, 2014.

"Estimating the Cost of Equity for Regulated Companies," (with P.R. Carpenter, Bente Villadsen, T. Brown, and P. Kumar), prepared for the Australian Pipeline Industry Association and filed with the Australian Energy Regulator and the Economic Regulation Authority, Western Australia, February 2013.

"Survey of Cost of Capital Practices in Canada," (with Bente Villadsen and Toby Brown), prepared for British Columbia Utilities Commission, May 2012.

"Economic Impact on City of Portland of Allocation of Remediation Costs of Portland Harbor Superfund Site," with Professor David Sunding, March 2012.

"The Impact of Decoupling on the Cost of Capital – An Empirical Study," Joseph B. Wharton, Michael J. Vilbert, Richard E. Goldberg, and Toby Brown, Discussion Paper, *The Brattle Group*, March 2011.

"Review of Regulatory Cost of Capital Methodologies," (with Bente Villadsen and Matthew Aharonian), Canadian Transportation Agency, September 2010.

"Understanding Debt Imputation Issues," by Michael J. Vilbert, Bente Villadsen and Joseph B. Wharton, *Edison Electric Institute*, August 2008.

"Measuring Return on Equity Correctly: Why current estimation models set allowed ROE too low," by A. Lawrence Kolbe, Michael J. Vilbert and Bente Villadsen, *Public Utilities Fortnightly*, August 2005.

"The Effect of Debt on the Cost of Equity in a Regulatory Setting," by A. Lawrence Kolbe, Michael J. Vilbert, Bente Villadsen and The Brattle Group, *Edison Electric Institute*, April 2005.

"Flaws in the Proposed IRS Rule to Reinstate Amortization of Deferred Tax Balances Associated with Generation Assets Reorganized in Industry Restructuring," by Frank C. Graves and Michael J. Vilbert, white paper for *Edison Electric Institute* (EEI) to the IRS, July 25, 2003.

TESTIMONY

Prepared direct testimony before the Federal Energy Regulatory Commission, Docket No. RP17-___-000 on behalf of Great Lakes Gas Transmission Limited Partnership, regarding the

appropriate ROE to allow for its regulated natural gas pipeline assets, March 2017.

Prepared direct testimony before the North Carolina Utilities Commission, Docket No. G-39, Sub 38, on behalf of the Cardinal Pipeline Company, LLC regarding the appropriate allowed ROE for the Company's pipeline assets, March 2017.

Prepared direct testimony before the Federal Energy Regulatory Commission, Docket No. ER17-___-000 on behalf of Gridliance West Transco LLC, regarding Gridliance West's application pursuant to section 205 of the Federal Power Act regarding the appropriate ROE, cost of debt, and capital structure to allow Gridliance West Transco LLC to earn on the transmission facilities acquired from Valley Electric Association, December 2016.

Prepared direct testimony and supporting exhibits before the Federal Energy Regulatory Commission, Docket No. EC17-049-000, on behalf of Gridliance West Transco LLC, regarding GridLiance West's application pursuant to section 203 of the Federal Power Act (FPA) to acquire certain high voltage transmission facilities from Valley Electric Transmission Association, LLC (VETA) through its parent non-profit electric cooperative parent Valley Electric Association, Inc. (Valley Electric), December 2016.

Prepared direct testimony and supporting exhibits before the Federal Energy Regulatory Commission, Docket No. ER16-___-000, on behalf of Trans Bay Cable LLC, regarding the appropriate ROE and capital structure to allow for its regulated electric transmission assets, September 2016.

Prepared direct testimony before the Public Utilities Commission of Hawai‘i on the effect on the cost of capital of decoupling ratemaking that relaxes the linkage between revenue and kWh sales on behalf of Hawai‘i Electric Light Company, Inc. Docket No. 2015-0170, August 2016.

Direct testimony before the Michigan Public Service Commission on behalf of the Detroit Thermal, LLC (Case No. U-18131) on the cost of common equity capital for Detroit Thermal's regulated steam service, July 2016.

Pre-filed direct testimony and supporting exhibits before the Rhode Island Public Utilities Commission on behalf of The Narragansett Electric Company d/b/a National Grid Docket No. 47xx regarding Petition for the Approval of Gas Capacity Contracts and Cost Recovery, June 2016.

Prepared direct testimony and supporting exhibits before the Federal Energy Regulatory Commission, Docket No. RP16-440-000, on behalf of ANR Pipeline Company, regarding the appropriate ROE to allow for its regulated natural gas pipeline assets, January 2016.

Pre-filed direct testimony before the Massachusetts Department of Public Utilities on behalf of Massachusetts Electric Company and Nantucket Electric Company d/b/a National Grid regarding the risk transfer inherent in signing long-term contracts for natural gas pipeline capacity, Docket No. D.P.U. 16-05, January 2016.

Direct and rebuttal testimony before the Michigan Public Service Commission on behalf of the DTE Electric Company (Case No. U-18014) on the cost of capital for DTE Electric Company's regulated electric assets, January 2016 and July 2016.

Rebuttal testimony before the Public Utility Commission of Texas on behalf of Ovation Acquisition I, L.L.C., Ovation Acquisition II, L.L.C., and Shary Holdings, L.L.C. concerning the adequacy of Oncor Electric Distribution Company's (Oncor) liquidity, access to capital and financial risk with regard to the proposed restructuring of Oncor, PUC Docket No. 451888, December, 2015.

Direct and rebuttal testimony before the Michigan Public Service Commission on behalf of the DTE Gas Company (Case No. U-17799) on the cost of capital for DTE Gas Company's natural gas distribution assets, December 2015 and May 2016.

Prepared direct testimony before the Federal Energy Regulatory Commission, Docket No. ER15-2594-000, on behalf of South Central MCN, LLC, regarding the appropriate ROE to include in the transmission rate formula (Formula Rate) to establish an annual transmission revenue requirement (ATRR) for transmission service over facilities that SCMCN will own in the Southwest Power Pool, Inc. (SPP) region, September 2015.

"Report on Gas LDC multiples," with Bente Villadsen, *Alaska Industrial Development and Export Authority*, May 2015.

Direct and reply testimony before the Regulatory Commission of Alaska on behalf of Cook Inlet Natural Gas Storage Alaska, LLC, Docket No. U-15-016 on the appropriate allocation of the proceeds from the sale of excess Found Native Gas discovered incidental to the construction of the storage facility, April 2015 and July 2015.

Direct testimony before the Michigan Public Service Commission on behalf of the Detroit Edison Electric Company (Case No. U-17767) on the cost of capital for DTE's electric utility assets, December 2014.

Direct and rebuttal testimony before the Washington Utilities and Transportation Commission on behalf of Puget Sound Energy, Inc. Docket Nos. UE-130137 and UG-130138 (consolidated) remand proceeding with regard to the effect of decoupling on the cost of capital, November 2014 and December 2014.

Initial and Reply Statement of Position before the Public Utilities Commission of Hawai'i In the Matter of Instituting an Investigation to Reexamine the Existing Decoupling Mechanisms for Hawaiian Electric Company, Inc., Hawai'i Electric Light Company, Inc., and Maui Electric Company, Limited, Docket No. 2013-0141, with Dr. Toby Brown and Dr. Joseph B. Wharton, May 2014 and September 2014.

Direct and rebuttal testimony before the Pennsylvania Public Utility Commission on behalf of Metropolitan Edison Company (Docket No. R-2014-2428745), Pennsylvania Electric Company (Docket No. R-2014-2428743), Pennsylvania Power Company (Docket No. R-2014-2428744),

and West Penn Power Company (Docket No. R-2014-2428742) regarding the appropriate cost of common equity for the companies, September 2014 and December 2014.

Direct and rebuttal testimony before the Public Service Commission of West Virginia in the Matter of the Application of Monongahela Power Company and The Potomac Edison Company, Case No. 14-0702-E-42T for approval of a general change in rates and tariffs, June 2014 and October 2014.

Direct testimony before the Public Utilities Commission of Ohio in the Matter of the Determination of the Existence of Significantly Excessive Earnings for 2012 Under the Electric Security Plans of Ohio on behalf of the Edison Company, The Cleveland Electric Illuminating Company, and The Toledo Edison Company, Case No. 14-0828-EL-UNC, May 2014.

Direct testimony before the Federal Energy Regulatory Commission, Docket No. ER14-1332-000, on behalf of DATC Path 15, LLC, regarding the appropriate ROE to include in the Submission of Revisions to Appendix I in TO Tariff Reflecting Updated TRR to be Effective February, 2014.

Direct testimony, rebuttal testimony and sur-surrebuttal testimony before the Arkansas Public Service Commission regarding the appropriate ROE to allow In the Matter of the Application of SourceGas Arkansas Inc., Docket No. 13-079-U for Approval of a General Change in Rates, and Tariffs, September 2013, March 2014, and April 2014.

Direct testimony before the Federal Energy Regulatory Commission, Docket No. ER13-2412-000, on behalf of Trans Bay Cable LLC, regarding the appropriate ROE to include in the Submission of Revisions to Appendix I of the Trans Bay Transmission Owner Tariff to be Effective 11/23/2013, September 2013.

Direct testimony before the Federal Energy Regulatory Commission, Docket No. ER13-2412-000, on behalf of Trans Bay Cable LLC, regarding the appropriate ROE to include in the Submission of Revisions to Appendix I of the Trans Bay Transmission Owner Tariff to be Effective 11/23/2013, September 2013.
Presentation on behalf of Alabama Power Company with regard to the appropriate cost of capital for the Rate Stabilization and Equalization mechanism, Dockets 18117 and 18416, July 2013.

Direct testimony before the Public Utilities Commission of Ohio in the Matter of the Determination of the Existence of Significantly Excessive Earnings for 2012 Under the Electric Security Plans of Ohio on behalf of the Edison Company, The Cleveland Electric Illuminating Company, and The Toledo Edison Company, Case No. 13-1147-EL-UNC, May 2013.

Expert Report, with A. Lawrence Kolbe and Bente Villadsen, on cost of equity, non-recovery of operating cost and asset retirement obligations on behalf of the behalf of oil pipeline in arbitration, April 2013.

Direct and Rebuttal testimony before the Public Utilities Commission of the State of Colorado on behalf of Rocky Mountain Natural Gas LLC regarding the cost of capital for an intrastate natural

gas pipeline, Docket No. 13AL-143G, with Advice Letter No. 77, January 2013 and October 2013.

Rebuttal Testimony before the Public Utilities Commission of the State of California on behalf of Southern California Edison regarding Application 12-04-015 of Southern California Edison Company (U 338-E) For Authority to Establish Its Authorized Cost of Capital for Utility Operations for 2013 and to Reset the Annual Cost of Capital Adjustment Mechanism , August 2012.

Direct testimony and supporting exhibits on behalf of Transcontinental Gas Pipeline Company, LLC, before the Federal Energy Regulatory Commission, on the Cost of Capital for Interstate Natural Gas Pipeline assets, Docket No. RP12-993-000, August 2012.
Direct Testimony before the North Carolina Utilities Commission on behalf of Cardinal Pipeline Company LLC, regarding the cost of capital for an intrastate natural gas pipeline, Docket G-39, Sub 28, August 2012.

Joint Rebuttal Testimony before the California Public Utility Commission on behalf of California American Water Company, regarding Application of California-American Water Company (U210W) for Authorization to increase its Revenues for Water Service, Application 10-07-007, and In the Matter of the Application of California-American Water Company (U210W) for an Order Authorizing and Imposing a Moratorium on New Water Service Connections in its Larkfield District, Application 11-09-016, August 2012.

Direct testimony before the Public Utilities Commission of Ohio, In the Matter of the Determination of the Existence of Significantly Excessive Earnings for 2011 Under the Electric Security Plan of Ohio Edison Company, The Cleveland Electric Illuminating Company, and The Toledo Edison Company, Case No. 12-1544-EL-UNC, May 2012.

Deposition testimony in *Tahoe City Public Utility District, Plaintiff vs. Case No. SCV 27283 Tahoe Park Water Company, Lake Forest Water Company, Defendants*, May 2012.

Deposition testimony in *Primex Farms, LLC, Plaintiff, v. Roll International Corporation, Westside Mutual Water Company, LLC, Paramount Farming Company, LLC, Defendants*, April 2012.

Direct and rebuttal testimony before the Michigan Public Service Commission, Case No. U-16999, on behalf of Michigan Consolidated Gas Company, regarding cost of service for natural gas distribution assets, April 2012 and October 2012.

Direct testimony before the Federal Energy Regulatory Commission, Docket No. PA10-13-000, on behalf of ITC Holdings Corp. regarding a rehearing for FERC Staff, Office of Enforcement, Division of Audits, Report on the appropriate accounting for goodwill for the acquisition of ITC Midwest assets from Interstate Power and Light Company, February 2012.

Rebuttal testimony before the Florida Public Service Commission, Docket No. 110138-EL, on behalf of Gulf Power, a Southern Company, on the method to adjust the return on equity for differences in financial risk, November 2011.

Direct testimony before the Federal Energy Regulatory Commission, Docket No. ER12-296-000, on behalf of Public Service Electric and Gas Company on the Cost of Capital and for Incentive Rate Treatment for the Northeast Grid Reliability Transmission Project, October 2011.

Rebuttal Evidence before the National Energy Board in the matter of AltaGas Utilities Inc., 2010-2012 GRA Phase I, Application No. 1606694; Proceeding I.D. 904, October, 2011.

Report before the Arbitrator on behalf of Canadian National Railway Company in the matter of a Submission by Tolko Marketing and Sales LTD for Final Offer Arbitration of the Freight Rates and Conditions Associated with Respect to the Movement of Lumber by Canadian National Railway Company from High Level, Alberta to Various Destinations in the Vancouver, British Columbia Area, October, 2011.

Written direct and reply evidence before the National Energy Board in the matter of the National Energy Board Act, R.S.C. 1985, c. N−7, as amended, and the Regulations made thereunder; and 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*, for determining the overall fair return on capital in the business and services restructuring and Mainline 2012 – 2013 toll application, RH-003-2011, September 2011 and May 2012.

Direct testimony before the Federal Energy Regulatory Commission, Docket No. PA10-13-000, on behalf of ITC Holdings Corp. in response to FERC Staff, Office of Enforcement, Division of Audits, Draft Report on the appropriate accounting for goodwill for the acquisition of ITC Midwest assets from Interstate Power and Light Company, July 2011.

Initial testimony before the Public Utilities Commission of Ohio, Case No. 11-4553-EL-UNC, In the Matter of the Determination of the Existence of Significantly Excessive Earnings for 2010 Under the Electric Security Plan of Ohio Edison Company, The Cleveland Electric Illuminating Company, and The Toledo Edison Company, July 2011.
Rebuttal testimony before the Public Utilities Commission of the State of California, Docket No. A.10-09-018, on behalf of California American Water Company, on Application of California American Water Company (U210W) for Authorization to Implement the Carmel River Reroute and San Clemente Dam Removal Project and to Recover the Costs Associated with the Project in Rates, June 2011.

Direct and rebuttal testimony before the Public Utilities Commission of the State of California, Docket No. A.11-05-001, on behalf of California Water Service Company, on the Cost of Capital for Water Distribution Assets, April 2011 and September 2011.

Direct testimony before the Federal Energy Regulatory Commission, Docket No. ER11-013-000, on behalf of the Atlantic Wind Connection Companies, on the Cost of Capital and Cost of Capital incentive adders for Electric Transmission Assets, December 2010.

Direct testimony before the Federal Energy Regulatory Commission, Docket No. RP11-1566-000, on behalf Tennessee Gas Pipeline Company, on the Cost of Capital for Natural Gas Transmission Assets, November 2010.

Direct and rebuttal testimony before the Michigan Public Service Commission, In the matter of the application of The Detroit Edison Company, for authority to increase its rates, amend its rate schedules and rules governing the distribution and supply of electric energy, and for miscellaneous accounting authority, Case No. U-16472, October 2010 and April 2011.

Direct and rebuttal testimony before the Federal Energy Regulatory Commission, Docket No. RP10-1398-000, on behalf of El Paso Natural Gas Company, on the Cost of Capital for Natural Gas Transmission Assets, September 2010 and September 2011.

Direct testimony before the Public Utilities Commission of Ohio, Case No. 10-1265-EL-UNC, In the Matter of the Determination of the Existence of Significantly Excessive Earnings for 2009 Under the Electric Security Plan of Ohio Edison Company, The Cleveland Electric Illuminating Company, and The Toledo Edison Company, September 2010.

Direct testimony before the Michigan Public Service Commission, Case No. U-16400, on behalf of Michigan Consolidated Gas Company, regarding cost of service for natural gas distribution assets, July 15, 2010.

Direct testimony before the Oklahoma Corporation Commission, Cause No. PUD 201000050, on behalf of Public Service Company of Oklahoma, regarding cost of service for a regulated electric utility, June 2010.

Direct testimony before the Federal Energy Regulatory Commission, Docket No. ER10-516-000, on behalf of South Caroline Gas and Electric Company, on the Cost of Capital for Electric Transmission Assets, December 2009.

Direct and Rebuttal Testimony before the California Public Utilities Commission regarding cost of service for San Joaquin Valley crude oil pipeline on behalf of Chevron Products Company, Docket Nos. A.08-09-024, C.08-03-021, C.09-02-007 and C.09-03-027, December 2009 and April 2010.

Direct testimony before the Federal Energy Regulatory Commission, Docket No. ER10-159-000, on behalf of Public Service Electric and Gas Company, on the incentive Cost of Capital for the Branchburg-Roseland-Hudson 500 kV Line electric transmission project ("BRH Project"), October 2009.

Rebuttal testimony before the Florida Public Service Commission in re: Petition for Increase in Rates by Progress Energy Florida, Inc., Docket No. 090079-EI, August 2009.

Direct and rebuttal testimony before the State of New Jersey Board of Public Utilities in the Matter of the Petition of Public Service Electric and Gas Company for Approval of an Increase in Electric and Gas Rates and for Changes in the Tariffs for Electric and Gas Service, B.P.U.N.J. No. 14 Electric and B.P.U.N.J No. 14 Gas Pursuant to N.J.S.A. 48:2-21 and N.J.S.A. 48:2-21.1 and for Approval of a Gas Weather Normalization Clause; a Pension Expense Tracker and for other Appropriate Relief BPU Docket No. GR09050422, June 2009 and December 2009.

Direct and rebuttal testimony before the Public Service Commission of Wisconsin, Docket No. 6680-UR-117, on behalf of Wisconsin Power and Light Company, on the cost of capital for electric and natural gas distribution assets, May 2009 and September 2009.

Written evidence before the Régie de l'Énergie on behalf of Gaz Métro Limited Partnership, Cause Tarifaire 2010, R-3690-2009, on the Cost of Capital for natural gas transmission assets, May 2009.

Direct testimony before the Federal Energy Regulatory Commission, Docket No. ER09-681-000, on behalf of Green Power Express, LLP, on the Cost of Capital for Electric Transmission Assets, February 2009.

Direct testimony before the Federal Energy Regulatory Commission, Docket No. ER09-548-000, on behalf of ITC Great Plains, LLC, on the Cost of Capital for Electric Transmission Assets, January 2009.

Written and Reply Evidence before the Alberta Utilities Commission in the matter of the Alberta Utilities Commission Act, S.A. 2007, c. A-37.2, as amended, and the regulations made thereunder; and IN THE MATTER OF the Gas Utilities Act, R.S.A. 2000, c. G-5, as amended, and the regulations made thereunder; and IN THE MATTER OF the Public Utilities Act, R.S.A. 2000, c. P-45, as amended, and the regulations made thereunder; and IN THE MATTER OF Alberta Utilities Commission 2009 Generic Cost of Capital Hearing, Application No. 1578571/Proceeding No. 85. 2009 Generic Cost of Capital Proceeding on behalf of AltaGas Utilities Inc., November 2008 and May 2009.

Written Evidence before the Alberta Utilities Commission in the matter of the Alberta Utilities Commission Act, S.A. 2007, c. A-37.2, as amended, and the regulations made thereunder; and IN THE MATTER OF the Gas Utilities Act, R.S.A. 2000, c. G-5, as amended, and the regulations made thereunder; and IN THE MATTER OF the Public Utilities Act, R.S.A. 2000, c. P-45, as amended, and the regulations made thereunder; and IN THE MATTER OF Alberta Utilities Commission 2009 Generic Cost of Capital Hearing, Application No. 1578571/Proceeding No. 85. 2009 Generic Cost of Capital Proceeding on behalf of NGTL, November 2008.

Direct and rebuttal testimony before the Public Service Commission of West Virginia, Case No. 08-1783-G-PC, on behalf of Dominion Hope Gas Company concerning the Cost of Capital for Gas Local Distribution Company assets, November 2008 and May 2009.

Direct testimony before the Federal Energy Regulatory Commission, Docket No. ER09-249-000, on behalf of Public Service Electric and Gas Company, on the incentive Cost of Capital for Mid-Atlantic Power Pathway Electric Transmission Assets, November 2008.

Direct and rebuttal testimony before the Public Utilities Commission of Ohio, Case No. 08-935-EL-SSO, on behalf of Ohio Edison Company, The Toledo Edison Company, and The Cleveland Electric Illuminating Company, with regard to the test to determine Significantly Excessive Earnings within the context of Senate Bill No. 221, September 2008 and October 2008.

Direct and rebuttal testimony before the Public Service Commission of West Virginia, Case No. 08-0900-W-42t, on behalf of West Virginia-American Water Company concerning the Cost of Capital for Water Utility assets, July 2008 and November 2008.

Direct testimony before the Federal Energy Regulatory Commission, Docket No. ER08-1233-000, on behalf of Public Service Electric and Gas Company, on the Cost of Capital for Electric Transmission Assets, July 2008.

Direct testimony before the Federal Energy Regulatory Commission, Docket No. ER08-1207-000, on behalf of Virginia Electric and Power Company, on the incentive Cost of Capital for investment in New Electric Transmission Assets, June 2008.

Direct and rebuttal testimony before the Federal Energy Regulatory Commission, Docket No. RP08-426-000, on behalf of El Paso Natural Gas Company, on the Cost of Capital for Natural Gas Transmission Assets, June 2008 and August 2009.

Rebuttal testimony on the financial risk of Purchased Power Agreements, before the Public Utilities Commission of the State of Colorado, Docket No. 07A-447E, in the matter of the application of Public Service Company of Colorado for approval of its 2007 Colorado Resource Plan, June 2008.

Direct and rebuttal testimony before the California Public Utilities Commission, Docket No. A.08-05-003, on behalf of California-American Water Company, concerning Cost of Capital, May 2008 and August 2008.

Post-Technical Conference Affidavit on behalf of The Interstate Natural Gas Association of America in response to the Reply Comments of the State of Alaska with regard the FERC's Proposed Policy Statement on to the Composition of Proxy Companies for Determining Gas and Oil Pipeline Return on Equity, Docket No. PL07-2-000, March, 2008.

Direct and rebuttal testimony on the Cost of Capital before the Tennessee Regulatory Authority, Case No. 08-00039, on behalf of Tennessee American Water Company, March and August 2008.

Comments in support of The Interstate Natural Gas Association of America's Additional Initial Comments on the FERC's Proposed Policy Statement with regard to the Composition of Proxy Companies for Determining Gas and Oil Pipeline Return on Equity, Docket No. PL07-2-000, December, 2007.

Written direct and reply evidence before the National Energy Board in the matter of the National Energy Board Act, R.S.C. 1985, c. N−7, as amended, and the Regulations made thereunder; and in the matter of an application by Trans Québec & Maritimes PipeLines Inc. ("TQM") for orders pursuant to Part I and Part IV of the *National Energy Board Act*, for determining the overall fair return on capital for tolls charged by TQM, December 2007 and September 2008, Decision RH-1-2008, dated March 2009.

Direct and rebuttal testimony before the California Public Utilities Commission, Docket No. A. 07-01-022, on behalf of California-American Water Company, on the Effect of a Water Revenue Adjustment Mechanism on the Cost of Capital, October 2007 and November 2007.

Direct testimony before the Federal Energy Regulatory Commission, Docket No. ER08-92-000 to Docket No. ER08-92-003, on behalf of Virginia Electric and Power Company, on the Cost of Capital for Transmission Assets, October 2007.

Direct and Supplemental testimony before the Public Utilities Commission of Ohio, Case No. 07-829-GA-AIR, Case No. 07-830-GA-ALT, and Case No. 07-831-GA-AAM, on behalf of Dominion East Ohio Company, on the rate of return for Dominion East Ohio's natural gas distribution operations, September 2007 and June 2008.

Direct and rebuttal testimony before the State Corporation Commission of Virginia, Case No. PUE-2007-00066, on behalf of Virginia Electric and Power Company on the cost of capital for its southwest Virginia coal plant, July 2007 and December 2007.

Direct testimony before the Public Service Commission of West Virginia, Case No. 07-0998-W-42T, on behalf of West Virginia American Water Company on cost of capital, July 2007.

Direct, supplemental and rebuttal testimony before the Public Utilities Commission of Ohio, Case No. 07-551-EL-AIR, Case No. 07-552-EL-ATA, Case No. 07-553-EL-AAM, and Case No. 07-554-EL-UNC, on behalf of Ohio Edison Company, The Toledo Edison Company, and The Cleveland Electric Illuminating Company, on the cost of capital for the FirstEnergy Company's Ohio electric distribution utilities, June 2007, January 2008 and February 2008.

Direct testimony before the Public Utilities Commission of the State of South Dakota, Docket No. NG-07-013, on behalf of NorthWestern Corporation, on the Cost of Capital for NorthWestern Energy Company's natural gas operations in South Dakota, June 2007.

Rebuttal testimony before the California Public Utilities Commission, Docket No. A. 07-01-036-39, on behalf of California-American Water Company, on the Cost of Capital, May 2007.

Direct and rebuttal testimony before the Public Service Commission of Wisconsin, Docket No. 5-UR-103, on behalf of Wisconsin Energy Corporation, on the Cost of Capital for Wisconsin Electric Power Company and Wisconsin Gas LLC, May 2007 and October 2007.

Direct and rebuttal testimony before the Tennessee Regulatory Authority, Case No. 06-00290, on

behalf of Tennessee American Water Company, on the Cost of Capital, November, 2006 and April 2007.

Direct testimony before the Federal Energy Regulatory Commission, Docket No. ER07-46-000, on behalf of Northwestern Corporation on the Cost of Capital for Transmission Assets, October 2006.

Direct and supplemental testimony before the Federal Energy Regulatory Commission, Docket No. ER06-427-003, on behalf of Mystic Development, LLC on the Cost of Capital for Mystic 8 and 9 Generating Plants Operating Under Reliability Must Run Contract, August 2006 and September 2006.

Expert report in the United States Tax Court, Docket No. 21309-05, 34th Street Partners, DH Petersburg Investment, LLC and Mid-Atlantic Finance, Partners Other than the Tax Matters Partner, Petitioner, v. Commissioner of Internal Revenue, Respondent, July 28, 2006.

Direct and rebuttal testimony before the Pennsylvania Public Utility Commission, Return on Equity for Metropolitan Edison Company, Docket No. R-00061366 and Pennsylvania Electric Company, Docket No. R-00061367, April 2006 and August 2006.

Written evidence before the Ontario Energy Board, Cost of Capital for Union Gas Limited, Inc., Docket No. EB-2005-0520, January 2006.

Direct testimony before the Arizona Corporation Commission, Cost of Capital for Paradise Valley Water Company, a subsidiary of Arizona-American Water Company, Docket No. WS-01303A-05, May 2005.

Direct and rebuttal testimony before the Federal Energy Regulatory Commission on Energy Allocation of Debt Cost for Incremental Shipping Rates for Edison Mission Energy, Docket No. RP04-274-000, December 2004 and March 2005.

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.

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, RH-2-2004, January 2004.

Direct and rebuttal reports 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, Application No. 1271597, July 2003, November 2003, Decision 2004-052, dated July 2004.

Direct report before the Arbitration Panel in the arbitration of stranded costs for the Town of Belleair, FL, Case No. 000-6487-C1-007, April 2003.

Direct testimony before the Federal Energy Regulatory Commission on behalf of Florida Power Corporation, dba Progress Energy Florida, Inc. in Docket No. SC03-1-000, March 2003.

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

Written evidence before the Public Utility Board on behalf of Newfoundland & Labrador Hydro - Rate Hearings, October 2001, Order No. P.U.7 (2002-2003), dated June 2002.

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*, Order AO-1-RH-4-2001, May 2001, Nov. 2001, Feb. 2002.

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

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 Central Maine Power in Docket No. ER00-982-000, December 1999.

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, Docket U99099, October 1998.

Table No. MJV-WATER-1

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Table No. MJV-WATER-2

Classification of Companies by Assets

Company	Company Category
Amer. States Water	R
Amer. Water Works	R
Aqua America	R
California Water	R
Conn. Water Services	R
Middlesex Water	R
SJW Corp.	R
York Water Co. (The)	R

Sources and Notes:
Percent regulated categories are defined based on Edison Electric Institute: "Rate Case Summary - Q4 2016 Financial Update".
R = Regulated (greater than 80 percent of total assets are regulated).
M = Mostly Regulated (50 to 80 percent of total assets are regulated)
D = Diversified (less than 50 percent of total assets are regulated).

Table No. MJV-WATER-3

Market Value of the U.S. Water Sample

Panel A: Amer. States Water

($MM)

	DCF Capital Structure	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	3rd Quarter, 2011	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$491	$491	$470	$510	$487	$449	$405	[a]
Shares Outstanding (in millions) - Common	37	37	37	38	39	38	37	[b]
Price per Share - Common	$43	$40	$40	$31	$27	$22	$17	[c]
Market Value of Common Equity	$1,586	$1,446	$1,466	$1,190	$1,028	$839	$627	[d] = [b] x [c].
Market Value of GP Equity	n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity	$1,586	$1,446	$1,466	$1,190	$1,028	$839	$627	[f]= [d]
Market to Book Value of Common Equity	3.23	2.95	3.12	2.33	2.11	1.87	1.55	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$137	$137	$135	$187	$203	$187	$160	[j]
Current Liabilities	$180	$180	$124	$121	$116	$109	$116	[k]
Current Portion of Long-Term Debt	$0	$0	$0	$6	$3	$0	$0	[l]
Net Working Capital	($43)	($43)	$12	$72	$90	$78	$44	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$77	$77	$15	$0	$0	$0	$5	[n]
Adjusted Short-Term Debt	$43	$43	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$321	$321	$326	$311	$332	$344	$340	[p]
Book Value of Long-Term Debt	$364	$364	$326	$317	$335	$344	$341	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$78	$78	$91	$80	$121	$97	$56	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$442	$442	$417	$397	$456	$441	$397	[s] = [q] + [r].
Market Value of Debt	$442	$442	$417	$397	$456	$441	$397	[t] = [s].
MARKET VALUE OF FIRM	$2,028	$1,887	$1,883	$1,587	$1,485	$1,280	$1,024	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	78.21%	76.59%	77.87%	74.97%	69.26%	65.56%	61.27%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	21.79%	23.41%	22.13%	25.03%	30.74%	34.44%	38.73%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of January 31, 2017
Capital structure from 3rd Quarter, 2016 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2016 balance sheet information and a 15-trading day average closing price ending on 1/31/2017.
Prices are reported in Workpaper #1 to Table No. MJV-WATER-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2012 to 2015 10-K.

Table No. MJV-WATER-3

Market Value of the U.S. Water Sample

Panel B: Amer. Water Works

($MM)

	DCF Capital Structure	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	3rd Quarter, 2011	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$5,238	$5,238	$5,165	$4,920	$4,633	$4,448	$4,259	[a]
Shares Outstanding (in millions) - Common	182	182	181	179	178	177	176	[b]
Price per Share - Common	$72	$75	$53	$49	$40	$37	$30	[c]
Market Value of Common Equity	$13,042	$13,661	$9,651	$8,756	$7,162	$6,501	$5,237	[d] = [b] x [c].
Market Value of GP Equity	n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity	$13,042	$13,661	$9,651	$8,756	$7,162	$6,501	$5,237	[f]= [d]
Market to Book Value of Common Equity	2.49	2.61	1.87	1.78	1.55	1.46	1.23	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$16	$18	$21	$27	[h]
Market Value of Preferred Equity	$0	$0	$0	$16	$18	$21	$27	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$801	$801	$879	$757	$613	$643	$1,479	[j]
Current Liabilities	$1,928	$1,928	$1,165	$1,059	$1,141	$1,006	$1,380	[k]
Current Portion of Long-Term Debt	$53	$53	$22	$56	$114	$35	$9	[l]
Net Working Capital	($1,074)	($1,074)	($264)	($246)	($415)	($328)	$108	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$951	$951	$380	$314	$389	$298	$409	[n]
Adjusted Short-Term Debt	$951	$951	$264	$246	$389	$298	$0	[o] = See Sources and Notes.
Long-Term Debt	$5,853	$5,853	$5,955	$5,541	$5,174	$5,185	$5,362	[p]
Book Value of Long-Term Debt	$6,857	$6,857	$6,241	$5,843	$5,677	$5,517	$5,370	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$843	$843	$913	$559	$1,027	$864	$417	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$7,700	$7,700	$7,154	$6,401	$6,704	$6,381	$5,787	[s] = [q] + [r].
Market Value of Debt	$7,700	$7,700	$7,154	$6,401	$6,704	$6,381	$5,787	[t] = [s].
MARKET VALUE OF FIRM	$20,742	$21,361	$16,805	$15,173	$13,884	$12,903	$11,051	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	62.88%	63.95%	57.43%	57.71%	51.59%	50.38%	47.39%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	0.11%	0.13%	0.16%	0.24%	[w] = [i] / [u].
Debt - Market Value Ratio	37.12%	36.05%	42.57%	42.19%	48.29%	49.45%	52.37%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of January 31, 2017
Capital structure from 3rd Quarter, 2016 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2016 balance sheet information and a 15-trading day average closing price ending on 1/31/2017.
Prices are reported in Workpaper #1 to Table No. MJV-WATER-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2012 to 2015 10-K.

Table No. MJV-WATER-3

Market Value of the U.S. Water Sample

Panel C: Aqua America

($MM)

	DCF Capital Structure	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	3rd Quarter, 2011	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$1,832	$1,832	$1,729	$1,615	$1,500	$1,314	$1,212	[a]
Shares Outstanding (in millions) - Common	177	177	177	177	177	175	173	[b]
Price per Share - Common	$30	$31	$26	$24	$25	$20	$17	[c]
Market Value of Common Equity	$5,323	$5,449	$4,556	$4,240	$4,329	$3,453	$2,967	[d] = [b] x [c].
Market Value of GP Equity	n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity	$5,323	$5,449	$4,556	$4,240	$4,329	$3,453	$2,967	[f]= [d]
Market to Book Value of Common Equity	2.91	2.97	2.64	2.63	2.89	2.63	2.45	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$141	$141	$168	$208	$212	$231	$336	[j]
Current Liabilities	$252	$252	$216	$235	$318	$315	$429	[k]
Current Portion of Long-Term Debt	$84	$84	$48	$87	$81	$41	$95	[l]
Net Working Capital	($27)	($27)	($0)	$59	($25)	($43)	$3	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$48	$48	$28	$7	$110	$98	$103	[n]
Adjusted Short-Term Debt	$27	$27	$0	$0	$25	$43	$0	[o] = See Sources and Notes.
Long-Term Debt	$1,726	$1,726	$1,681	$1,560	$1,439	$1,520	$1,402	[p]
Book Value of Long-Term Debt	$1,837	$1,837	$1,729	$1,647	$1,546	$1,604	$1,498	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$126	$126	$75	($15)	$114	$75	($77)	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$1,963	$1,963	$1,804	$1,632	$1,660	$1,679	$1,421	[s] = [q] + [r].
Market Value of Debt	$1,963	$1,963	$1,804	$1,632	$1,660	$1,679	$1,421	[t] = [s].
MARKET VALUE OF FIRM	$7,287	$7,412	$6,360	$5,873	$5,990	$5,132	$4,388	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	73.06%	73.51%	71.64%	72.20%	72.28%	67.29%	67.62%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	26.94%	26.49%	28.36%	27.80%	27.72%	32.71%	32.38%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of January 31, 2017
Capital structure from 3rd Quarter, 2016 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2016 balance sheet information and a 15-trading day average closing price ending on 1/31/2017.
Prices are reported in Workpaper #1 to Table No. MJV-WATER-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2012 to 2015 10-K.

Table No. MJV-WATER-3

Market Value of the U.S. Water Sample

Panel D: California Water

($MM)

	DCF Capital Structure	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	3rd Quarter, 2011	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$652	$652	$641	$622	$600	$475	$454	[a]
Shares Outstanding (in millions) - Common	48	48	48	48	48	42	42	[b]
Price per Share - Common	$34	$32	$21	$23	$20	$18	$18	[c]
Market Value of Common Equity	$1,616	$1,531	$1,021	$1,109	$939	$773	$735	[d] = [b] x [c].
Market Value of GP Equity	n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity	$1,616	$1,531	$1,021	$1,109	$939	$773	$735	[f]= [d]
Market to Book Value of Common Equity	2.48	2.35	1.59	1.78	1.56	1.63	1.62	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$151	$151	$191	$177	$171	$150	$155	[j]
Current Liabilities	$204	$204	$301	$215	$197	$190	$161	[k]
Current Portion of Long-Term Debt	$6	$6	$7	$7	$48	$7	$2	[l]
Net Working Capital	($47)	($47)	($103)	($32)	$22	($33)	($3)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$57	$57	$137	$62	$12	$61	$40	[n]
Adjusted Short-Term Debt	$47	$47	$103	$32	$0	$33	$3	[o] = See Sources and Notes.
Long-Term Debt	$556	$556	$416	$423	$430	$479	$478	[p]
Book Value of Long-Term Debt	$608	$608	$526	$461	$478	$520	$483	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$15	$15	$23	$18	$27	$20	$7	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$624	$624	$549	$479	$505	$540	$490	[s] = [q] + [r].
Market Value of Debt	$624	$624	$549	$479	$505	$540	$490	[t] = [s].
MARKET VALUE OF FIRM	$2,239	$2,154	$1,571	$1,588	$1,444	$1,313	$1,225	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	72.15%	71.05%	65.03%	69.85%	65.02%	58.89%	60.01%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	27.85%	28.95%	34.97%	30.15%	34.98%	41.11%	39.99%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of January 31, 2017
Capital structure from 3rd Quarter, 2016 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2016 balance sheet information and a 15-trading day average closing price ending on 1/31/2017.
Prices are reported in Workpaper #1 to Table No. MJV-WATER-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2012 to 2015 10-K.

Table No. MJV-WATER-3

Market Value of the U.S. Water Sample

Panel E: Conn. Water Services

($MM)

	DCF Capital Structure	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	3rd Quarter, 2011	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$238	$238	$223	$210	$196	$127	$118	[a]
Shares Outstanding (in millions) - Common	11	11	11	11	11	9	9	[b]
Price per Share - Common	$54	$49	$36	$33	$31	$31	$26	[c]
Market Value of Common Equity	$609	$556	$397	$366	$347	$278	$223	[d] = [b] x [c].
Market Value of GP Equity	n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity	$609	$556	$397	$366	$347	$278	$223	[f]= [d]
Market to Book Value of Common Equity	2.56	2.34	1.78	1.74	1.77	2.19	1.89	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$1	$1	$1	$1	$1	$1	$1	[h]
Market Value of Preferred Equity	$1	$1	$1	$1	$1	$1	$1	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$36	$36	$39	$39	$47	$32	$24	[j]
Current Liabilities	$41	$41	$32	$21	$19	$36	$40	[k]
Current Portion of Long-Term Debt	$3	$3	$3	$2	$4	$1	$0	[l]
Net Working Capital	($2)	($2)	$10	$20	$32	($3)	($15)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$22	$22	$11	$1	$1	$23	$31	[n]
Adjusted Short-Term Debt	$2	$2	$0	$0	$0	$3	$15	[o] = See Sources and Notes.
Long-Term Debt	$200	$200	$177	$173	$176	$187	$111	[p]
Book Value of Long-Term Debt	$205	$205	$179	$175	$180	$191	$127	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$82	$82	$108	$77	$132	$137	$58	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$287	$287	$288	$252	$312	$328	$185	[s] = [q] + [r].
Market Value of Debt	$287	$287	$288	$252	$312	$328	$185	[t] = [s].
MARKET VALUE OF FIRM	$896	$843	$685	$619	$659	$607	$409	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	67.93%	65.93%	57.94%	59.16%	52.62%	45.75%	54.64%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	0.09%	0.09%	0.11%	0.12%	0.12%	0.13%	0.19%	[w] = [i] / [u].
Debt - Market Value Ratio	31.98%	33.98%	41.94%	40.72%	47.27%	54.12%	45.17%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of January 31, 2017
Capital structure from 3rd Quarter, 2016 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2016 balance sheet information and a 15-trading day average closing price ending on 1/31/2017.
Prices are reported in Workpaper #1 to Table No. MJV-WATER-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2012 to 2015 10-K.

Table No. MJV-WATER-3

Market Value of the U.S. Water Sample

Panel F: Middlesex Water

($MM)

	DCF Capital Structure	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	3rd Quarter, 2011	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$218	$218	$205	$196	$188	$181	$177	[a]
Shares Outstanding (in millions) - Common	16	16	16	16	16	16	16	[b]
Price per Share - Common	$39	$35	$23	$20	$21	$19	$17	[c]
Market Value of Common Equity	$632	$571	$380	$323	$331	$302	$271	[d] = [b] x [c].
Market Value of GP Equity	n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity	$632	$571	$380	$323	$331	$302	$271	[f]= [d]
Market to Book Value of Common Equity	2.90	2.62	1.86	1.64	1.76	1.67	1.52	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$2	$2	$2	$2	$3	$3	$3	[h]
Market Value of Preferred Equity	$2	$2	$2	$2	$3	$3	$3	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$30	$30	$31	$29	$27	$26	$28	[j]
Current Liabilities	$44	$44	$47	$57	$52	$50	$48	[k]
Current Portion of Long-Term Debt	$6	$6	$6	$6	$5	$5	$5	[l]
Net Working Capital	($8)	($8)	($10)	($22)	($20)	($19)	($16)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$14	$14	$18	$31	$30	$28	$24	[n]
Adjusted Short-Term Debt	$8	$8	$10	$22	$20	$19	$16	[o] = See Sources and Notes.
Long-Term Debt	$131	$131	$135	$129	$131	$132	$133	[p]
Book Value of Long-Term Debt	$145	$145	$151	$157	$156	$157	$153	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$3	$3	$1	($8)	$1	$1	($4)	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$148	$148	$153	$149	$157	$158	$149	[s] = [q] + [r].
Market Value of Debt	$148	$148	$153	$149	$157	$158	$149	[t] = [s].
MARKET VALUE OF FIRM	$783	$721	$536	$474	$490	$463	$423	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	80.82%	79.19%	71.02%	68.01%	67.48%	65.26%	63.92%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	0.31%	0.34%	0.45%	0.51%	0.59%	0.72%	0.79%	[w] = [i] / [u].
Debt - Market Value Ratio	18.87%	20.47%	28.52%	31.48%	31.93%	34.01%	35.28%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of January 31, 2017
Capital structure from 3rd Quarter, 2016 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2016 balance sheet information and a 15-trading day average closing price ending on 1/31/2017.
Prices are reported in Workpaper #1 to Table No. MJV-WATER-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2012 to 2015 10-K.

Table No. MJV-WATER-3

Market Value of the U.S. Water Sample

Panel G: SJW Corp.

($MM)

	DCF Capital Structure	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	3rd Quarter, 2011	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$412	$412	$371	$357	$319	$272	$260	[a]
Shares Outstanding (in millions) - Common	20	20	20	20	20	19	19	[b]
Price per Share - Common	$50	$44	$30	$27	$27	$25	$22	[c]
Market Value of Common Equity	$1,032	$892	$606	$552	$554	$466	$408	[d] = [b] x [c].
Market Value of GP Equity	n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity	$1,032	$892	$606	$552	$554	$466	$408	[f]= [d]
Market to Book Value of Common Equity	2.51	2.17	1.63	1.55	1.73	1.71	1.57	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$133	$133	$77	$71	$49	$62	$89	[j]
Current Liabilities	$151	$151	$73	$52	$50	$51	$39	[k]
Current Portion of Long-Term Debt	$12	$12	$4	$1	$1	$5	$1	[l]
Net Working Capital	($6)	($6)	$7	$19	$0	$17	$52	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$64	$64	$21	$8	$7	$0	$6	[n]
Adjusted Short-Term Debt	$6	$6	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$364	$364	$381	$385	$335	$336	$345	[p]
Book Value of Long-Term Debt	$382	$382	$385	$385	$336	$341	$346	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$116	$116	$75	$60	$114	$89	$47	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$498	$498	$460	$445	$450	$430	$393	[s] = [q] + [r].
Market Value of Debt	$498	$498	$460	$445	$450	$430	$393	[t] = [s].
MARKET VALUE OF FIRM								
	$1,530	$1,390	$1,066	$997	$1,004	$896	$801	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	67.47%	64.19%	56.87%	55.33%	55.19%	51.98%	50.98%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	32.53%	35.81%	43.13%	44.67%	44.81%	48.02%	49.02%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of January 31, 2017
Capital structure from 3rd Quarter, 2016 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2016 balance sheet information and a 15-trading day average closing price ending on 1/31/2017.
Prices are reported in Workpaper #1 to Table No. MJV-WATER-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2012 to 2015 10-K.

Table No. MJV-WATER-3

Market Value of the U.S. Water Sample

Panel H: York Water Co. (The)

($MM)

	DCF Capital Structure	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	3rd Quarter, 2011	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$114	$114	$107	$103	$102	$99	$94	[a]
Shares Outstanding (in millions) - Common	13	13	13	13	13	13	13	[b]
Price per Share - Common	$37	$30	$22	$20	$20	$18	$17	[c]
Market Value of Common Equity	$470	$380	$276	$259	$264	$234	$212	[d] = [b] x [c].
Market Value of GP Equity	n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity	$470	$380	$276	$259	$264	$234	$212	[f]= [d]
Market to Book Value of Common Equity	4.14	3.35	2.58	2.52	2.59	2.38	2.24	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$15	$15	$10	$12	$14	$12	$11	[j]
Current Liabilities	$6	$6	$6	$12	$7	$6	$5	[k]
Current Portion of Long-Term Debt	$0	$0	$0	$0	$0	$0	$0	[l]
Net Working Capital	$9	$9	$4	$0	$7	$5	$6	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$0	$0	$0	$0	$0	$0	$0	[n]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$85	$85	$87	$85	$85	$85	$85	[p]
Book Value of Long-Term Debt	$85	$85	$87	$85	$85	$85	$85	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$14	$14	$15	$9	$22	$17	$9	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$99	$99	$102	$94	$107	$102	$94	[s] = [q] + [r].
Market Value of Debt	$99	$99	$102	$94	$107	$102	$94	[t] = [s].
MARKET VALUE OF FIRM	$569	$479	$378	$353	$371	$336	$306	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	82.59%	79.33%	72.93%	73.36%	71.16%	69.69%	69.24%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	17.41%	20.67%	27.07%	26.64%	28.84%	30.31%	30.76%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of January 31, 2017
Capital structure from 3rd Quarter, 2016 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2016 balance sheet information and a 15-trading day average closing price ending on 1/31/2017.
Prices are reported in Workpaper #1 to Table No. MJV-WATER-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2012 to 2015 10-K.

Book Value Equity Percentages

Company	Current	5-Year Average
Amer. States Water	57.4%	58.0%
Amer. Water Works	43.3%	44.4%
Aqua America	49.9%	48.3%
California Water	51.7%	52.5%
Conn. Water Services	53.6%	51.0%
Middlesex Water	59.7%	56.0%
SJW Corp.	51.9%	48.1%
York Water Co. (The)	57.3%	55.0%
#N/A	NA	NA
#N/A	NA	NA
#N/A	NA	NA
Average	53.1%	51.7%
Median	52.7%	51.8%

Sources and Notes: Table No. MJV-WATER-3, Panels A to H.

Table No. MJV-WATER-4

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]
Amer. States Water	78.2%	0.0%	21.8%	71.3%	0.0%	28.7%
Amer. Water Works	62.9%	0.0%	37.1%	54.6%	0.1%	45.3%
Aqua America	73.1%	0.0%	26.9%	70.8%	0.0%	29.2%
California Water	72.1%	0.0%	27.9%	64.9%	0.0%	35.1%
Conn. Water Services	67.9%	0.1%	32.0%	55.2%	0.1%	44.7%
Middlesex Water	80.8%	0.3%	18.9%	68.7%	0.6%	30.8%
SJW Corp.	67.5%	0.0%	32.5%	55.4%	0.0%	44.6%
York Water Co. (The)	82.6%	0.0%	17.4%	72.3%	0.0%	27.7%
Average	73.1%	0.0%	26.8%	64.1%	0.1%	35.8%

Sources and Notes:
[1], [4]: Workpaper #1 to Table No. MJV-WATER-4.
[2], [5]: Workpaper #2 to Table No. MJV-WATER-4.
[3], [6]: Workpaper #3 to Table No. MJV-WATER-4.
Values in this table may not add up exactly to 100% because of rounding.

Workpaper #1 to Table No. MJV-WATER-4

Calculation of the Average Common Equity - Market Value Ratio

Company	DCF Capital Structure [1]	3rd Quarter, 2016 [2]	3rd Quarter, 2015 [3]	3rd Quarter, 2014 [4]	3rd Quarter, 2013 [5]	3rd Quarter, 2012 [6]	3rd Quarter, 2011 [7]	5-Year Average [8]
Amer. States Water	78.2%	76.6%	77.9%	75.0%	69.3%	65.6%	61.3%	71.3%
Amer. Water Works	62.9%	64.0%	57.4%	57.7%	51.6%	50.4%	47.4%	54.6%
Aqua America	73.1%	73.5%	71.6%	72.2%	72.3%	67.3%	67.6%	70.8%
California Water	72.1%	71.0%	65.0%	69.9%	65.0%	58.9%	60.0%	64.9%
Conn. Water Services	67.9%	65.9%	57.9%	59.2%	52.6%	45.8%	54.6%	55.2%
Middlesex Water	80.8%	79.2%	71.0%	68.0%	67.5%	65.3%	63.9%	68.7%
SJW Corp.	67.5%	64.2%	56.9%	55.3%	55.2%	52.0%	51.0%	55.4%
York Water Co. (The)	82.6%	79.3%	72.9%	73.4%	71.2%	69.7%	69.2%	72.3%

Sources and Notes:
[1] - [7]: Table No. MJV-WATER-3; Panels A - H, [v].
[8]: Average of [2] - [7] with 1/2 weighting to 3Q2016 and 3Q2011 for the purposes of calculating average capital structure during the period.
[1]: Reflects the current capital structure.

Workpaper #2 to Table No. MJV-WATER-4

Calculation of the Average Preferred Equity - Market Value Ratio

Company	DCF Capital Structure [1]	3rd Quarter, 2016 [2]	3rd Quarter, 2015 [3]	3rd Quarter, 2014 [4]	3rd Quarter, 2013 [5]	3rd Quarter, 2012 [6]	3rd Quarter, 2011 [7]	5-Year Average [8]
Amer. States Water	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Amer. Water Works	0.0%	0.0%	0.0%	0.1%	0.1%	0.2%	0.2%	0.1%
Aqua America	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
California Water	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Conn. Water Services	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.2%	0.1%
Middlesex Water	0.3%	0.3%	0.5%	0.5%	0.6%	0.7%	0.8%	0.6%
SJW Corp.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
York Water Co. (The)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Sources and Notes:
[1] - [7]: Table No. MJV-WATER-3; Panels A - H, [w].
[8]: Average of [2] - [7] with 1/2 weighting to 3Q2016 and 3Q2011 for the purposes of calculating average capital structure during the period.
[1]: Reflects the current capital structure.

Workpaper #3 to Table No. MJV-WATER-4

Calculation of the Average Debt - Market Value Ratio

Company	DCF Capital Structure [1]	3rd Quarter, 2016 [2]	3rd Quarter, 2015 [3]	3rd Quarter, 2014 [4]	3rd Quarter, 2013 [5]	3rd Quarter, 2012 [6]	3rd Quarter, 2011 [7]	5-Year Average [8]
Amer. States Water	21.8%	23.4%	22.1%	25.0%	30.7%	34.4%	38.7%	28.7%
Amer. Water Works	37.1%	36.0%	42.6%	42.2%	48.3%	49.5%	52.4%	45.3%
Aqua America	26.9%	26.5%	28.4%	27.8%	27.7%	32.7%	32.4%	29.2%
California Water	27.9%	29.0%	35.0%	30.1%	35.0%	41.1%	40.0%	35.1%
Conn. Water Services	32.0%	34.0%	41.9%	40.7%	47.3%	54.1%	45.2%	44.7%
Middlesex Water	18.9%	20.5%	28.5%	31.5%	31.9%	34.0%	35.3%	30.8%
SJW Corp.	32.5%	35.8%	43.1%	44.7%	44.8%	48.0%	49.0%	44.6%
York Water Co. (The)	17.4%	20.7%	27.1%	26.6%	28.8%	30.3%	30.8%	27.7%

Sources and Notes:
[1] - [7]: Table No. MJV-WATER-3; Panels A - H, [x].
[8]: Average of [2] - [7] with 1/2 weighting to 3Q2016 and 3Q2011 for the purposes of calculating average capital structure during the period.
[1]: Reflects the current capital structure.

Table No. MJV-WATER-5

Estimated Growth Rates

Company	ThomsonOne IBES Estimate		Value Line			Combined Growth Rate
	Long-Term Growth Rate	Number of Estimates	EPS Year 2016 Estimate	EPS Year 2019-2021 Estimate	Annualized Growth Rate	
	[1]	[2]	[3]	[4]	[5]	[6]
Amer. States Water	4.4%	2	$1.60	$2.25	8.9%	5.9%
Amer. Water Works	7.5%	4	$2.60	$3.75	9.6%	7.9%
Aqua America	5.0%	2	$1.35	$1.75	6.7%	5.6%
California Water	7.8%	2	$0.90	$1.60	15.5%	10.3%
Conn. Water Services	5.7%	2	$2.20	$2.50	3.2%	4.8%
Middlesex Water	NA	NA	$1.50	$1.85	5.4%	5.4%
SJW Corp.	NA	NA	$2.55	$2.55	0.0%	0.0%
York Water Co. (The)	NA	NA	$0.96	$1.25	6.8%	6.8%

Sources and Notes:

[1] - [2]: Updated from Thomson Reuters as of Jan 31, 2017.

[3] - [4]: From Valueline Investment Analyzer as of Jan 31, 2017.

[5]: ([4]/[3])^(1/4) - 1, where 4 is the number of years between 2020, the middle year of Value Line's 3-5 year forecast, and our study year 2016.

[6]: Weighted average growth rate. If information is missing from one source, the weighted average is based solely on the other source.

Table No. MJV-WATER-6

DCF Cost of Equity of the U.S. Water Sample

Panel A: Simple DCF Method (Quarterly)

Company	Stock Price [1]	Most Recent Dividend [2]	Quarterly Dividend Yield [3]	Combined Long-Term Growth [4]	Quarterly Growth Rate [5]	DCF Cost of Equity [6]
Amer. States Water	$43.37	$0.24	0.57%	5.9%	1.4%	8.2%
Amer. Water Works	$71.77	$0.38	0.53%	7.9%	1.9%	10.2%
Aqua America	$30.02	$0.19	0.65%	5.6%	1.4%	8.3%
California Water	$33.68	$0.17	0.52%	10.3%	2.5%	12.6%
Conn. Water Services	$54.15	$0.28	0.53%	4.8%	1.2%	7.1%
Middlesex Water	$38.83	$0.21	0.55%	5.4%	1.3%	7.7%
SJW Corp.	$50.47	$0.20	0.40%	0.0%	0.0%	1.6%
York Water Co. (The)	$36.54	$0.16	0.45%	6.8%	1.7%	8.7%

Sources and Notes:
[1]: Workpaper #1 to Table No. MJV-WATER-6.
[2]: Workpaper #2 to Table No. MJV-WATER-6.
[3]: ([2] / [1]) x (1 + [5]).
[4]: Table No. MJV-WATER-5, [6].
[5]: {(1 + [4]) ^ (1/4)} - 1.
[6]: {([3] + [5] + 1) ^ 4} - 1.

Table No. MJV-WATER-6

DCF Cost of Equity of the U.S. Water Sample

Panel B: Multi-Stage DCF (Using Blue Chip Economic Indicators, March 2017 U.S. GDP Growth Forecast as the Perpetual Rate)

Company	Stock Price [1]	Most Recent Dividend [2]	Combined Long-Term Growth Rate [3]	Growth Rate: Year 6 [4]	Growth Rate: Year 7 [5]	Growth Rate: Year 8 [6]	Growth Rate: Year 9 [7]	Growth Rate: Year 10 [8]	GDP Long-Term Growth Rate [9]	DCF Cost of Equity [10]
Amer. States Water	$43.37	$0.24	5.87%	5.59%	5.31%	5.03%	4.76%	4.48%	4.20%	6.8%
Amer. Water Works	$71.77	$0.38	7.88%	7.26%	6.65%	6.04%	5.43%	4.81%	4.20%	7.0%
Aqua America	$30.02	$0.19	5.57%	5.34%	5.11%	4.88%	4.66%	4.43%	4.20%	7.1%
California Water	$33.68	$0.17	10.32%	9.30%	8.28%	7.26%	6.24%	5.22%	4.20%	7.4%
Conn. Water Services	$54.15	$0.28	4.85%	4.74%	4.63%	4.52%	4.42%	4.31%	4.20%	6.5%
Middlesex Water	$38.83	$0.21	5.38%	5.19%	4.99%	4.79%	4.59%	4.40%	4.20%	6.7%
SJW Corp.	$50.47	$0.20	0.00%	0.70%	1.40%	2.10%	2.80%	3.50%	4.20%	5.5%
York Water Co. (The)	$36.54	$0.16	6.82%	6.38%	5.95%	5.51%	5.07%	4.64%	4.20%	6.4%

Sources and Notes:
[1]: Workpaper #1 to Table No. MJV-WATER-6.
[2]: Workpaper #2 to Table No. MJV-WATER-6.
[3]: Table No. MJV-WATER-5, [6].
[4]: [3] - {([3] - [9])/ 6}.
[5]: [4] - {([3] - [9])/ 6}.
[6]: [5] - {([3] - [9])/ 6}.
[7]: [6] - {([3] - [9])/ 6}.
[8]: [7] - {([3] - [9])/ 6}.
[9]: Blue Chip Economic Indicators, March 2017 U.S. This number is assumed to be the perpetual growth rate.
[10]: Workpaper #3 to Table No. MJV-WATER-6.

Workpaper #1 to Table No. MJV-WATER-6

Common Stock Prices from January 10, 2017 to January 31, 2017

Company	1/31/2017	1/30/2017	1/27/2017	1/26/2017	1/25/2017	1/24/2017	1/23/2017	1/20/2017	1/19/2017	1/18/2017	1/17/2017	1/13/2017	1/12/2017	1/11/2017	1/10/2017	Average
Amer. States Water	$43.78	$43.20	$43.84	$44.10	$44.25	$43.59	$42.68	$42.62	$42.39	$42.82	$43.14	$43.66	$43.18	$43.89	$43.46	$43.37
Amer. Water Works	$73.44	$71.91	$72.31	$72.19	$71.72	$71.91	$71.77	$71.93	$71.87	$72.60	$72.07	$70.82	$70.69	$70.57	$70.72	$71.77
Aqua America	$30.41	$29.87	$30.12	$30.14	$30.06	$29.57	$29.54	$29.65	$29.79	$30.16	$30.49	$30.28	$30.09	$30.14	$29.92	$30.02
California Water	$34.50	$33.95	$34.75	$34.85	$35.10	$34.05	$33.55	$33.40	$32.95	$33.10	$33.05	$33.00	$32.65	$33.35	$33.00	$33.68
Conn. Water Services	$54.04	$53.20	$54.80	$55.55	$55.55	$54.78	$54.01	$53.16	$52.86	$53.73	$53.80	$53.71	$53.63	$54.86	$54.61	$54.15
Middlesex Water	$37.81	$37.30	$38.98	$39.24	$39.58	$38.64	$38.72	$38.46	$38.09	$38.96	$39.37	$39.30	$38.81	$39.58	$39.62	$38.83
SJW Corp.	$50.10	$49.19	$50.28	$51.43	$51.79	$51.11	$49.53	$48.99	$49.12	$49.99	$50.68	$51.09	$51.10	$51.50	$51.08	$50.47
York Water Co. (The)	$35.80	$35.40	$36.85	$37.65	$37.40	$37.25	$36.20	$36.85	$36.10	$36.75	$36.50	$36.15	$35.70	$37.15	$36.30	$36.54

Sources and Notes:
Bloomberg as of January 31, 2017.
Daily prices for the 15-trading day period ending January 31, 2017.

Workpaper #2 to Table No. MJV-WATER-6

Most Recent Paid Dividends

Company	Most Recent Dividend
Amer. States Water	$0.24
Amer. Water Works	$0.38
Aqua America	$0.19
California Water	$0.17
Conn. Water Services	$0.28
Middlesex Water	$0.21
SJW Corp.	$0.20
York Water Co. (The)	$0.16

Sources and Notes:
Bloomberg as of January 31, 2017.

Workpaper #3 to Table No. MJV-WATER-6

DCF Cost of Equity of the U.S. Water Sample

Multi-Stage DCF (using Blue Chip Economic Indicators, March 2017 U.S. GDP Growth Forecast as the Perpetual Growth Rate)

Year	Company	Amer. States Water	Amer. Water Works	Aqua America	California Water	Conn. Water Services	Middlesex Water	SJW Corp.	York Water Co. (The)
	Current Dividend	$0.24	$0.38	$0.19	$0.17	$0.28	$0.21	$0.20	$0.16
	Current Stock Price	($43.37)	($71.77)	($30.02)	($33.68)	($54.15)	($38.83)	($50.47)	($36.54)
YEAR 2017	Dividend Q1 Estimate	$0.25	$0.38	$0.19	$0.18	$0.29	$0.21	$0.20	$0.16
YEAR 2017	Dividend Q2 Estimate	$0.25	$0.39	$0.20	$0.18	$0.29	$0.22	$0.20	$0.17
YEAR 2017	Dividend Q3 Estimate	$0.25	$0.40	$0.20	$0.19	$0.29	$0.22	$0.20	$0.17
YEAR 2017	Dividend Q4 Estimate	$0.26	$0.40	$0.20	$0.19	$0.30	$0.22	$0.20	$0.17
YEAR 2018	Dividend Q1 Estimate	$0.26	$0.41	$0.20	$0.20	$0.30	$0.23	$0.20	$0.17
YEAR 2018	Dividend Q2 Estimate	$0.26	$0.42	$0.21	$0.20	$0.30	$0.23	$0.20	$0.18
YEAR 2018	Dividend Q3 Estimate	$0.27	$0.43	$0.21	$0.20	$0.31	$0.23	$0.20	$0.18
YEAR 2018	Dividend Q4 Estimate	$0.27	$0.44	$0.21	$0.21	$0.31	$0.23	$0.20	$0.18
YEAR 2019	Dividend Q1 Estimate	$0.28	$0.44	$0.22	$0.22	$0.31	$0.24	$0.20	$0.19
YEAR 2019	Dividend Q2 Estimate	$0.28	$0.45	$0.22	$0.22	$0.32	$0.24	$0.20	$0.19
YEAR 2019	Dividend Q3 Estimate	$0.28	$0.46	$0.22	$0.23	$0.32	$0.24	$0.20	$0.19
YEAR 2019	Dividend Q4 Estimate	$0.29	$0.47	$0.23	$0.23	$0.33	$0.25	$0.20	$0.20
YEAR 2020	Dividend Q1 Estimate	$0.29	$0.48	$0.23	$0.24	$0.33	$0.25	$0.20	$0.20
YEAR 2020	Dividend Q2 Estimate	$0.30	$0.49	$0.23	$0.24	$0.33	$0.25	$0.20	$0.20
YEAR 2020	Dividend Q3 Estimate	$0.30	$0.50	$0.23	$0.25	$0.34	$0.26	$0.20	$0.21
YEAR 2020	Dividend Q4 Estimate	$0.30	$0.51	$0.24	$0.26	$0.34	$0.26	$0.20	$0.21
YEAR 2021	Dividend Q1 Estimate	$0.31	$0.52	$0.24	$0.26	$0.35	$0.26	$0.20	$0.21
YEAR 2021	Dividend Q2 Estimate	$0.31	$0.53	$0.24	$0.27	$0.35	$0.27	$0.20	$0.22
YEAR 2021	Dividend Q3 Estimate	$0.32	$0.54	$0.25	$0.28	$0.35	$0.27	$0.20	$0.22
YEAR 2021	Dividend Q4 Estimate	$0.32	$0.55	$0.25	$0.28	$0.36	$0.27	$0.20	$0.22
YEAR 2022	Dividend Q1 Estimate	$0.33	$0.56	$0.25	$0.29	$0.36	$0.28	$0.20	$0.23
YEAR 2022	Dividend Q2 Estimate	$0.33	$0.57	$0.26	$0.29	$0.37	$0.28	$0.20	$0.23
YEAR 2022	Dividend Q3 Estimate	$0.34	$0.58	$0.26	$0.30	$0.37	$0.29	$0.20	$0.23
YEAR 2022	Dividend Q4 Estimate	$0.34	$0.59	$0.26	$0.31	$0.37	$0.29	$0.20	$0.24
YEAR 2023	Dividend Q1 Estimate	$0.34	$0.60	$0.27	$0.31	$0.38	$0.29	$0.20	$0.24
YEAR 2023	Dividend Q2 Estimate	$0.35	$0.61	$0.27	$0.32	$0.38	$0.30	$0.21	$0.24
YEAR 2023	Dividend Q3 Estimate	$0.35	$0.62	$0.27	$0.33	$0.39	$0.30	$0.21	$0.25
YEAR 2023	Dividend Q4 Estimate	$0.36	$0.63	$0.28	$0.33	$0.39	$0.30	$0.21	$0.25
YEAR 2024	Dividend Q1 Estimate	$0.36	$0.64	$0.28	$0.34	$0.40	$0.31	$0.21	$0.25
YEAR 2024	Dividend Q2 Estimate	$0.37	$0.65	$0.28	$0.35	$0.40	$0.31	$0.21	$0.26
YEAR 2024	Dividend Q3 Estimate	$0.37	$0.65	$0.29	$0.35	$0.41	$0.31	$0.21	$0.26
YEAR 2024	Dividend Q4 Estimate	$0.38	$0.66	$0.29	$0.36	$0.41	$0.32	$0.21	$0.26
YEAR 2025	Dividend Q1 Estimate	$0.38	$0.67	$0.29	$0.36	$0.41	$0.32	$0.21	$0.27
YEAR 2025	Dividend Q2 Estimate	$0.38	$0.68	$0.30	$0.37	$0.42	$0.32	$0.21	$0.27
YEAR 2025	Dividend Q3 Estimate	$0.39	$0.69	$0.30	$0.37	$0.42	$0.33	$0.22	$0.28
YEAR 2025	Dividend Q4 Estimate	$0.39	$0.70	$0.30	$0.38	$0.43	$0.33	$0.22	$0.28
YEAR 2026	Dividend Q1 Estimate	$0.40	$0.71	$0.31	$0.39	$0.43	$0.34	$0.22	$0.28
YEAR 2026	Dividend Q2 Estimate	$0.40	$0.72	$0.31	$0.39	$0.44	$0.34	$0.22	$0.28
YEAR 2026	Dividend Q3 Estimate	$0.41	$0.73	$0.31	$0.40	$0.44	$0.34	$0.22	$0.29
YEAR 2026	Dividend Q4 Estimate	$0.41	$0.73	$0.32	$0.40	$0.45	$0.35	$0.22	$0.29
YEAR 2027 Q1	Year 10 Stock Price	$67.22	$112.70	$46.52	$53.90	$83.31	$59.96	$76.03	$56.74
	Trial COE: Quarterly Rate	1.7%	1.7%	1.7%	1.8%	1.6%	1.6%	1.3%	1.6%
	Trial COE: Annual Rate	6.8%	7.0%	7.1%	7.4%	6.5%	6.7%	5.5%	6.4%
	Cost of Equity	6.8%	7.0%	7.1%	7.4%	6.5%	6.7%	5.5%	6.4%
	(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-WATER-6; Panel B.
Stock Prices and Dividends are from Bloomberg as of January 31, 2017.
1. See Workpaper #1 to Table No. MJV-WATER-6 for the average closing stock price obtained from Bloomberg.
2. See Workpaper #2 to Table No. MJV-WATER-6 for the for the quarterly dividend obtained from Bloomberg.
3. See Workpaper #4 to Table No. MJV-WATER-6 for the Growth Rate used to calculate the Year 10 Stock Price.

Year 10 Stock Price = {(the Dividend Year 2024 Q3 Estimate) x ((1 + the Perpetual Growth Rate) ^ (1/4) x (1 + Quarterly Rate))} / {(Quarterly Rate) - ((1 + the Perpetual Growth Rate) ^ (1/4) -1)}.

Workpaper #4 to Table No. MJV-WATER-6

Blue Chip GDP Forecasts (March 2017)

	2019	2020	2021	2022	2023	2019-2023	2024-2028
Nominal GDP Percent Change, Full Year-Over-Prior Year	4.3%	4.2%	4.1%	4.0%	4.2%	4.2%	4.2%

Sources and Notes: Blue Chip Economic Indicators, March 2017 U.S.
Blue Chip Economic Indicators, March 2017 U.S.

Table No. MJV-WATER-7

Overall After-Tax DCF Cost of Capital of the U.S. Water Sample

Panel A: Simple DCF Method (Quarterly)

Company	3rd Quarter, 2016 Bond Rating [1]	3rd Quarter, 2016 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]	DCF Cost of Debt [7]	DCF Debt to Market Value Ratio [8]	Cal Water's Statutory Income Tax Rate [9]	Overall After-Tax Cost of Capital [10]
Amer. States Water	A	-	8.2%	78.2%	-	0.0%	4.1%	21.8%	40.7%	6.98%
Amer. Water Works	A	-	10.2%	62.9%	-	0.0%	4.1%	37.1%	40.7%	7.29%
Aqua America	A	-	8.3%	73.1%	-	0.0%	4.1%	26.9%	40.7%	6.71%
California Water	A	-	12.6%	72.1%	-	0.0%	4.1%	27.9%	40.7%	9.77%
Conn. Water Services	A	A	7.1%	67.9%	4.1%	0.1%	4.1%	32.0%	40.7%	5.57%
Middlesex Water	A	A	7.7%	80.8%	4.1%	0.3%	4.1%	18.9%	40.7%	6.69%
SJW Corp.	BBB	-	1.6%	67.5%	-	0.0%	4.5%	32.5%	40.7%	~~1.96%~~
York Water Co. (The)	A	-	8.7%	82.6%	-	0.0%	4.1%	17.4%	40.7%	7.62%
Simple Full Sample Average			9.0%	73.9%	4.1%	0.1%	4.1%	26.0%	40.7%	7.23%

Sources and Notes:
[1]: S&P Credit Ratings from Research Insight.
[2]: Preferred ratings were assumed equal to debt ratings.
[3]: Table No. MJV-WATER-6; Panel A, [6].
[4]: Table No. MJV-WATER-4, [1].
[5]: Workpaper #2 to Table No. MJV-WATER-11, Panel C.
[6]: Table No. MJV-WATER-4, [2].
[7]: Workpaper #2 to Table No. MJV-WATER-11, Panel B.
[8]: Table No. MJV-WATER-4, [3].
[9]: Cal Water's Statutory Income Tax Rate.
[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}. A strikethrough indicates the utility was excluded from the full sample average calculation as a result of its cost of equity not exceeding its cost of debt by 100 basis points.

Table No. MJV-WATER-7

Overall After-Tax DCF Cost of Capital of the U.S. Water Sample

Panel B: Multi-Stage DCF (Using Blue Chip Economic Indicators, March 2017 U.S. GDP Growth Forecast as the Perpetual Rate)

Company	3rd Quarter, 2016 Bond Rating [1]	3rd Quarter, 2016 Preferred Equity Rating	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]	DCF Cost of Debt [7]	DCF Debt to Market Value Ratio [8]	Cal Water's Statutory Income Tax Rate [9]	Overall After-Tax Cost of Capital [10]
Amer. States Water	A	-	6.8%	78.2%	-	0.0%	4.1%	21.8%	40.7%	5.86%
Amer. Water Works	A	-	7.0%	62.9%	-	0.0%	4.1%	37.1%	40.7%	5.30%
Aqua America	A	-	7.1%	73.1%	-	0.0%	4.1%	26.9%	40.7%	5.87%
California Water	A	-	7.4%	72.1%	-	0.0%	4.1%	27.9%	40.7%	6.01%
Conn. Water Services	A	A	6.5%	67.9%	4.1%	0.1%	4.1%	32.0%	40.7%	5.19%
Middlesex Water	A	A	6.7%	80.8%	4.1%	0.3%	4.1%	18.9%	40.7%	5.86%
SJW Corp.	BBB	-	5.5%	67.5%	-	0.0%	4.5%	32.5%	40.7%	~~4.55%~~
York Water Co. (The)	A	-	6.4%	82.6%	-	0.0%	4.1%	17.4%	40.7%	5.70%
Multi Full Sample Average			6.8%	73.9%	4.1%	0.1%	4.1%	26.0%	40.7%	5.68%

Sources and Notes:
[1]: S&P Credit Ratings from Research Insight.
[2]: Preferred ratings were assumed equal to debt ratings.
[3]: Table No. MJV-WATER-6; Panel B, [10].
[4]: Table No. MJV-WATER-4, [1].
[5]: Workpaper #2 to Table No. MJV-WATER-11, Panel C.
[6]: Table No. MJV-WATER-4, [2].
[7]: Workpaper #2 to Table No. MJV-WATER-11, Panel B.
[8]: Table No. MJV-WATER-4, [3].
[9]: Cal Water's Statutory Income Tax Rate.
[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}. A strikethrough indicates the utility was excluded from the full sample average calculation as a result of its cost of equity not exceeding its cost of debt by 100 basis points.

Table No. MJV-WATER-8

DCF Cost of Equity at Cal Water's Regulatory Capital Structure

	Overall After -Tax Cost of Capital [1]	Cal Water's Regulatory Capital Structure % Debt [2]	Representative Cost of A Rated Utility Debt [3]	Cal Water's Statutory Income Tax Rate [4]	Cal Water's Regulatory Capital Structure % Equity [5]	Estimated Return on Equity [6]
Full Sample						
Simple DCF Quarterly	7.2%	46.6%	4.1%	40.7%	53.4%	11.4%
Multi-Stage DCF - Using Long-Term GDP Growth Forecast as the Perpetual Rate	5.7%	46.6%	4.1%	40.7%	53.4%	8.5%

Sources and Notes:
[1]: Table No. MJV-WATER-7; Panels A-B, [10].
[2]: Cal Water's Regulatory Capital Structure.
[3]: Based on an A rating. Yield from Bloomberg as of January 31, 2017.
[4]: Cal Water's Statutory Income Tax Rate.
[5]: Cal Water's Regulatory Capital Structure.
[6]: {[1] - ([2] x [3] x (1 - [4]))} / [5].

Table No. MJV-WATER-9

Risk Free Rate

[1]	Consensus 10-Year Forecast	3.10%
	U.S. Government Bond Yields	
[2]	20-Year	5.23%
[3]	10-Year	4.72%
[4]	Maturity Premium	0.50%
[5]	Consensus 10-Year Forecast Adjusted to 20-year Horizon	3.60%

Sources and Notes:
[1]: January 2017 Bluechip Consensus Forecast for 2018.
[2]-[3]: Workpaper # 1 to Table No. MJV-WATER-9. Average of monthly bond yields from January 1990 until January 2017.
[4]: [2] - [3].
[5]: [1] + [4].

Workpaper # 1 to Table No. MJV-WATER-9

U.S. Government Bond Yields as reported by Bloomberg

Date	10-Year	20-Year	30-Year
1/31/1990	8.21	8.24	8.26
2/28/1990	8.47	8.49	8.50
3/31/1990	8.59	8.58	8.56
4/30/1990	8.79	8.77	8.76
5/31/1990	8.76	8.74	8.73
6/30/1990	8.48	8.47	8.46
7/31/1990	8.47	8.48	8.50
8/31/1990	8.75	8.81	8.86
9/30/1990	8.89	8.96	9.03
10/31/1990	8.72	8.79	8.86
11/30/1990	8.39	8.47	8.54
12/31/1990	8.08	8.16	8.24
1/31/1991	8.09	8.19	8.27
2/28/1991	7.85	7.95	8.03
3/31/1991	8.11	8.20	8.29
4/30/1991	8.04	8.13	8.21
5/31/1991	8.07	8.17	8.27
6/30/1991	8.28	8.38	8.47
7/31/1991	8.27	8.37	8.45
8/31/1991	7.90	8.03	8.14
9/30/1991	7.65	7.80	7.95
10/31/1991	7.53	7.73	7.93
11/30/1991	7.42	7.67	7.92
12/31/1991	7.09	7.39	7.70
1/31/1992	7.03	7.30	7.58
2/29/1992	7.34	7.59	7.85
3/31/1992	7.54	7.76	7.97
4/30/1992	7.48	7.72	7.96
5/31/1992	7.39	7.65	7.89
6/30/1992	7.26	7.56	7.84
7/31/1992	6.84	7.24	7.60
8/31/1992	6.59	7.00	7.39
9/30/1992	6.42	6.88	7.34
10/31/1992	6.59	7.07	7.53
11/30/1992	6.87	7.24	7.61
12/31/1992	6.77	7.10	7.44
1/31/1993	6.60	6.98	7.34
2/28/1993	6.26	6.67	7.09
3/31/1993	5.98	6.40	6.82
4/30/1993	5.97	6.41	6.85
5/31/1993	6.04	6.48	6.92
6/30/1993	5.96	6.39	6.81
7/31/1993	5.81	6.23	6.63
11/30/1993	5.72	6.38	6.21
12/31/1993	5.77	6.40	6.25
1/31/1994	5.75	6.39	6.29
2/28/1994	5.97	6.57	6.49
3/31/1994	6.48	7.00	6.91
4/30/1994	6.97	7.40	7.27
5/31/1994	7.18	7.54	7.41
6/30/1994	7.10	7.51	7.40
7/31/1994	7.30	7.67	7.58
8/31/1994	7.24	7.62	7.49
9/30/1994	7.46	7.87	7.71
10/31/1994	7.74	8.08	7.94
11/30/1994	7.96	8.20	8.08
12/31/1994	7.81	7.99	7.87
1/31/1995	7.78	7.97	7.85
2/28/1995	7.47	7.73	7.61
3/31/1995	7.20	7.57	7.45
4/30/1995	7.06	7.45	7.36
5/31/1995	6.63	7.01	6.95
6/30/1995	6.17	6.59	6.57
7/31/1995	6.28	6.74	6.72
8/31/1995	6.49	6.92	6.86
9/30/1995	6.20	6.65	6.55
10/31/1995	6.04	6.45	6.37
11/30/1995	5.93	6.33	6.26
12/31/1995	5.71	6.12	6.06

Workpaper # 1 to Table No. MJV-WATER-9

U.S. Government Bond Yields as reported by Bloomberg

Date	10-Year	20-Year	30-Year
1/31/1996	5.65	6.11	6.05
2/29/1996	5.81	6.30	6.24
3/31/1996	6.27	6.74	6.60
4/30/1996	6.51	6.98	6.79
5/31/1996	6.74	7.11	6.93
6/30/1996	6.91	7.22	7.06
7/31/1996	6.87	7.14	7.03
8/31/1996	6.64	6.97	6.84
9/30/1996	6.83	7.17	7.03
10/31/1996	6.53	6.90	6.81
11/30/1996	6.20	6.58	6.48
12/31/1996	6.30	6.65	6.55
1/31/1997	6.58	6.91	6.83
2/28/1997	6.42	6.77	6.69
3/31/1997	6.69	7.05	6.93
4/30/1997	6.89	7.20	7.09
5/31/1997	6.71	7.02	6.94
6/30/1997	6.49	6.84	6.77
7/31/1997	6.22	6.56	6.51
8/31/1997	6.30	6.65	6.58
9/30/1997	6.21	6.56	6.50
10/31/1997	6.03	6.38	6.33
11/30/1997	5.88	6.20	6.11
12/31/1997	5.81	6.07	5.99
1/31/1998	5.54	5.88	5.81
2/28/1998	5.57	5.96	5.89
3/31/1998	5.65	6.01	5.95
4/30/1998	5.64	6.00	5.92
5/31/1998	5.65	6.01	5.93
6/30/1998	5.50	5.80	5.70
7/31/1998	5.46	5.78	5.68
8/31/1998	5.34	5.66	5.54
9/30/1998	4.81	5.38	5.20
10/31/1998	4.53	5.30	5.01
11/30/1998	4.83	5.48	5.25
12/31/1998	4.65	5.36	5.06
1/31/1999	4.72	5.45	5.16
2/28/1999	5.00	5.66	5.37
3/31/1999	5.23	5.87	5.58
4/30/1999	5.18	5.82	5.55
5/31/1999	5.54	6.08	5.81
6/30/1999	5.90	6.36	6.04
7/31/1999	5.79	6.28	5.98
8/31/1999	5.94	6.43	6.07
9/30/1999	5.92	6.50	6.07
10/31/1999	6.11	6.66	6.26
11/30/1999	6.03	6.48	6.15
12/31/1999	6.28	6.69	6.35
1/31/2000	6.66	6.86	6.63
2/29/2000	6.52	6.54	6.23
3/31/2000	6.26	6.38	6.05
4/30/2000	5.99	6.18	5.85
5/31/2000	6.44	6.55	6.15
6/30/2000	6.10	6.28	5.93
7/31/2000	6.05	6.20	5.85
8/31/2000	5.83	6.02	5.72
9/30/2000	5.80	6.09	5.83
10/31/2000	5.74	6.04	5.80
11/30/2000	5.72	5.98	5.78
12/31/2000	5.19	5.64	5.47
1/31/2001	5.17	5.65	5.55
2/28/2001	5.10	5.62	5.45
3/31/2001	4.88	5.49	5.34
4/30/2001	5.14	5.78	5.65
5/31/2001	5.39	5.92	5.78
6/30/2001	5.28	5.82	5.67

Workpaper # 1 to Table No. MJV-WATER-9

U.S. Government Bond Yields as reported by Bloomberg

Date	10-Year	20-Year	30-Year
7/31/2001	5.24	5.75	5.61
8/31/2001	4.97	5.58	5.48
9/30/2001	4.73	5.53	5.48
10/31/2001	4.57	5.34	5.32
11/30/2001	4.65	5.33	5.12
12/31/2001	5.09	5.76	5.48
1/31/2002	5.04	5.69	5.45
2/28/2002	4.91	5.61	5.40
3/31/2002	5.28	5.93	NA
4/30/2002	5.21	5.85	NA
5/31/2002	5.16	5.81	NA
6/30/2002	4.93	5.65	NA
7/31/2002	4.65	5.51	NA
8/31/2002	4.26	5.19	NA
9/30/2002	3.87	4.87	NA
10/31/2002	3.94	5.00	NA
11/30/2002	4.05	5.04	NA
12/31/2002	4.03	5.01	NA
1/31/2003	4.05	5.02	NA
2/28/2003	3.90	4.87	NA
3/31/2003	3.81	4.82	NA
4/30/2003	3.96	4.91	NA
5/31/2003	3.57	4.52	NA
6/30/2003	3.33	4.34	NA
7/31/2003	3.98	4.92	NA
8/31/2003	4.45	5.39	NA
9/30/2003	4.27	5.21	NA
10/31/2003	4.29	5.21	NA
11/30/2003	4.30	5.17	NA
12/31/2003	4.27	5.11	NA
1/31/2004	4.15	5.01	NA
2/29/2004	4.08	4.94	NA
3/31/2004	3.83	4.72	NA
4/30/2004	4.35	5.16	NA
5/31/2004	4.72	5.46	NA
6/30/2004	4.73	5.45	NA
7/31/2004	4.50	5.24	NA
8/31/2004	4.28	5.07	NA
9/30/2004	4.13	4.89	NA
10/31/2004	4.10	4.85	NA
11/30/2004	4.19	4.89	NA
12/31/2004	4.23	4.88	NA
1/31/2005	4.22	4.77	NA
2/28/2005	4.17	4.61	NA
3/31/2005	4.50	4.89	NA
4/30/2005	4.34	4.75	NA
5/31/2005	4.14	4.56	NA
6/30/2005	4.00	4.35	NA
7/31/2005	4.18	4.48	NA
8/31/2005	4.26	4.53	NA
9/30/2005	4.20	4.51	NA
10/31/2005	4.46	4.74	NA
11/30/2005	4.54	4.83	NA
12/31/2005	4.47	4.73	NA
1/31/2006	4.42	4.65	NA
2/28/2006	4.57	4.73	4.54
3/31/2006	4.72	4.91	4.73
4/30/2006	4.99	5.22	5.06
5/31/2006	5.11	5.35	5.20
6/30/2006	5.11	5.29	5.15
7/31/2006	5.09	5.25	5.13
8/31/2006	4.88	5.08	5.00
9/30/2006	4.72	4.93	4.85
10/31/2006	4.73	4.94	4.85
11/30/2006	4.60	4.78	4.69
12/31/2006	4.56	4.78	4.68

Workpaper # 1 to Table No. MJV-WATER-9

U.S. Government Bond Yields as reported by Bloomberg

Date	10-Year	20-Year	30-Year
1/31/2007	4.76	4.95	4.85
2/28/2007	4.72	4.93	4.82
3/31/2007	4.56	4.81	4.72
4/30/2007	4.69	4.95	4.87
5/31/2007	4.75	4.98	4.90
6/30/2007	5.10	5.29	5.20
7/31/2007	5.00	5.19	5.11
8/31/2007	4.67	5.00	4.93
9/30/2007	4.52	4.84	4.79
10/31/2007	4.53	4.83	4.77
11/30/2007	4.15	4.56	4.52
12/31/2007	4.10	4.57	4.53
1/31/2008	3.74	4.35	4.33
2/29/2008	3.74	4.49	4.52
3/31/2008	3.51	4.36	4.39
4/30/2008	3.67	4.44	4.44
5/31/2008	3.88	4.60	4.60
6/30/2008	4.10	4.74	4.69
7/31/2008	4.01	4.62	4.57
8/31/2008	3.89	4.53	4.50
9/30/2008	3.69	4.32	4.27
10/31/2008	3.81	4.45	4.17
11/30/2008	3.53	4.27	4.00
12/31/2008	2.42	3.18	2.87
1/31/2009	2.52	3.46	3.13
2/28/2009	2.87	3.83	3.59
3/31/2009	2.82	3.78	3.64
4/30/2009	2.93	3.84	3.76
5/31/2009	3.29	4.22	4.23
6/30/2009	3.72	4.51	4.52
7/31/2009	3.56	4.38	4.41
8/31/2009	3.59	4.33	4.37
9/30/2009	3.40	4.14	4.19
10/31/2009	3.39	4.16	4.19
11/30/2009	3.40	4.24	4.32
12/31/2009	3.59	4.40	4.49
1/31/2010	3.73	4.50	4.60
2/28/2010	3.69	4.48	4.62
3/31/2010	3.73	4.49	4.64
4/30/2010	3.85	4.53	4.69
5/31/2010	3.42	4.11	4.29
6/30/2010	3.20	3.95	4.13
7/31/2010	3.01	3.80	3.99
8/31/2010	2.70	3.52	3.80
9/30/2010	2.65	3.47	3.77
10/31/2010	2.54	3.52	3.87
11/30/2010	2.76	3.82	4.19
12/31/2010	3.29	4.17	4.42
1/31/2011	3.39	4.28	4.52
2/28/2011	3.58	4.42	4.65
3/31/2011	3.41	4.27	4.51
4/30/2011	3.45	4.28	4.50
5/31/2011	3.17	4.01	4.29
6/30/2011	3.00	3.91	4.23
7/31/2011	3.00	3.95	4.27
8/31/2011	2.30	3.24	3.65
9/30/2011	1.97	2.83	3.17
10/31/2011	2.15	2.87	3.13
11/30/2011	2.01	2.72	3.02
12/31/2011	1.97	2.67	2.98
1/31/2012	1.97	2.70	3.03
2/29/2012	1.97	2.75	3.11
3/31/2012	2.17	2.94	3.28
4/30/2012	2.05	2.82	3.18
5/31/2012	1.80	2.53	2.93
6/30/2012	1.62	2.31	2.70

Workpaper # 1 to Table No. MJV-WATER-9

U.S. Government Bond Yields as reported by Bloomberg

Date	10-Year	20-Year	30-Year
7/31/2012	1.53	2.22	2.59
8/31/2012	1.68	2.40	2.77
9/30/2012	1.72	2.49	2.88
10/31/2012	1.75	2.51	2.90
11/30/2012	1.65	2.39	2.80
12/31/2012	1.72	2.47	2.88
1/31/2013	1.91	2.68	3.08
2/28/2013	1.98	2.78	3.17
3/31/2013	1.96	2.78	3.17
4/30/2013	1.75	2.55	2.93
5/31/2013	1.93	2.73	3.11
6/30/2013	2.30	3.07	3.40
7/31/2013	2.58	3.31	3.60
8/31/2013	2.74	3.49	3.76
9/30/2013	2.81	3.53	3.79
10/31/2013	2.62	3.38	3.68
11/30/2013	2.72	3.50	3.81
12/31/2013	2.90	3.63	3.89
1/31/2014	2.86	3.52	3.77
2/28/2014	2.71	3.38	3.66
3/31/2014	2.72	3.35	3.62
4/30/2014	2.71	3.27	3.52
5/31/2014	2.56	3.12	3.39
6/30/2014	2.60	3.15	3.42
7/31/2014	2.54	3.07	3.33
8/31/2014	2.42	2.94	3.20
9/30/2014	2.53	3.01	3.26
10/31/2014	2.30	2.77	3.04
11/30/2014	2.33	2.76	3.04
12/31/2014	2.21	2.55	2.83
1/31/2015	1.88	2.20	2.46
2/28/2015	1.98	2.34	2.57
3/31/2015	2.04	2.41	2.63
4/30/2015	1.94	2.33	2.59
5/31/2015	2.20	2.69	2.96
6/30/2015	2.36	2.85	3.11
7/31/2015	2.32	2.77	3.07
8/31/2015	2.17	2.55	2.86
9/30/2015	2.17	2.62	2.95
10/31/2015	2.07	2.50	2.89
11/30/2015	2.26	2.69	3.03
12/31/2015	2.24	2.61	2.97
1/31/2016	2.09	2.49	2.86
2/29/2016	1.78	2.20	2.62
3/31/2016	1.89	2.28	2.68
4/30/2016	1.81	2.21	2.62
5/31/2016	1.81	2.22	2.63
6/30/2016	1.64	2.02	2.45
7/31/2016	1.50	1.82	2.23
8/31/2016	1.56	1.89	2.26
9/30/2016	1.63	2.02	2.35
10/31/2016	1.76	2.17	2.50
11/30/2016	2.14	2.54	2.86
12/31/2016	2.49	2.84	3.11
1/31/2017	2.43	2.75	3.02

Source: Bloomberg as of January 31, 2017.

Table No. MJV-WATER-10

Risk Positioning Cost of Equity of the U.S. Water Sample

Panel A: Scenario 1 - Long-Term Risk Free Rate of 4.00%, Long-Term Market Risk Premium of 6.90%

Company	Long-Term Risk-Free Rate [1]	Value Line Betas [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]
Amer. States Water	4.00%	0.75	6.90%	9.2%	9.3%	9.6%
Amer. Water Works	4.00%	0.65	6.90%	8.5%	8.7%	9.0%
Aqua America	4.00%	0.70	6.90%	8.8%	9.0%	9.3%
California Water	4.00%	0.75	6.90%	9.2%	9.3%	9.6%
Conn. Water Services	4.00%	0.65	6.90%	8.5%	8.7%	9.0%
Middlesex Water	4.00%	0.75	6.90%	9.2%	9.3%	9.6%
SJW Corp.	4.00%	0.75	6.90%	9.2%	9.3%	9.6%
York Water Co. (The)	4.00%	0.75	6.90%	9.2%	9.3%	9.6%
Average		0.72		9.0%	9.1%	9.4%

Sources and Notes:
[1]: Vilbert Direct Testimony.
[2]: Bloomberg as of January 31, 2017.
[3]: Vilbert Direct Testimony.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 0.5%) + [2] x ([3] - 0.5%).
[6]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Table No. MJV-WATER-10

Risk Positioning Cost of Equity of the U.S. Water Sample

Panel B: Scenario 2 - Long-Term Risk Free Rate of 3.75%, Long-Term Market Risk Premium of 7.90%

Company	Long-Term Risk-Free Rate [1]	Value Line Betas [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]
Amer. States Water	3.75%	0.75	7.90%	9.7%	9.8%	10.1%
Amer. Water Works	3.75%	0.65	7.90%	8.9%	9.1%	9.4%
Aqua America	3.75%	0.70	7.90%	9.3%	9.4%	9.7%
California Water	3.75%	0.75	7.90%	9.7%	9.8%	10.1%
Conn. Water Services	3.75%	0.65	7.90%	8.9%	9.1%	9.4%
Middlesex Water	3.75%	0.75	7.90%	9.7%	9.8%	10.1%
SJW Corp.	3.75%	0.75	7.90%	9.7%	9.8%	10.1%
York Water Co. (The)	3.75%	0.75	7.90%	9.7%	9.8%	10.1%
Average		0.72		9.4%	9.6%	9.9%

[2]: Bloomberg as of January 31, 2017.
[3]: Vilbert Direct Testimony.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 0.5%) + [2] x ([3] - 0.5%).
[6]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Workpaper # 1 to Table No. MJV-WATER-10

Value Line 5-Year Adjusted Betas

Company	Value Line Betas [1]
Amer. States Water	0.75
Amer. Water Works	0.65
Aqua America	0.70
California Water	0.75
Conn. Water Services	0.65
Middlesex Water	0.75
SJW Corp.	0.75
York Water Co. (The)	0.75
Average	0.72

Sources and Notes:
[1]: From Valueline Investment Analyzer as of Jan 31, 2017.

Table No. MJV-WATER-11

Overall After-Tax Cost of Capital of the U.S. Water Sample

Panel A: CAPM Cost of Equity Scenario 1 - Long-Term Risk Free Rate of 4.00%, Long-Term Market Risk Premium of 6.90%

Company	CAPM Cost of Equity [1]	ECAPM (0.5%) Cost of Equity [2]	ECAPM (1.5%) Cost of Equity [3]	5-Year Average Common Equity to Market Value Ratio [4]	Weighted - Average Cost of Preferred Equity [5]	5-Year Average Preferred Equity to Market Value Ratio [6]	Weighted-Average Cost of Debt [7]	5-Year Average Debt to Market Value Ratio [8]	Cal Water's Statutory Income Tax Rate [9]	Overall After-Tax Cost of Capital (CAPM) [10]	Overall After-Tax Cost of Capital (ECAPM 0.5%) [11]	Overall After-Tax Cost of Capital (ECAPM 1.5%) [12]
Amer. States Water	9.2%	9.3%	9.6%	71.3%	-	0.0%	4.11%	28.7%	40.7%	7.2%	7.3%	7.5%
Amer. Water Works	8.5%	8.7%	9.0%	54.6%	4.25%	0.1%	4.19%	45.3%	40.7%	5.8%	5.9%	6.0%
Aqua America	8.8%	9.0%	9.3%	70.8%	-	0.0%	4.19%	29.2%	40.7%	7.0%	7.1%	7.3%
California Water	9.2%	9.3%	9.6%	64.9%	-	0.0%	4.11%	35.1%	40.7%	6.8%	6.9%	7.0%
Conn. Water Services	8.5%	8.7%	9.0%	55.2%	4.11%	0.1%	4.11%	44.7%	40.7%	5.8%	5.9%	6.1%
Middlesex Water	9.2%	9.3%	9.6%	68.7%	4.11%	0.6%	4.11%	30.8%	40.7%	7.1%	7.2%	7.3%
SJW Corp.	9.2%	9.3%	9.6%	55.4%	-	0.0%	4.53%	44.6%	40.7%	6.3%	6.3%	6.5%
York Water Co. (The)	9.2%	9.3%	9.6%	72.3%	-	0.0%	4.11%	27.7%	40.7%	7.3%	7.4%	7.6%
Full Sample Average	9.0%	9.1%	9.4%	64.1%	4.2%	0.1%	4.2%	35.8%	40.7%	6.7%	6.7%	6.9%

Sources and Notes:
[1]: Table No. MJV-WATER-10; Panel A, [4].
[3]: Table No. MJV-WATER-10; Panel A, [5].
[4]: Table No. MJV-WATER-4, [4].
[5]: Workpaper #2 to Table No. MJV-WATER-11, Panel C.
[6]: Table No. MJV-WATER-4, [5].
[7]: Workpaper #2 to Table No. MJV-WATER-11, Panel B.
[8]: Table No. MJV-WATER-4, [6].
[9]: Cal Water's Statutory Income Tax Rate
[10]: ([1] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}.
[11]: ([2] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}.
[12]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}.
[10]-[12]: A strikethrough indicates the utility was excluded from the full sample average calculation as a result of its cost of equity not exceeding its cost of debt by 100 basis points

Table No. MJV-WATER-11

Overall After-Tax Cost of Capital of the U.S. Water Sample

Panel B: CAPM Cost of Equity Scenario 2 - Long-Term Risk Free Rate of 3.75%, Long-Term Market Risk Premium of 7.90%

Company	CAPM Cost of Equity [1]	ECAPM (0.5%) Cost of Equity [2]	ECAPM (1.5%) Cost of Equity [3]	5-Year Average Common Equity to Market Value Ratio [4]	Weighted - Average Cost of Preferred Equity [5]	5-Year Average Preferred Equity to Market Value Ratio [6]	Weighted-Average Cost of Debt [7]	5-Year Average Debt to Market Value Ratio [8]	Cal Water's Statutory Income Tax Rate [9]	Overall After-Tax Cost of Capital (CAPM) [10]	Overall After-Tax Cost of Capital (ECAPM 0.5%) [11]	Overall After-Tax Cost of Capital (ECAPM 1.5%) [12]
Amer. States Water	9.7%	9.8%	10.1%	71.3%	-	0.0%	4.11%	28.7%	40.7%	7.6%	7.7%	7.9%
Amer. Water Works	8.9%	9.1%	9.4%	54.6%	4.25%	0.1%	4.19%	45.3%	40.7%	6.0%	6.1%	6.3%
Aqua America	9.3%	9.4%	9.7%	70.8%	-	0.0%	4.19%	29.2%	40.7%	7.3%	7.4%	7.6%
California Water	9.7%	9.8%	10.1%	64.9%	-	0.0%	4.11%	35.1%	40.7%	7.1%	7.2%	7.4%
Conn. Water Services	8.9%	9.1%	9.4%	55.2%	4.11%	0.1%	4.11%	44.7%	40.7%	6.0%	6.1%	6.3%
Middlesex Water	9.7%	9.8%	10.1%	68.7%	4.11%	0.6%	4.11%	30.8%	40.7%	7.4%	7.5%	7.7%
SJW Corp.	9.7%	9.8%	10.1%	55.4%	-	0.0%	4.53%	44.6%	40.7%	6.6%	6.6%	6.8%
York Water Co. (The)	9.7%	9.8%	10.1%	72.3%	-	0.0%	4.11%	27.7%	40.7%	7.7%	7.8%	7.9%
Full Sample Average	9.4%	9.6%	9.9%	64.1%	4.2%	0.1%	4.2%	35.8%	40.7%	7.0%	7.0%	7.2%

Sources and Notes:
[1]: Table No. MJV-WATER-10; Panel B, [4].
[3]: Table No. MJV-WATER-10; Panel B, [5].
[4]: Table No. MJV-WATER-4, [4].
[5]: Workpaper #2 to Table No. MJV-WATER-11, Panel C.
[6]: Table No. MJV-WATER-4, [5].
[7]: Workpaper #2 to Table No. MJV-WATER-11, Panel B.
[8]: Table No. MJV-WATER-4, [6].
[9]: Cal Water's Statutory Income Tax Rate
[10]: ([1] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}.
[11]: ([2] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}.
[12]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}.
[10]-[12]: A strikethrough indicates the utility was excluded from the full sample average calculation as a result of its cost of equity not exceeding its cost of debt by 100 basis points

Workpaper #1 to Table No. MJV-WATER-11

Panel A: Rating to Yield Conversion

Rating	Bond Yield	Preferred Yield
A	4.11%	4.11%
BBB	4.53%	4.53%

Sources and Notes:
Bond Yields from Bloomberg as of January 31, 2017.
Preferred Yields from Matching Bloomberg bond yields as of Jan 31, 2017.

Workpaper #1 to Table No. MJV-WATER-11

Panel B: Bond Rating Summary

Company	January 31, 2017 [1]	3rd Quarter, 2016 [2]	3rd Quarter, 2015 [3]	3rd Quarter, 2014 [4]	3rd Quarter, 2013 [5]	3rd Quarter, 2012 [6]
Amer. States Water	A+	A+	A+	A+	A+	A+
Amer. Water Works	A	A	A	A-	A-	BBB+
Aqua America	A-	A-	A-	A-	A-	BBB+
California Water	A+	A+	A+	A+	A+	A+
Conn. Water Services	A	A	A	A	A	A
Middlesex Water	A	A	A	A-	A-	A-
SJW Corp.	BBB+	BBB+	BBB+	BBB+	BBB+	BBB+
York Water Co. (The)	A-	A-	A-	A-	A-	A-

Sources and Notes:
[1] - [6]: S&P Credit Ratings from Research Insight.
Aqua America Inc is rated by Egan Jones until September 2013 at A-, assumed to be the same going forward.
California Water Service Inc sourced from Bloomberg.
SJW is rated by Egan Jones from October 2014 onwards at BBB+, assumed to be the same over the period.

Workpaper #1 to Table No. MJV-WATER-11

Panel C: Preferred Equity Rating Summary

Company	January 31, 2017 [1]	3rd Quarter, 2016 [2]	3rd Quarter, 2015 [3]	3rd Quarter, 2014 [4]	3rd Quarter, 2013 [5]	3rd Quarter, 2012 [6]
Amer. States Water	-	-	-	-	-	-
Amer. Water Works	-	-	-	A-	A-	BBB+
Aqua America	-	-	-	-	-	-
California Water	-	-	-	-	-	-
Conn. Water Services	A	A	A	A	A	A
Middlesex Water	A	A	A	A-	A-	A-
SJW Corp.	-	-	-	-	-	-
York Water Co. (The)	-	-	-	-	-	-

Sources and Notes:
[1] - [6]: Preferred equity ratings are assumed equal to the company's bond ratings reported in Workpaper #1 to Table No. MJV-WATER-11, Panel B if the company has preferred equity.

Workpaper #2 to Table No. MJV-WATER-11

Panel A: 15-Day Average U.S. Utility Bond Yields and Preferred Yields

Date	A Rated Utility [1]	BBB Rated Utility [2]	A Preferred [3]	BBB Preferred [4]
1/31/2017	4.15%	4.56%	4.15%	4.56%
1/30/2017	4.18%	4.59%	4.18%	4.59%
1/27/2017	4.17%	4.59%	4.17%	4.59%
1/26/2017	4.18%	4.61%	4.18%	4.61%
1/25/2017	4.20%	4.63%	4.20%	4.63%
1/24/2017	4.12%	4.55%	4.12%	4.55%
1/23/2017	4.08%	4.51%	4.08%	4.51%
1/20/2017	4.13%	4.57%	4.13%	4.57%
1/19/2017	4.13%	4.57%	4.13%	4.57%
1/18/2017	4.08%	4.54%	4.08%	4.54%
1/17/2017	4.00%	4.45%	4.00%	4.45%
1/13/2017	4.06%	4.51%	4.06%	4.51%
1/12/2017	4.03%	4.47%	4.03%	4.47%
1/11/2017	4.03%	4.42%	4.03%	4.42%
1/10/2017	4.05%	4.44%	4.05%	4.44%
Average	4.11%	4.53%	4.11%	4.53%

Sources and Notes:
[1] - [2]: Bloomberg as of January 31, 2017.
[3] - [4]: From Matching Bloomberg bond yields as of Jan 31, 2017.

Workpaper #2 to Table No. MJV-WATER-11

Panel B: Bond Yield Summary

Company	January 31, 2017 [1]	3rd Quarter, 2016 [2]	3rd Quarter, 2015 [3]	3rd Quarter, 2014 [4]	3rd Quarter, 2013 [5]	3rd Quarter, 2012 [6]	5-Year Average [7]
Amer. States Water	4.11%	4.11%	4.11%	4.11%	4.11%	4.11%	4.11%
Amer. Water Works	4.11%	4.11%	4.11%	4.11%	4.11%	4.53%	4.19%
Aqua America	4.11%	4.11%	4.11%	4.11%	4.11%	4.53%	4.19%
California Water	4.11%	4.11%	4.11%	4.11%	4.11%	4.11%	4.11%
Conn. Water Services	4.11%	4.11%	4.11%	4.11%	4.11%	4.11%	4.11%
Middlesex Water	4.11%	4.11%	4.11%	4.11%	4.11%	4.11%	4.11%
SJW Corp.	4.53%	4.53%	4.53%	4.53%	4.53%	4.53%	4.53%
York Water Co. (The)	4.11%	4.11%	4.11%	4.11%	4.11%	4.11%	4.11%

Sources and Notes:
[1] - [6]: Ratings based on Workpaper #1 to Table No. MJV-WATER-11, Panel B. Bond yields from Bloomberg as of January 31, 2017.
[7]: Average of [2] through [6].

Workpaper #2 to Table No. MJV-WATER-11

Panel C: Preferred Equity Yield Summary

Company	January 31, 2017 [1]	3rd Quarter, 2016 [2]	3rd Quarter, 2015 [3]	3rd Quarter, 2014 [4]	3rd Quarter, 2013 [5]	3rd Quarter, 2012 [6]	5-Year Average [7]
Amer. States Water	-	-	-	-	-	-	-
Amer. Water Works	-	-	-	4.11%	4.11%	4.53%	4.25%
Aqua America	-	-	-	-	-	-	-
California Water	-	-	-	-	-	-	-
Conn. Water Services	4.11%	4.11%	4.11%	4.11%	4.11%	4.11%	4.11%
Middlesex Water	4.11%	4.11%	4.11%	4.11%	4.11%	4.11%	4.11%
SJW Corp.	-	-	-	-	-	-	-
York Water Co. (The)	-	-	-	-	-	-	-

Sources and Notes:
[1] - [6]: See Workpaper #1 to Table No. MJV-WATER-11, Panel C. Preferred equity yields are from Matching Bloomberg bond yields as of Jan 31, 2017.
[7]: Average of [2] through [6].

Table No. MJV-WATER-12

Risk Positioning Cost of Equity at Cal Water's Regulatory Capital Structure

	Overall After-Tax Cost of Capital (Scenario 1) [1]	Overall After-Tax Cost of Capital (Scenario 2) [2]	Cal Water's Regulatory Capital Structure % Debt [3]	Representative Cost of A-Rated Utility Debt [4]	Cal Water's Statutory Income Tax Rate [5]	Cal Water's Regulatory Capital Structure % Equity [6]	Estimated Return on Equity (Scenario 1) [7]	Estimated Return on Equity (Scenario 2) [8]
CAPM	6.7%	7.0%	46.6%	4.1%	40.7%	53.4%	10.3%	10.9%
ECAPM (0.50%)	6.7%	7.0%	46.6%	4.1%	40.7%	53.4%	10.5%	11.1%
ECAPM (1.50%)	6.9%	7.2%	46.6%	4.1%	40.7%	53.4%	10.8%	11.4%

Sources and Notes:
[1]: Table No. MJV-WATER-11; Panel A, [9] - [10]. Scenario 1: Long-Term Risk Free Rate of 4.00%, Long-Term Market Risk Premium of 6.90%.
[2]: Table No. MJV-WATER-11; Panel B, [9] - [10]. Scenario 2: Long-Term Risk Free Rate of 3.75%, Long-Term Market Risk Premium of 7.90%.
[3]: Cal Water's Regulatory Capital Structure.
[4]: Based on a A rating. Yield from Bloomberg as of January 31, 2017.
[5]: Cal Water's Statutory Income Tax Rate.
[6]: Cal Water's Regulatory Capital Structure.
[7]: {[1] - ([3] x [4] x (1 - [5]))}/ [6].
[8]: {[2] - ([3] x [4] x (1 - [5]))}/ [6].

Table No. MJV-WATER-13

Hamada Adjustment to Obtain Unlevered Asset Beta

Company	Value Line Betas [1]	Debt Beta [2]	5-Year Average Common Equity to Market Value Ratio [3]	5-Year Average Preferred Equity to Market Value Ratio [4]	5-Year Average Debt to Market Value Ratio [5]	Cal Water's Statutory Income Tax Rate [6]	Asset Beta: Without Taxes [7]	Asset Beta: With Taxes [8]
Amer. States Water	0.75	0.05	71.3%	0.0%	28.7%	40.7%	0.55	0.62
Amer. Water Works	0.65	0.06	54.6%	0.1%	45.3%	40.7%	0.38	0.45
Aqua America	0.70	0.06	70.8%	0.0%	29.2%	40.7%	0.51	0.57
California Water	0.75	0.05	64.9%	0.0%	35.1%	40.7%	0.50	0.58
Conn. Water Services	0.65	0.05	55.2%	0.1%	44.7%	40.7%	0.38	0.45
Middlesex Water	0.75	0.05	68.7%	0.6%	30.8%	40.7%	0.53	0.60
SJW Corp.	0.75	0.10	55.4%	0.0%	44.6%	40.7%	0.46	0.54
York Water Co. (The)	0.75	0.05	72.3%	0.0%	27.7%	40.7%	0.56	0.62
Full Sample Average	0.72	0.06	64.1%	0.1%	35.8%	40.7%	0.48	0.55

Sources and Notes:
[1]: Workpaper # 1 to Table No. MJV-WATER-10, [1].
[2]: Workpaper #1 to Table No. MJV-WATER-13, [7].
[3]: Table No. MJV-WATER-4, [4].
[4]: Table No. MJV-WATER-4, [5].
[5]: Table No. MJV-WATER-4, [6].
[6]: Cal Water's Statutory Income Tax Rate
[7]: [1]*[3] + [2]*([4] + [5]).
[8]: {[1]*[3] + [2]*([4]+[5]*(1-[6]))} / {[3] + [4] + [5]*(1 -[6])}.

Workpaper #1 to Table No. MJV-WATER-13

Debt Beta Summary

Company	January 31, 2017 [1]	3rd Quarter, 2016 [2]	3rd Quarter, 2015 [3]	3rd Quarter, 2014 [4]	3rd Quarter, 2013 [5]	3rd Quarter, 2012 [6]	5-Year Average [7]
Amer. States Water	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Amer. Water Works	0.05	0.05	0.05	0.05	0.05	0.10	0.06
Aqua America	0.05	0.05	0.05	0.05	0.05	0.10	0.06
California Water	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Conn. Water Services	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Middlesex Water	0.05	0.05	0.05	0.05	0.05	0.05	0.05
SJW Corp.	0.10	0.10	0.10	0.10	0.10	0.10	0.10
York Water Co. (The)	0.05	0.05	0.05	0.05	0.05	0.05	0.05

Sources and Notes:
[1] - [6]: Ratings based on Workpaper #1 to Table No. MJV-WATER-11, Panel B. Debt Betas are from Corporate Finance, Berk and Demarzo, Second Edition, p. 389.
[7]: Average of [2] through [6].

Table No. MJV-WATER-14

Sample Average Asset Beta Relevered at Cal Water's Regulatory Capital Structure

	Asset Beta [1]	Assumed Debt Beta [2]	Cal Water's Regulatory Capital Structure % [3]	Cal Water's Statutory Income Tax Rate [4]	Cal Water's Regulatory Capital Structure % [5]	Estimated Equity Beta [6]
Asset Beta Without Taxes	0.48	0.05	46.6%	40.7%	53.4%	0.86
Asset Beta With Taxes	0.55	0.05	46.6%	40.7%	53.4%	0.82

Sources and Notes:
[1]: Table No. MJV-WATER-13, [7] - [8].
[2]: Debt Beta estimate for A-rated entities.Corporate Finance, Berk and Demarzo, Second Edition, p. 389.
[3]: Cal Water's Regulatory Capital Structure.
[4]: Cal Water's Statutory Income Tax Rate.
[5]: Cal Water's Regulatory Capital Structure.
[6]: [1] + [3]/[5]*([1] - [2]) without taxes, [1] + [3]*(1 - [4])/[5]*([1] - [2]) with taxes.

Table No. MJV-WATER-15

Risk-Positioning Cost of Equity using Hamada-Adjusted Betas

Panel A: Scenario 1 - Long-Term Risk Free Rate of 4.00%, Long-Term Market Risk Premium of 6.90%

Company	Long-Term Risk-Free Rate [1]	Hamada Adjusted Equity Betas [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]
Asset Beta Without Taxes	4.00%	0.86	6.90%	10.0%	10.0%	10.2%
Asset Beta With Taxes	4.00%	0.82	6.90%	9.6%	9.7%	9.9%

Sources and Notes:
[1]: Vilbert Direct Testimony.
[2]: Table No. MJV-WATER-14, [6].
[3]: Vilbert Direct Testimony.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 0.5%) + [2] x ([3] - 0.5%).
[6]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Table No. MJV-WATER-15

Risk-Positioning Cost of Equity using Hamada-Adjusted Betas

Panel B: Scenario 2 - Long-Term Risk Free Rate of 3.75%, Long-Term Market Risk Premium of 7.90%

Company	Long-Term Risk-Free Rate [1]	Hamada Adjusted Equity Betas [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]
Asset Beta Without Taxes	3.75%	0.86	7.90%	10.6%	10.6%	10.8%
Asset Beta With Taxes	3.75%	0.82	7.90%	10.2%	10.3%	10.5%

Sources and Notes:
[1]: Vilbert Direct Testimony.
[2]: Table No. MJV-WATER-14, [6].
[3]: Vilbert Direct Testimony.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 0.5%) + [2] x ([3] - 0.5%).
[6]: ([1] + 1.5%) + [2] x ([3] - 1.5%).