BEFORE THE
TENNESSEE PUBLIC UTILITY COMMISSION

APPLICATION OF
TENNESSEE-AMERICAN WATER COMPANY, INC.
FOR ADJUSTMENT OF RATES AND CHARGES

TPUC DOCKET NO. 24-00032

DIRECT TESTIMONY
OF
AARON L. ROTHSCHILD

COST OF CAPITAL

ON BEHALF OF THE
OFFICE OF THE TENNESSEE ATTORNEY GENERAL
CONSUMER ADVOCATE DIVISION

September 17, 2024

Contents

I. STATEMENT OF QUALIFICATIONS

Q. PLEASE STATE YOUR NAME, TITLE, AND BUSINESS ADDRESS.

A. My name is Aaron L. Rothschild. My title is President, and my business address is 15 Lake Road, Ridgefield, CT.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am President of Rothschild Financial Consulting ("RFC").

Q. PLEASE STATE YOUR EDUCATIONAL ACHIEVEMENTS AND PROFESSIONAL DESIGNATIONS.

A. I have a B.A. degree in mathematics from Clark University (1994) and an M.B.A. from Vanderbilt University (1996).

Q. PLEASE DESCRIBE YOUR BUSINESS EXPERIENCE.

A. I performed financial analysis in the telecom industry in the United States and Asia Pacific from 1996 to 2001, investment banking consulting in New York, complex systems science research regarding the power sector at an independent research institute, and I have prepared rate of return testimonies since 2002. See Appendix F for my resume.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE TENNESSEE PUBLIC UTILITY COMMISSION, OR OTHER STATE COMMISSIONS? IF SO, WHICH COMMISSIONS?

A. Yes. I have testified before the Tennessee Public Utility Commission. My expert witness experience also includes testifying in over 75 cost of capital proceedings before the

following state commissions: California; Colorado; Connecticut; Delaware; District of Columbia; Florida; New Jersey; Maryland; New Hampshire; North Dakota; Pennsylvania; South Carolina; and Vermont. See Appendix G for the list of dockets for each of my testimonies.

Q. ON WHOSE BEHALF ARE YOU PROVIDING THIS TESTIMONY?

A. I am testifying on behalf of the Office of the Tennessee Attorney General ("Consumer Advocate").

II. PURPOSE

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

A. The purpose of my testimony is to address the cost of capital for Tennessee-American Water Company, Inc. ("TAWC" or the "Company") which includes the following three components:

1. Cost of Equity ("COE")
2. Cost of Debt
3. Capital Structure

Based on my analysis of these cost of capital components, I recommend an allowed rate of return for ratemaking purposes, including an appropriate authorized return on equity ("ROE"), authorized cost of debt, and authorized capital structure.

Q. PLEASE DEFINE THE COE, COST OF DEBT, AND CAPITAL STRUCTURE.

A.

1. **COE:** My COE recommendation is my opinion of the return investors require to provide equity capital to TAWC based on current capital markets. Since investors must pay the market price of a stock to make an investment, investors' required returns are based on the return they expect to receive on the market price of stocks. In other words, TAWC's COE is forward-looking and "market-based." My recommendation is consistent with the following legal standards set by the United States Supreme Court for a fair rate of return:

> The return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks.[1]

And

> [S]ufficient to . . . support its credit and . . . raise the money necessary for the proper discharge of its public duties.[2]

2. **Cost of Debt:** My cost of debt recommendation is based on the actual cost of debt paid by the utility to its sources of credit. For example, if a utility has issued a bond with a 3% interest rate three years ago, its authorized cost of debt should be 3%, even if interest rates are currently higher or lower than 3%.

3. **Capital Structure:** Capital structure is the percentage of equity and debt that makes up the finances of a utility. For example, if a utility raises $1 million of equity capital and $1 million of debt capital, we say it has a capital structure containing 50% equity and 50% debt. The utility has the burden of proof to demonstrate that its requested

[1] *Fed. Power Comm'n v. Hope Nat. Gas Co.*, 320 U.S. 591, 603 (1944).

[2] *Bluefield Water Works & Improvement Co. v. Pub. Serv. Comm'n of the State of W. Va.* 262 U.S. 679, 692-693 (1923).

capital structure for regulatory purposes produces the lowest, reasonable overall cost of capital. My capital structure recommendation is based on my review of TAWC's justification for its requested regulatory capital structure, the capital structure ratios of other water utility companies, and the capital structure of TAWC's parent, American Water Works Company, Inc.. As discussed below, the reported capital structure of a regulated subsidiary is often not representative of how the regulated utility was financed. For example, the parent of a regulated utility can report funds raised through debt financing at the holding company level as equity financing on the books of its regulated utility subsidiary. Therefore, it is important to make sure TAWC's requested capital structure would not overcharge consumers by including a higher common equity ratio than is appropriate.[3]

Q. WHAT IS THE DIFFERENCE BETWEEN TAWC'S COST OF EQUITY AND ITS AUTHORIZED ROE?

A. The COE is the market-based return investors expect to earn on the market value of any given stock. In other words, the COE is the return investors expect to earn on the market price of equity. As it applies to this proceeding, it is the return investors require to provide equity capital to TAWC. The appropriate authorized ROE is based on the TPUC's determination of the COE at the time of the proceeding, after reviewing the evidentiary record, which incorporates investor expectations. Once the TPUC issues an authorized ROE, the market-based cost of equity will continue to fluctuate as capital markets

[3] A higher common equity ratio, all else equal, results in higher rates for consumers because equity is more expensive than debt.

inevitably continue to change. The authorized ROE is based on a snapshot of the COE, which is constantly changing.

Q. PLEASE DEFINE THE APPROPRIATE RATE OF RETURN.

A. The appropriate Rate of Return (ROR) is based upon the weighted overall cost of capital (WACC) of the current costs of debt and equity at the time of this proceeding. The weighted cost rate is calculated by multiplying the capital structure ratios of the sources of capital (debt, preferred equity, and common equity) times their respective cost rates.

WACC = Cost of Debt X Debt Ratio + COE X Common Equity Ratio + Cost of Preferred Equity X Preferred Equity Ratio.

Q. CALCULATING THE COST OF EQUITY IS A HIGHLY TECHNICAL TOPIC. HOW CAN A DECISION MAKER WHO IS NOT SPECIALIZED IN FINANCE BEST USE THE CONTENT OF THIS TESTIMONY?

A. My testimony includes a thorough technical analysis, including the use of specialized mathematical models. Models are required to determine the cost of equity like a map is required to plan a road trip. Maps and models are useful because they simplify the complexity and vastness of reality into a form that is understandable and useful. A map of Tennessee that left out no details would be the same size as the state and thus unusable. A model that included every detail of financial markets (e.g., the trading activity of every single stock investor on earth) would be unusable as well. It is critical to remember that models are simplifications of reality and there are arguably as many "models" as there are investors. My ROE recommendation is based on the best tools I am aware of to calculate TAWC's COE; however, I urge the Commission to test the reasonableness of my model results by comparing them to model results from sources that have nothing to do with this

proceeding. For example, I recommend that the Commission consider the long-term equity return expectations of pension funds and leading financial institutions like the ones shown in Table 4 on page 18.

Q. HAVE YOU REVIEWED TAWC'S RATE CASE FILING AND DIRECT TESTIMONY?

A. Yes.

III. INTRODUCTION AND SUMMARY OF CONCLUSIONS

Q. PLEASE SUMMARIZE YOUR MAIN CONCLUSIONS.

A. The Commission should reject (1) Ms. Bulkley's recommended return on equity ("ROE") of 10.75% because it is higher than DEC's market-based cost of equity ("COE') and (2) TAWC's requested capital structure consisting of 54.52% equity and 43.49% debt, because they have a significantly higher common equity ratio (54.52%) than the average common equity ratio (50.9%) used by other water utility companies in the country and the consolidated capital structure being used by TAWC's parent American Water Works Company, Inc. (about 44%).[4]

As a regulated monopoly, TAWC's authorized ROE should be consistent with the following legal standards set by the United States Supreme Court for a fair rate of return: (1) "The return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks"[1] and (2) "[S]ufficient to . . . support its

[4] American Water's Value Line Company Report, July 5, 2024.

credit and . . . raise the money necessary for the proper discharge of its public duties."[5] In my testimony, I explain why Ms. Bulkley's recommendations fail to meet these standards. My ROE recommendation of up to 8.28% is at the high end of my cost of equity model results (7.09% - 8.28% with a midpoint of 7.68%) and is more than sufficient to meet these standards.[6]

To arrive at my recommendation, I conducted a thorough technical analysis to determine the equity return investors require to provide capital to enterprises having corresponding risks to TAWC. I also cross-referenced the results of my analysis with the model results of leading financial institutions so the Commission can better judge the reasonableness of my model results and 8.28% ROE recommendation.

Additionally, the U.S. Supreme Court established that when determining the fairness or reasonableness of a utility's authorized ROE it is the result reached, as opposed to the methodology employed that matters.[7] Therefore, in addition to my thorough technical analysis, I provide evidence to help the Commission evaluate the result reached by Ms. Bulkley (10.75% ROE recommendation) independent of her methods. Aside from the issues with her methods, Ms. Bulkley's 10.75% ROE recommendation is significantly higher than the equity return expectations of major financial institutions shown in Table 4 on page 18 which range between 6.2% and 7.9% for large capitalization companies (e.g., Amazon, Apple, Tesla)[8]. There is no good reason for TAWC's authorized ROE to be

[5] Bluefield Water Works & Improvement Co. v. Pub. Serv. Comm'n of the State of W. Va. 262 U.S. 679, 692-693 (1923).

[6] As I will explain further, this 7.09% - 8.28% range does not include an adjustment to account for the difference between my recommended capital structure, containing a 50% common equity ratio, and the average capital structure ratio of the companies in my proxy group, which contain an average common equity ratio of .

[7] *Federal Power Commission v. Hope Natural Gas Co.,* 320 U.S. 591, 602 (1944).

[8] Table 4slo shows an 8.5% cost of equity from Duff & Phelps / Kroll, a financial advisor and data provider.

hundreds of basis points higher than the equity return expectations for large cap unregulated companies that operate in extremely competitive markets. If there is one, I have not seen it.

Ms. Bulkley's testimony is not a reliable source of information regarding TAWC's cost of equity because of significant inaccuracies. For example, she claims that TAWC's planned capital expenditure program is a risk, when in fact it is an opportunity. AWK's investor presentation from July 31, 2024, explains that growing rate base is a primary source of growth. Additionally, she claims that consumers should pay for the cost of issuing stock is a cost – referred as "flotation costs - when issuing stock with a market-to-book ratio significantly above one, as is the case for water utility stocks, it is a significant profit opportunity.

Q. HOW IS YOUR TESTIMONY ORGANIZED?

A. First, I provide a summary of my recommendations, an overview of cost of equity concepts, and explanation of how current capital markets relate to my cost of equity calculations. Second, I will provide a more detailed discussion of current capital markets and how key parameters are impacting equity costs. Third, I will provide my capital structure and cost of debt recommendation. Fourth, I will provide an explanation of the various models I use in my cost of equity calculations. Lastly, I will provide an evaluation of TAWC's rate of return testimony.

Q. PLEASE PROVIDE A SUMMARY OF YOUR RECOMMENDATIONS.

A. I recommend the following cost of capital for TAWC's water operations:

- An overall cost of capital of 6.46% (5.86% - 6.46%)

- An ROE of 8.28% (7.09% - 8.28%)
- A capital structure containing 50.90% common equity and 47.11% long-term debt
- A long-term and short-term debt cost rate of 4.59% and

A summary of my cost of capital recommendations for TAWC's water operations is presented in Table 1 below.

TABLE 1: ALR RECOMMENDED RANGE - TENNESSEE-AMERICAN WATER COMPANY, INC.
TPUC Docket No. 24-00032

	Capital Structure Ratios	Cost Rate	Weighted Cost Rate
Long-Term Debt	47.11%	4.59%	2.16%
Short-Term Debt	1.99%	4.27%	0.08%
Preferred Equity	0.00%	0.00%	0.00%
Common Equity	50.90%	8.28%	4.21%
Rate of Return			6.46%

Exhibit ALR-1

If the TPUC decides to use TAWC's requested capital structure instead of my recommended capital structure, it would be appropriate to reduce TAWC's authorized ROE because it has lower financial risk. A higher common equity ratio means less debt, a lower chance of financial stress (financial risk), and therefore a lower cost of equity. On the other hand, a lower common equity ratio means more debt, a higher chance of financial stress (financial risk), and therefore a higher cost of equity. Based on a regression analysis of dozens of utility companies, I found a 0.04% reduction in the cost of equity for every 1% increase in the common equity ratio. Applying the results of this regression analysis, I determined that TAWC's authorized ROE should be reduced from 8.28% (7.09% - 8.28%) to 8.13% (6.94% - 8.13%) if their requested regulatory capital structure is used to set rates.

Q. ARE YOU RECOMMENDING A SPECIFIC ROE OF 8.28% OR AN ROE RANGE OF 7.09% TO 8.28%?

A. I recommend both a range of appropriate ROEs and a specific point within that range that I consider to be the most appropriate. It is not possible to measure TAWC's COE with the precision of measuring temperature with a thermometer. However, my recommended ROE range of 7.09% to 8.28% already eliminates the extreme ends of the results of my models and provides the Commission with a range of ROEs I feel confident will allow TAWC to raise the capital it needs to provide safe and reliable service. I also recommend a specific point of 8.28% which is at the high end of that range.

Q. PLEASE SUMMARIZE HOW YOU DETERMINED YOUR 8.28% COST OF EQUITY RECOMMENDATION FOR TAWC.

A. To arrive at my recommendation, I applied the Constant Growth[9] and Non-Constant Growth versions of the DCF and 8 variations of the CAPM methodologies to a proxy group of 6 publicly traded water utility companies ("RFC Water Proxy Group")[10] using data available through August 31, 2024. As discussed below, I utilize capital market data and cross-reference the model results of leading financial institutions as an additional check on the reasonableness of my model results.

I use a proxy group to calculate TAWC's cost of equity because TAWC does not have publicly traded stock data needed for COE models.[11] Additionally, using a proxy

[9] The constant growth DCF model is a variant, or version, of the single-stage DCF model that uses a consistent, never-changing growth rate component in perpetuity.

[10] Rothschild Financial Consulting ("RFC")

[11] TAWC's parent American Water Works Company, Inc. has publicly traded stocks, but it owns many utility companies in different states. Therefore, American Water Works Company, Inc.'s stock is not the same as TAWC.

group provides more reliable results because it is less likely to be skewed by specific circumstances or anomalies faced by any individual company.

As shown in Table 2 below, Cost of Equity Model Results, the high-end results of my three cost of equity models, including eight variations of the CAPM, range between 7.62% and 8.38%, with an upper percentile of 8.28%. The low-end results of my three cost of equity models, including eight variations of the CAPM, range between 7.07% and 8.03%, with a lower percentile of 7.09%.[12]

TABLE 2: COST OF EQUITY MODEL RESULTS		
DCF	**Low**	**High**
Constant Growth - Sustainable Growth	7.65%	7.69%
Constant Growth - Option-Implied Growth	8.03%	8.38%
CAPM		
Spot (Aug. 31, 2024)		
Risk Free Rate - 3-Month T Bill	7.35%	7.77%
Risk Free Rate - 30-Yr T Bond	7.07%	7.62%
3-Mo. Weighted Average (Jun. to Aug. 2024)		
Risk Free Rate - 3-Month T Bill	7.39%	7.91%
Risk Free Rate - 30-Yr T Bond	7.14%	7.85%
Outer Percentile Range	**7.09%**	**8.28%**
Midpoint of Range	**7.68%**	

Exhibit ALR-2

Q. ARE YOUR COE MODELS BASED ON ESTABLISHED METHODOLOGIES?

A. Yes. My constant growth DCF model is used by major financial institutions. J.P. Morgan Chase uses the sustainable growth form of the DCF method, as I do, in its 2019 Long-Term Capital Market Assumptions publication.[13] *Principles of Corporate Finance*, a leading

[12] I decided to limit the range model results to the middle 90% to eliminate my COE model results that are close to the current cost of debt. Additionally, I decided to not include the results of my non-constant growth rate method the results are not sufficiently higher than the cost of debt.

[13] 23rd Annual Edition, Long-Term Capital Market Assumptions - Time-tested projections to build stronger portfolios, pp. 62-63.

financial textbook used in business schools and investment banks around the world, recommends using the very same method I use to calculate the cost of equity for regulated energy utility companies.[14] As discussed in Section V - F. Capital Asset Pricing Model on page 61, my CAPM is based on methodologies used by Value Line, the Chicago Board of Options Exchange (CBOE), and published in peer-reviewed academic journals (e.g., The Review of Financial Studies). My CAPM method has also been recognized by state utility commissions. On April 9, 2020, the Public Service Commission of South Carolina stated the following:

> Amongst the three witnesses, Consumer Affairs Rothschild's approach was unique in that he included the use of both historical and forward-looking, market-based data in his analysis. Based on the testimony and facts presented, the Commission therefore adopts the recommended ROE of 7.46% proposed by witness Rothschild.[15]

In California's 2017 Water Cost of Capital proceedings, a company witness acknowledged the validity of RFC's method. California Administrative Law Judge Bemesderfer stated the following:

> [O]n cross-examination Vilbert [California Water Service Company witness] admitted that Rothschild's use of the method [b x r method] was "reasonable" and that Rothschild had "implemented the methodology correctly" in arriving at his Water Proxy Group ROE of 8.25%.[16]

In a 2024 decision, California Commissioner John Reynolds found merit in my analysis and used my cost of equity methodology, including the CAPM and DCF methods

[14] Brealey, Myers, and Allen, Principles of Corporate Finance, pp. 86-87 (12th ed. 2017).

[15] Order Ruling on Application for Adjustment in Rates, p. 43, SC PSC Docket No. 2019-290-WS, Order No. 2020-306 (April 9, 2020).

[16] Proposed Decision of ALJ Bemesderfer, p.19, CPUC Application No. 17-04-001 (February 6, 2018).

I use in this proceeding, to determine the authorized ROEs for California's ten Independent Small Telephone Companies (ILECs).[17]

Q. HOW DO YOUR RECOMMENDATIONS COMPARE TO THE RECOMMENDATIONS OF TAWC'S WITNESS, MS. BULKLEY?

A. As shown in Table 3 below, my 8.28% cost of equity and capital structure recommendations result in a 6.46% overall rate of return. Ms. Bulkley's 10.75% cost of equity and capital structure recommendations result in an overall rate of return of 7.94%.

TABLE 3: RECOMMENDATION COMPARISON - ROTHSCHILD AND BULKLEY

	Cost of Equity	Cost of Long-term Debt	Common Equity %	long-Term Debt %	Short-Term Debt %	Rate of Return
Rothschild [1]	8.28%	4.59%	50.90%	47.11%	1.99%	6.46%
Bulkley [2]	10.75%	4.59%	54.52%	43.49%	1.99%	7.86%

[1] Exhibit ALR-1

[2] Mr. Furia's Direct Testimony, Petitioner's Exhibit CS-1-Capital Structure-NF, Scheudle CS-1.1.

I recommend a different ROE[18] for TAWC than its witnesses Ms. Bulkley for many reasons.

First, we have different analytical approaches. As discussed above, my COE recommendation is market-based; I use capital market data (e.g., stock prices, bond yields, stock option prices) to calculate the cost of equity. I use capital market data because it reveals investors' expectations, including their expectations regarding future capital market conditions. Current capital markets are forward-looking. On the other hand, Ms. Bulkley rejects the collective information revealed by the behavior of millions of investors participating in capital markets. She argues it is important to consider "projected market

[17] Alternative Proposed Decision of Commissioner John Reynolds, p.19, CPUC Application No. 22-09-003 (August 5, 2024).

[18] My ROE recommendation is based on TAWC's current market-based COE. As stated previously, the authorized ROE is based on a snapshot of the COE which is constantly changing. In the context of this case my recommended COE and ROE are synonymous.

data" (e.g., economist forecasts) because investors may "not expect current market conditions to be sustained in the future."[19] But investors' expectations regarding future capital market conditions are revealed in current capital market data because when investors buy a stock or a bond they care what price they will be able to sell those securities for in the future. Ms. Bulkley's method is to prioritize the opinions of a few analysts over the expectations of millions of investors. My market-based methodology is superior to Ms. Bulkley's non market-based method because it relies on a much larger sample size of data, but also because it is based on the expectations of those who provide TAWC the capital it needs, investors.

Second, we disagree on the characteristics of current capital markets and what they mean regarding TAWC's access to financing and cost of capital. Ms. Bulkley claims that because the current dividend yields of utility companies are relatively low, it is reasonable to conclude that they will increase, supporting a cost of equity at the high end of DCF model results.[20] The dividend yield of utility stocks is determined by investors because it is based on the price investors are willing to pay for utility stocks in relation to dividends (dividend yield = dividend per share/market price of stock). The dividend yield is currently lower relative to the yield on treasury bonds than average because of decisions made by investors. They have communicated that they require a lower return (dividend yield) to invest in utility stocks than they do on average. If investors needed a higher dividend yield to invest in utility stocks the market price of utility stocks would have already fallen so that the dividend yield matched their return requirements. Ms. Bulkley, in essence, argues that

[19] Ms. Bulkley's Direct Testimony at 15:16-20.
[20] Id. At 25:16 -26.

TAWC's cost of equity should be increased because it is currently below average. Her argument disregards data and is extremely unfair to consumers.

Q. PLEASE PROVIDE A SUMMARY OF HOW YOUR COST OF EQUITY RECOMMENDATION COMPARES TO THE RETURN EXPECTATIONS OF MAJOR FINANCIAL INSTITUTIONS.

A. As shown in Table 4 on page 18, major financial institutions are informing their clients to expect returns on the overall market (S&P 500) of 6.2% to 7.9%. Even a source relied upon by Ms. Bulkley, Kroll, determined that the cost of equity for the overall market is 8.5%.[21] As stated above, TAWC's authorized ROE should be based investors' expectations as indicated by capital market data, not the opinions of small groups of people including those of major financial institutions. However, I chose to include the equity return expectations of major financial institutions to encourage the Commission consider why Ms. Bulkley's 10.75% ROE is significantly higher than financial mainstream. If there is a good reason for TAWC's COE to be hundreds of basis points higher than the equity return expectations of major financial institutions, I have not seen it.

[21] Ms. Bulkley's Direct Testimony at 46: 3-10. Ms. Bulkley uses data from Kroll to justify the market risk premium portion of her CAPM analysis.

TABLE 4: U.S. EQUITY RETURN EXPECTATIONS AMONG MAJOR FINANCIAL INSTITUTIONS	
Duff & Phelps / Kroll (June 2024) [1]	**8.5%**
Horizon Actuarial Services, LLC Survey - 20 Year Horizon (August 2024) [2]	
U.S. Equity - Large Cap (5.3-10.2%, 50% Percentile - 6.7%)	**6.7%**
U.S. Equity - Small / Mid Cap (5.1-10.9%, 50% Percentile - 7.3%)	**7.3%**
J.P. Morgan Asset Management - Equity Long-Term Returns (2023) [3]	**7.9%**
Charles Schwab - 10-year U.S. Large Cap Returns (January 2024) [4]	**6.2%**

Sources:
[1] Kroll Recommended U.S. ERP and Corresponding RFR to be Used in Computing Cost of Capital: January 2008 - Pres
https://www.kroll.com/en/insights/publications/cost-of-capital/recommended-us-equity-risk-premium-and-corresponding-risk-free-rates
Note: Duff & Phelps acquired Kroll in 2021 and rebranded itself as Kroll.
[2] Horizon Actuarial Services, LLC, Survey of Capital Market Assumptions Survey, August 2024, page 19.
Survey participants Include: Bank of New York Mellon, BlackRock, Goldman Sachs Asset Management, J.P. Morgan Asset Management, Merrill, Morgan Stanley Wealth Management, Royal Bank of Canada, UBS.
[3] J.P. Morgan Asset Management - 2024 Long-Term Capital Market Assumptions, 2023, page 12.
[4] Schwab's 2024 Long-Term Capital Market Expectations, January 2, 2024.
https://www.schwab.com/learn/story/schwabs-long-term-capital-market-expectations

The equity return expectations, shown in Table 4 above, are for the overall stock market (e.g., US Large Cap, S&P 500[22]), which should be higher than the return expectations for utility stocks because regulated monopoly utilities are lower risk than most, if not all, unregulated companies in the S&P 500, like Tesla and Amazon. Therefore, Ms. Bulkley's 10.75% ROE recommendation is even more out of line with the financial mainstream than it appears from the numbers presented in this table.

Even my cost of equity recommendation of 8.28% (7.09% to 8.28%) for TAWC is in the middle to upper part of the range of these expectations which should give the Commission more confidence that if they adopt my recommendation TAWC will be able to raise the capital it needs to provide safe and reliable service.

[22] S&P 500 is a stock market index that includes 500 of the largest U.S. companies, including 11 sectors to show the health of the U.S. stock market and broader economy. The Dow Jones Industrial Average, 30 of the largest U.S. companies, is another commonly used measure of equity markets in general.

Q. PLEASE COMPARE TAWC'S REVENUE REQUIREMENT IF YOUR RECOMMENDATIONS ARE ADOPTED INSTEAD OF MS. BULKLEY'S.

A. If my 8.28% cost of equity recommendation and capital structure recommendation are used to set rates for TAWC, the rate of return portion of the revenue requirement will be about $23.0 million. On the other hand, if Ms. Bulkley's 10.75% cost of equity recommendation and capital structure recommendation are used to set rates, the rate of return portion of the annual revenue requirement will be $30.6 million. As shown in Table 5 below, if Ms. Bulkley's rate of return recommendations are adopted instead of mine, consumers will pay approximately $6.3 million more per year.

TABLE 5: ANNUAL REVENUE IMPACT VS. ROTHSCHILD RECOMMENDATION - TENNESSEE-AMERICAN WATER COMPANY, INC.
($ million)

	Rate of Return Portion of Revenue Requirement	Difference versus Rothschild Recommendation
Rothschild ROE & Cap Structure	$24.3	
Rothschild ROE with Bulkley Cap Structure	$25.0	$0.7
Bulkley ROE & Cap Structure	$30.6	$6.3

Source/Inputs:

Requested Rate Base [1]	$305.0
Federal income tax rate	21.00%
State income tax rate	6.50%
Uncollectable Expense	0.00%

[1] Petition of Tennessee American Water Company to Modify Tariff, TPUC Docket No. 24-00032, Page 4

Q. YOU RECOMMEND THAT TAWC SHOULD BE AUTHORIZED TO EARN AN ROE EQUAL TO ITS MARKET-BASED COST OF EQUITY OF 8.28% (7.09% TO 8.28%). PLEASE EXPLAIN MORE REGARDING THE IMPORTANCE OF DETERMINING THE MARKET-BASED COE AS ACCURATELY AS POSSIBLE.

A. As discussed above, TAWC's authorized ROE should be in line with its market-based COE. In other words, the cost of equity is the return investors expect to earn when they purchase the equity (or stock) of a company. The return investors expect can come in the form of capital gains (stock price appreciation) or dividend payments. As investors buy

and sell stock in the market, they convey information about their return expectations and therefore the underlying cost of equity (companies with different risk profiles will have different costs of equity). It is impossible to determine the cost of equity based on accounting information alone (e.g., revenue, net income, equity book value, or return on book equity) as it can only be established by capital market prices (e.g., stocks, stock options).

It is important that the cost of equity used to set rates for TAWC in this proceeding be market-based. This makes sense because investor-owned utility companies ("IOUs") raise money from investors. It is thus critical that the authorized ROE be consistent with the market return expectations of investors.

Q. DO ANY ROE WITNESSES USE A DIFFERENT DEFINITION FOR THE COST OF EQUITY?

A. All the ROE witnesses I have encountered over my more than 20 years in the industry, including Ms. Bulkley, define the cost of equity as market-based somewhere in their testimony. Ms. Bulkley correctly states that "the cost of equity is market-based and, therefore, must be estimated based on observable market data."[23] However, as discussed above, Ms. Bulkley's approach relies significantly on the personal opinions of equity analysts in both her CAPM and DCF analysis instead of the supply and demand of stocks and bonds as indicated by market data. Calculating the cost of equity should be an interpretive approach (i.e., using market data to measure investors' expectations as Ms.

[23] Ms. Bulkley's Direct Testimony at 32:21-22.

Bulkley did in some parts of her testimony) rather than a speculative one (i.e., using interest rate forecasts instead of investors' expectations as revealed in the market yield).

Q. IS YOUR MARKET-BASED COST OF EQUITY RECOMMENDATION BASED ON YOUR OPINION OF FUTURE STOCK PRICE RETURNS?

A. No. I do not pretend to be able to predict the future. Capital markets are unpredictable and, as explained above, it is investors' expectations that matter since they are the ones providing the capital. Therefore, I provide an expert interpretation of investors' return expectations as indicated by the current market prices of stocks, bonds, and stock options, without attempting to predict future prices. This is an important topic that I will revisit throughout my testimony.

I do use Value Line and Zacks analyst forecasts to estimate the market-based cost of equity in my Discounted Cash Flow (DCF) analyses. However, I do not use them mechanically and I go to great lengths to distill the sustainable growth component to ensure it is in line with investors' long-term expectations, including using a DCF model that is based only on market data (stock option prices). My Capital Asset Pricing Model (CAPM) is based on a direct measurement of investors' expectations as indicated by market prices instead of analyst forecasts, which have proven to be unrealistic. McKinsey & Company found that analysts have been over optimistic for decades.[24]

Q. YOU STATED ABOVE THAT ROES AUTHORIZED IN OTHER PROCEEDINGS SHOULD NOT BE USED TO SET THE AUTHORIZED ROE IN THIS

[24] Marc Goedhart, Rishi Raj, & Abshishek Saxena, Equity Analysts: Still too bullish (April 1, 2010) at https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/equity-analysts-still-too-bullish. This is also discussed later in testimony at p. 96.

PROCEEDING. CAN YOU ELABORATE ON WHY PREVIOUS PROCEEDINGS' ROES ARE NOT AN APPROPRIATE GAUGE FOR TAWC'S COE?

A. Past authorized ROEs are applied to rate base, which is nearly identical to book value. In other words, they are accounting returns. We are not trying to determine what investors expect the return on book value to be. We are trying to determine the return investors expect/require on the market price of stock.

As discussed in Appendix A, when the market to book ratio of water utility company is significantly above one, as it is now,[25] it indicates that their COE is lower than their authorized ROE.[26]

In his 1970 book *The Economics of Regulation: Principles and Institutions*, regulatory economist Alfred Kahn wrote on why the cost of equity is lower than authorized returns when market to book ratios are significantly above one, saying:[27]

> [T]he sharp appreciation in the prices of public utility stocks, to one and half and then two times their book value during this period, reflected ... a growing recognition that the companies in question were in fact being permitted to earn considerably more than their cost of capital. ... The source of the discrepancy between market and book value has been that commissions have been allowing r's [returns on equity] in excess of k [market cost of equity]; if instead they had set r equal to k, or proceeded at some point to do so ... the discrepancy between market and book value ... would have disappeared, or would never have arisen.

A utility company's COE should not be based on authorized ROEs, which are accounting returns. The COE is set based on what investors in the market expect for a

[25] See Exhibit ALR-3, page 1. The market to book ratios of the companies in my proxy group averaged 2.34 over the year ending August 31, 2024.

[26] An authorized ROE is applied to rate base, which is nearly identical to the return on the book value of equity; therefore, authorized ROEs are nearly identical to return on book equity.

[27] Alfred Kahn, *The Economics of Regulation: Principles and Institutions*, Mass. Inst. Tech. at 48 (fn. 69), 50 (1970).

given risk profile. In the case of a utility stock, an increasing market value results in a lower return on market for the same expected return on book, all else equal.

IV. COST OF EQUITY IN TODAY'S FINANCIAL MARKETS

Q. WHY DO YOU CONSIDER CAPITAL MARKETS IN GENERAL?

A. My COE models are designed to reflect capital market conditions. However, it is important to "cross-check" the model results because capital markets are complicated. I consider capital market data in general like a ship captain might use visual landmarks, by comparing them with electronic navigation aids like GPS, and cross-referencing with nautical charts to confirm their position. This process of cross-checking helps to identify and correct any discrepancies or errors in any single source.

Q. PLEASE SUMMARIZE YOUR CONCLUSIONS REGARDING CURRENT CAPITAL MARKET CONDITIONS.

A. The capital market data I discuss below, indicate that an authorized ROE of 8.28% for a regulated utility like TAWC is sufficient for TAWC to be able to raise capital from investors.

As discussed in detail below, interest rates increased between the end of 2021 and remain at levels not seen since the end of 2007. However, long-term interest rates have declined significantly since peaking in October 2023. The yield on the 30-year U.S. Treasury bond has declined from just over 5% to just over 4% between October 2023 and August 2024. The yield on the 30-year U.S. Treasury bond has continued its decline

September, falling under 4% on numerous trading days.[28] Capital market data indicates that the cost of equity for water utility companies remains below that of the overall market.

There are many cross currents in today's capital markets. However, I would like to emphasize that since the end of 2022 there has been a downward trend in the cost of equity of both the overall market and water utility stocks, specifically. My conclusion that a 8.28% ROE is sufficient for TAWC to be able to raise capital is based primarily on the interplay between the following four capital market factors: (A) inflation and interest rates, B) the relative risk/cost of equity for water utility companies (including TAWC), (C) the cost of equity for the overall market, and (D) investors' volatility expectations. I will discuss each of these components in detail below. First, however, I will provide a summary of the individual issues.

Q. PLEASE SUMMARIZE WHY THESE FOUR CAPITAL MARKET FACTORS SUPPORT YOUR 8.28% ROE RECOMMENDATION FOR TAWC.

A. I elaborate on each of the points in the following sections. However, the following summary of each of these market factors or developments shows how they impact the COE:

A. Inflation and Interest Rates. It is reasonable to ask how interest rates are impacting the cost of equity. All else equal, higher interest rates mean a higher cost of equity. However, as discussed below, all else is not equal and we must look beyond inflation and interest rates. The Federal Reserve (the Fed) has increased short-term interest rates (the Federal Funds Rate) from near 0% to a range of 5.25% - 5.50% as of August 31, 2024, to fight

[28] U.S. Department of the Treasury.

inflation.[29] Long-term interest rates have increased as well. However, inflation has been easing and the Fed Chair Jerome Power stated on August 2024 that inflation has declined significantly and "[t]he time has come for policy to adjust."[30] As shown on Chart 2 on page 31, investors expect the Federal Reserve to start lowering the Federal Funds Rate next year. Long-term interest rates have decreased since October 31, 2023, as well, with the yield on the 30-year U.S. Treasury bond decreasing from about 5.04% to about 4.2% as of August 31, 2024. Chart 2 shows that as of July 9, 2024, investors expected the Fed to reduce the Federal Funds Rate to about 3.65% by mid-March 2027. As of August 2024, investors expected the Fed to reduce this rate to about 3.2%. As shown on Chart 3 on page 33, investors expect inflation to decrease sharply over the next few years. These recent changes in inflation and interest rate expectations is likely putting more downward pressure on TAWC's cost of equity, as water utility stocks have started to significantly outperform the overall market in the middle of July 2024.

B. Relative risk/cost of equity of water utility stocks. As shown in Chart 13 on page 47, despite relatively high volatility expectations for the companies in the RFC Water Proxy Group, investors' expectations regarding the chance of a large drop in utility stock prices, or investors' perceived downside risk, remain significantly below those for the overall market, which indicates that

[29] Federal Reserve Bank of New York, Effective Federal Funds Rate at https://www.newyorkfed.org/markets/reference-rates/effr..

[30] BARRON'S, Full Text: Jerome Powell's Jackson Hole Speech 2024 (last updated at August 23, 2024) at https://www.barrons.com/livecoverage/jackson-hole-fed-meeting-powell-speech/card/full-text-jerome-powell-s-jackson-hole-speech-2024-9gnZ5cQOxKDr9KwygGdw

the relative cost of equity for water utility companies remains below the overall market.[31] The volatility expectations for the companies in the RFC Water Proxy Group have not declined as much as the overall market over the past year and remain higher than for the overall market.[32] However, since the middle of August, the volatility expectations of the companies in the RFC Water Proxy Group have declined sharply. Additionally, the beta coefficients[33] of water utility stocks remain somewhat elevated, also indicating that the cost of equity for water utility stocks has become closer when compared to the overall market.

C. Cost of equity for the overall market. Global stock markets have been increasing in recent years, with the S&P 500 rising over 45% since the end of 2022.[34] An Economist article published in July reported that "[a]ll around the world, stock markets have been rising at a breakneck pace" and "[v]aluations, or the multiples by which underlying earnings are scaled up to generate share prices, have risen from expensive to alarming."[35] Stock prices have increased at a faster clip than earnings, leading to higher price-to-earnings ratios (as shown on Chart 7 on page 37). In other words, investors have been willing

[31] Option-implied skewness represents investors' expectations regarding the asymmetry of the probability distribution for stock price movements. Option-implied skewness is further discussed in Section IV. D. Investor-Perceived Downside Risk (Option-Implied Skewness).

[32] As discussed more below, volatility, uncertainty and risk are synonymous. Higher volatility expectations mean higher uncertainty regarding future stock prices, higher risk and generally, all else equal, a higher cost of equity.

[33] As discussed in Section F. Capital Asset Pricing Model on page 61, a beta coefficient measures the type of risk that most impacts a firm's cost of equity, i.e., systematic risk. As also equal, the higher the beta the higher the cost of equity.

[34] S&P 500 was 3,839.5 on the last trading day of 2022 and $5,648.40 on the last trading day of August,2024. (5,648.40-3,839)/3839.5 = 47.51%.

[35] "Stocks are on an astonishing run. Yet threats lurk", *The Economist* (published July 16, 2024), https://www.economist.com/finance-and-economics/2024/07/16/stocks-are-on-an-astonishing-run-yet-threats-lurk

to pay a higher premium for earnings. This rise in price-to-earnings ratios (among other market data) indicates that the cost of equity for the overall market (e.g. S&P 500) has been declining over the last two years and is at historical lows. J.P. Morgan's 3Q 2024 Guide to the Markets reported that the forward price-to-earnings ratio of the S&P 500 is significantly higher today[36] (21.2) than over the 20-year average (15.7). The utility section, according to J.P. Morgan, has as higher than average price-to-earnings ratio, 17.9 currently compared to a 20-year average of only 15.7.[37]

D. Stock price volatility. As shown on Chart 11 on page 44, investors' volatility expectations for the overall market decreased considerably between October 2022 and December 2023, nearing historical lows in June 2023. Despite a spike in late September and early October 2023, market volatility expectations remain significantly lower than the highs of October 2022. Like high price-to-earnings ratios, the relatively low market volatility expectations of investors indicate a lower cost of equity. However, as discussed above, the volatility expectations for the companies in the RFC Water Proxy Group have declined in recent weeks but as of August 31, 2024, have not yet declined as much as the overall market over the past years.

[36] As of August 31, 2024.
[37] J.P. Morgan Asset Management, U.S. 3Q 2024 Guide to The Markets, As of August 31, 2024, page 15.

A. Inflation and Interest Rates

Q. PLEASE DISCUSS THE CURRENT INFLATION AND INTEREST RATE ENVIRONMENT AND WHAT IT INDICATES REGARDING THE COST OF EQUITY.

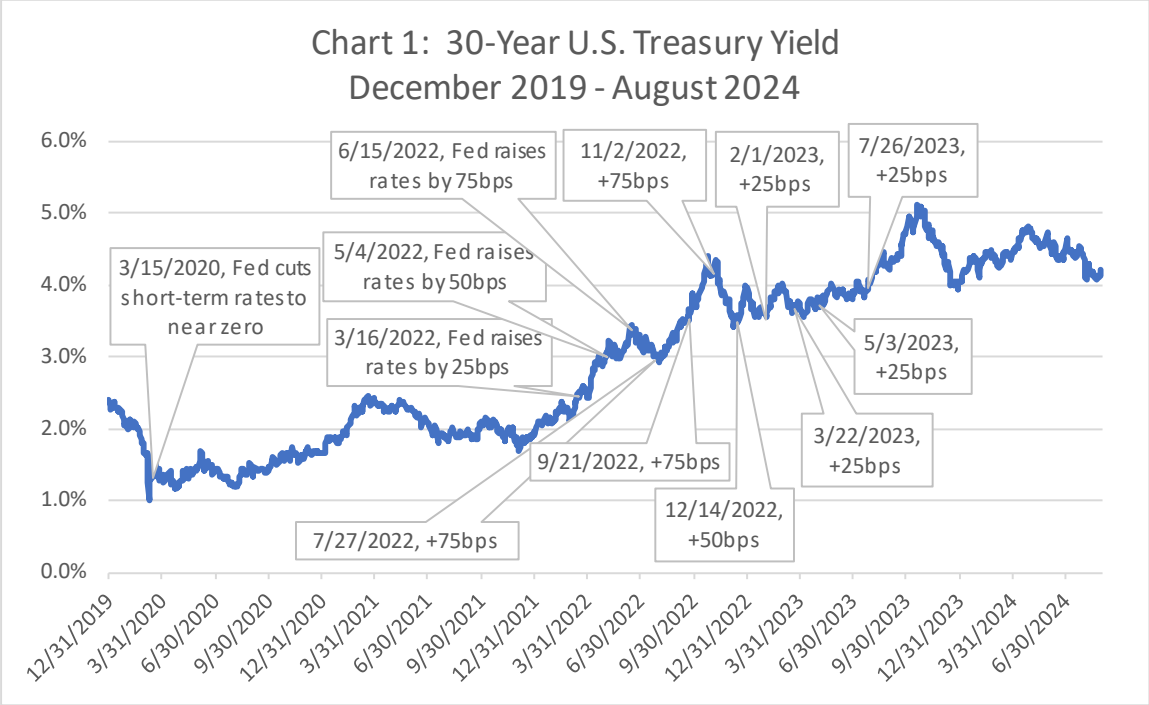
A. Starting in March 2022, the Fed has increased the benchmark federal-funds rate by a cumulative 5 percentage points (i.e., 500 basis points) to a 22-year high. As of August 31, 2024, the benchmark rate is 5.25% to 5.50%. After the Federal Reserve's last meeting in March 2024, Fed Chairman Jerome Powell stated that "Inflation has eased substantially while the labor market has remained strong, and that is very good news."[38] More good news has come in since that statement made by Chairman Powell. As discussed above, he stated that a rate cut could be on the table in the next Fed meeting. As shown in Chart 2 on page 31, market data as of August 31 2024 shows that investors expect the Fed to cut the Federal Funds rate over the next couple years. Since Chairman Powell made these comments, market data indicates that investors have revised their expectations regarding the Federal Funds rate's downward trajectory.

Q. PLEASE EXPLAIN THE IMPORTANCE OF, AND THE RELATIONSHIP BETWEEN, THE FEDERAL FUNDS RATE AND THE COST OF EQUITY.

A. The Federal Funds rate is important because it can impact the cost of long-term borrowing and the cost of equity. As shown in Chart 1 on page 29, the yield on the 30-year U.S. Treasury bond has increased along with the Federal Funds rate, increasing from 2% at the

[38] Wall Street Journal Pro – Central Banking, Transcript: Fed Chief Jerome Powell's Post Meeting Press Conferencer (January 31, 2024) at https://www.wsj.com/articles/transcript-fed-chief-powells-postmeeting-press-conference-29ce7b9f.

start of 2022 to 4.20% as of August 30, 2024. The cost of equity has increased along with the Federal Funds Rate and the yield on Treasury Bonds initially, but not one for one. However, the cost of equity for water utility stocks has been mostly trending down since reaching highs at the end of 2022. Additionally, the market-based COE for water utility stocks is below authorized ROEs because the market-to-book ratios of these stocks is above one.



Q. WHAT IMPACT CAN HIGHER INFLATION HAVE ON THE COST OF EQUITY?

A. Higher inflation can impact the cost of equity because it can impact interest rates. Higher interest rates, all else equal, generally indicate a higher cost of equity for water utility companies because fixed income investments become relatively more attractive when they start paying a higher rate (e.g., a bond with an interest rate of 3% is more attractive to investors, all else equal, than when they are paying a 2% rate). However, as discussed

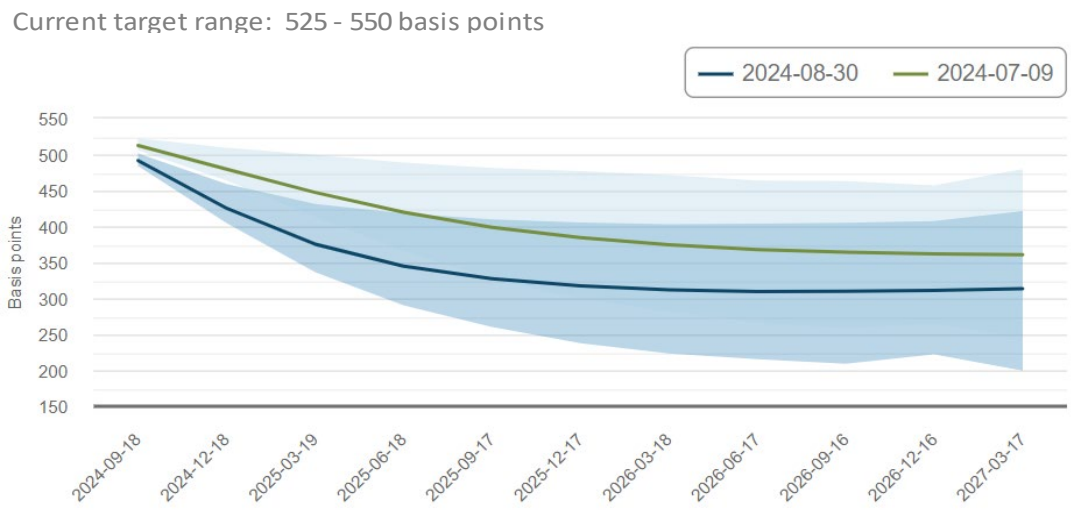
above, the cost of equity for utility companies has likely been decreasing because the cost of equity for the overall market has been declining. Additionally, the TPUC can be confident that the 8.28% ROE recommendation is sufficient because it is higher than my calculations that reflect interest rate changes. My calculations reflect interest rate changes because they are based on market data, including the changing market yields on government bonds.

Q. WHAT DOES MARKET DATA INDICATE REGARDING INVESTORS' CURRENT INFLATION AND INTEREST RATE EXPECTATIONS?

A. As shown in Chart 2 on page 31, the Federal Reserve Bank of Atlanta estimated that as of August 31, 2024, investors expect the three-month average Federal Funds rate[39] will most likely decrease from its current range of 5.25%-5.50% to an expected value of about 3.2% in 2027. The same chart shows that about two months prior (July 9, 2024), investors expected the Federal Funds rate would decrease to be about 3.65% in 2027.

[39] The Federal Funds rate guides overnight lending among U.S. banks, but this short-term rate impacts the interest rates on debt with longer maturities.

Chart 2: Investors' Federal Funds Rate Expectations
Three-Month Average SOFR Path as of Aug. 31, 2024



Source: Federal Reserve Bank of Atlanta (latest available date compared to oldest available date)

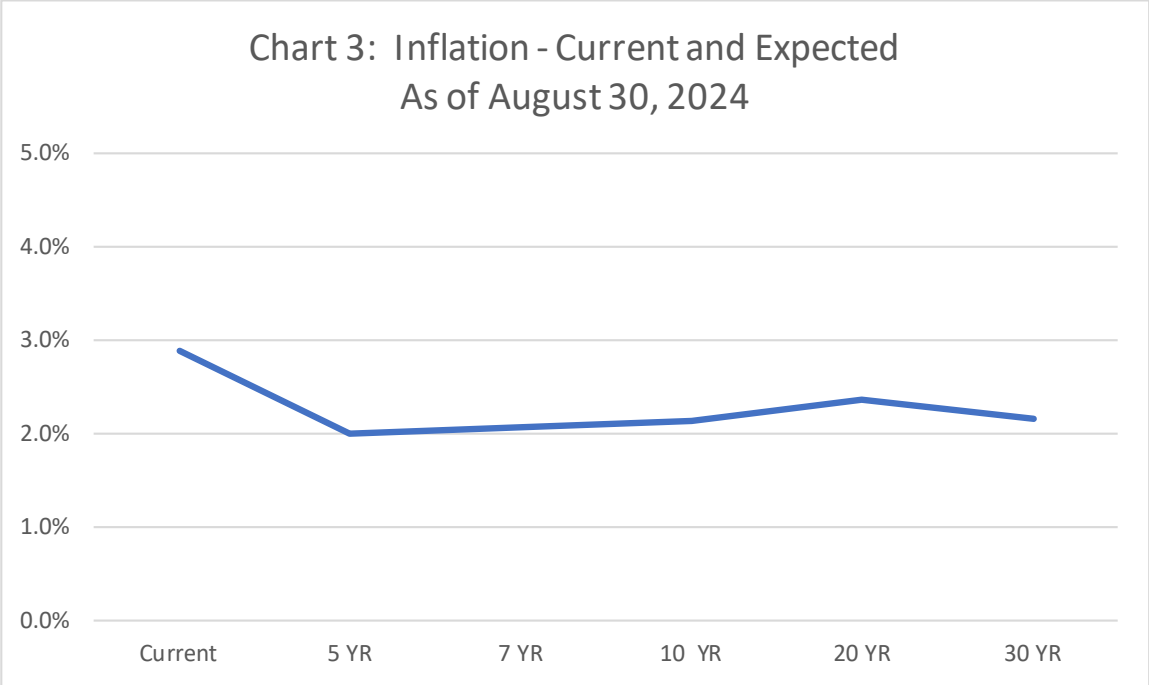
I use the Federal Reserve Bank of Atlanta's market-implied probabilities because it is based on investors' expectations as indicated by option prices, future prices, and swap spreads. As discussed considerably above, market-based expectations like those provided by the Federal Reserve Bank are more appropriate to consider when calculating the cost of equity than economist/analyst projections for many reasons, primarily because market data like that used by the Federal Reserve Bank provides a direct observation of investor expectations.

Q. YOU STATED THAT THE FEDERAL RESERVE BANK OF ATLANTA USES MARKET DATA TO CALCULATE INVESTORS' EXPECTATIONS REGARDING THE FEDERAL FUNDS RATE. IS THERE A WAY TO MEASURE INVESTORS' INFLATION AND LONG-TERM INTEREST RATE EXPECTATIONS AS WELL?

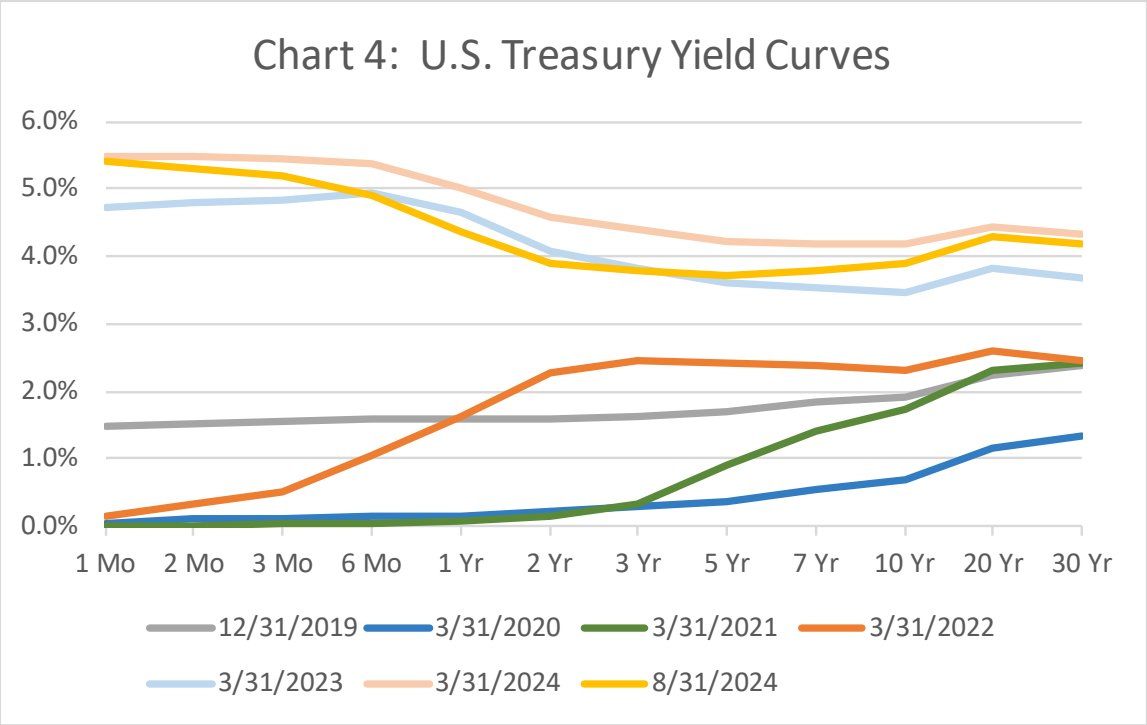
A. Yes. Regarding inflation, it is possible to measure investors' expectations directly simply by subtracting the interest rate of nominal Treasuries and TIPS (Treasury Inflation - Protected Securities) of comparable maturities. This difference is referred to as the "breakeven inflation rate" because it represents what inflation would have to be for an investor to "break even" or make the same return on both nominal Treasuries and TIPS.[40]

As indicated by the difference between nominal-treasuries and TIPS, Investors expect the Fed's actions will reduce the inflation rate substantially in the coming years. As shown on Chart 3 on page 33, the relative market price of inflation-protected bonds as compared to regular Treasury bonds as of August 31, 2024, indicates that investors expected the inflation rate to decline from the current 2.89% to only 2.01% over the next 5 years and to about 2.16% over the 30-year horizon.

[40] For example, if the yield on a nominal 10-year Treasury is 2.5% and TIPS of the same duration are 1.5%, an investor would make the same real return on both bonds if the inflation rate is 1% over the next 10 years. (Nominal yield – real yield = breakeven inflation rate) In this case, investors' breakeven inflation rate is 1% (2.5% - 1.5% = 1%). It makes sense that investors' inflation expectation is equal to the breakeven inflation rate because if investors, on average, believed that inflation was going to be 10%, in the example above, they would buy TIPS and expect to make exceptional profits. The investor who purchases TIPS would earn 1.5% + 10% inflation = 11.5%. The investor who purchased the nominal Treasury would lose 7.5% (2.5% yield — 10% inflation rate). With such large relative returns to be made buying TIPS in this hypothetical example, investors would bid up the price of TIPS and drive down the yield until investors expect the same real return on nominal Treasuries and TIPS. And in this way, the relationship between the market yields on TIPS vs. nominal Treasury bonds is a self-balancing safe measurement of investors' expectation of inflation.



Regarding interest rates, it is possible to use the yield curve to calculate investors' expectations regarding future interest rates. An upward sloping yield curve indicates investors expect higher interest rates and a downward sloping yield curve indicates investors expect lower interest rates in the future. As shown in Chart 4 above, the yield curve went from being significantly upward sloping on March 31, 2021, to mostly downward sloping as of August 31, 2024. This indicates that investors expect that short-term interest rates will decline in the future along with the Federl Funds Rate. This makes sense because if investors expected short-term interest rates to remain the same there would be no reason to purchase long-term bonds and earn a lower interest rate.



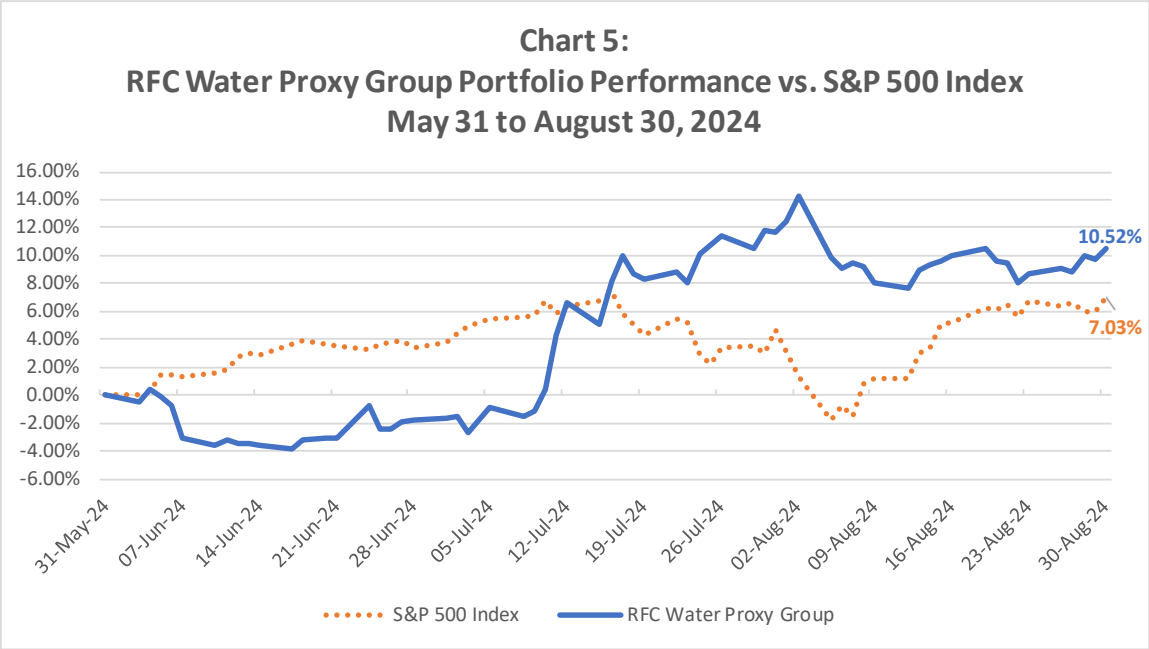
B. The cost of equity for the overall market

Q. WHAT, IF ANYTHING, DOES STOCK MARKET DATA INDICATE WITH REGARD TO THE COST OF EQUITY?

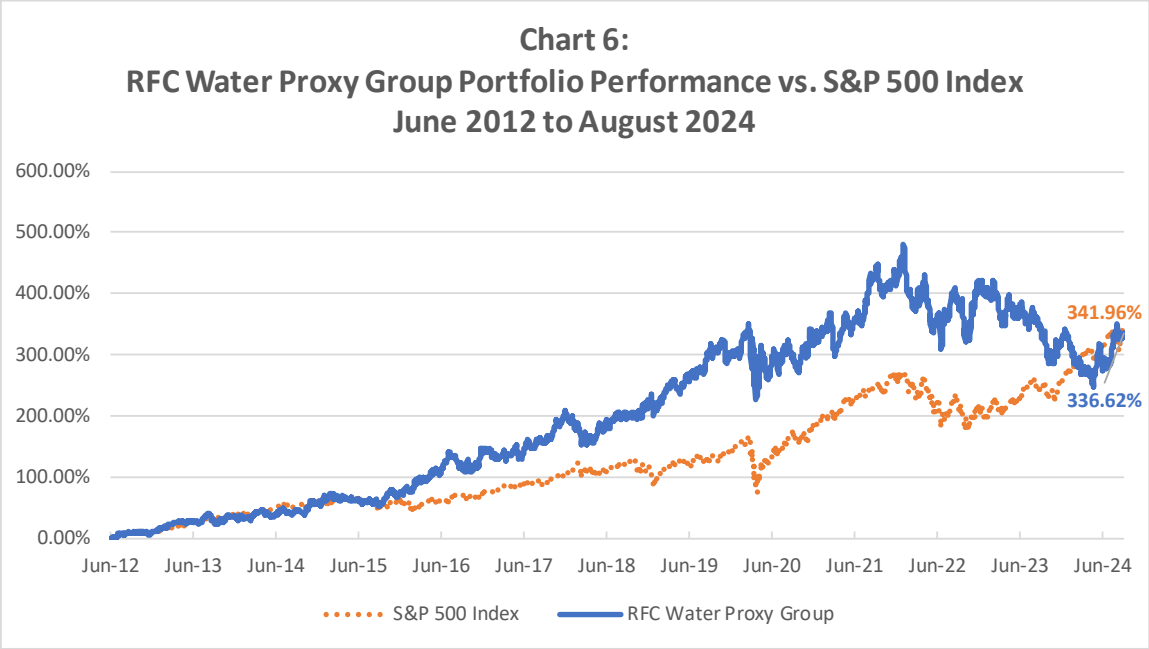
A. As discussed above, increasing stock prices have in recent years led to higher price-to-earnings ratios. All else equal, higher price-to-earnings ratios indicate that the cost of equity may be decreasing.[41] As show in Chart 5 on page 35, stock prices for the S&P 500 have increased in recent months, up 7.03% between May 31, 2024 and August 30, 2024. On the other hand, the water utility stocks in the RFC Proxy Group were up 10.52% over the same time period. The recent overperformance of water utility stocks may or may not continue, but it indicates that investors are starting to favor these stocks relative to the

[41] When investors pay a higher price today for the same earnings, the immediate yield or return on investment (ROI) is lower. Using our real estate investment analogy, if you spend more on an apartment, the rental income is a smaller return relative to your investment.

overall market as the FED starts to reduce the Federal Funds rate and their relative cost of equity is likely decreasing as well.



As shown in Chart 6, below, since TAWC's last rate case in 2012, water utility stocks have increased just about the same as the overall market, up about 342% compared to S&P 500's increase of about 336%.

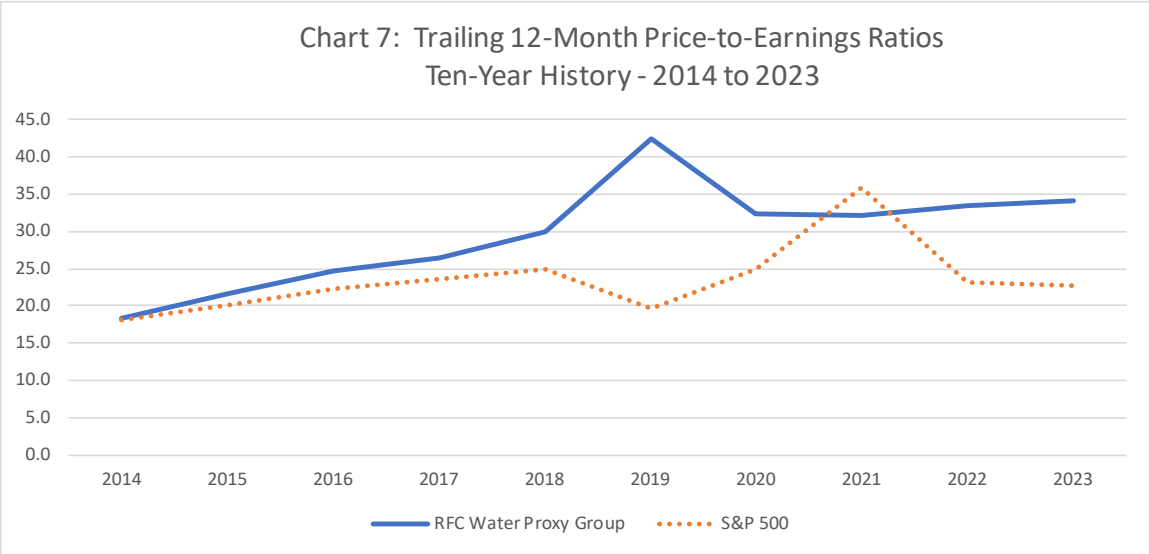


Regarding the underperformance of water utility stocks over the past one, three- and five-year periods, Value Line reported that "the stocks [of water utilities] had just become too expensive and began trading at price-to-earnings ratios that weren't appropriate for the industry's estimated earnings growth."[42]

Value line referred to price-to-earnings ratios because stock prices on their own cannot tell us how the cost of equity has changed. As discussed above, all else equal, price-to-earnings ratio and the cost of equity are inversely related – a higher price-to-earnings ratio indicates a lower cost of equity and a lower price-to-earnings ratio indicates a higher cost of equity.

The price-to-earnings ratio of the S&P 500 has increased from about 18.1 in 2014 to 22.82 in 2023 As shown in Chart 7 on page 37. Over the same time period the price-to-earnings ratio of the Proxy Group increased from 18.4 to 34.1. The ten-year (2014-2023) average of the S&P's price-to-earnings ratio is about 23.53. As investors are willing to pay more (higher price-to-earnings ratio) for the same earnings, this indicates that the cost of equity is decreasing. The price-to-earnings ratio indicates that equity costs for the overall market have been declining in recent years. Chart 7 also shows that the price-to-earnings ratio for water utility stocks has increased even more than for the S&P 500, which indicates that the cost of equiy for water utility stocks may have declined relative to the overall market over this time period.

[42] Value Line Water Utility Industry Report, July 5, 2024.



Q. DOES ADDITIONAL EVIDENCE INDICATE THAT THE COST OF EQUITY IS RELATIVELY LOW BY HISTORICAL STANDARDS?

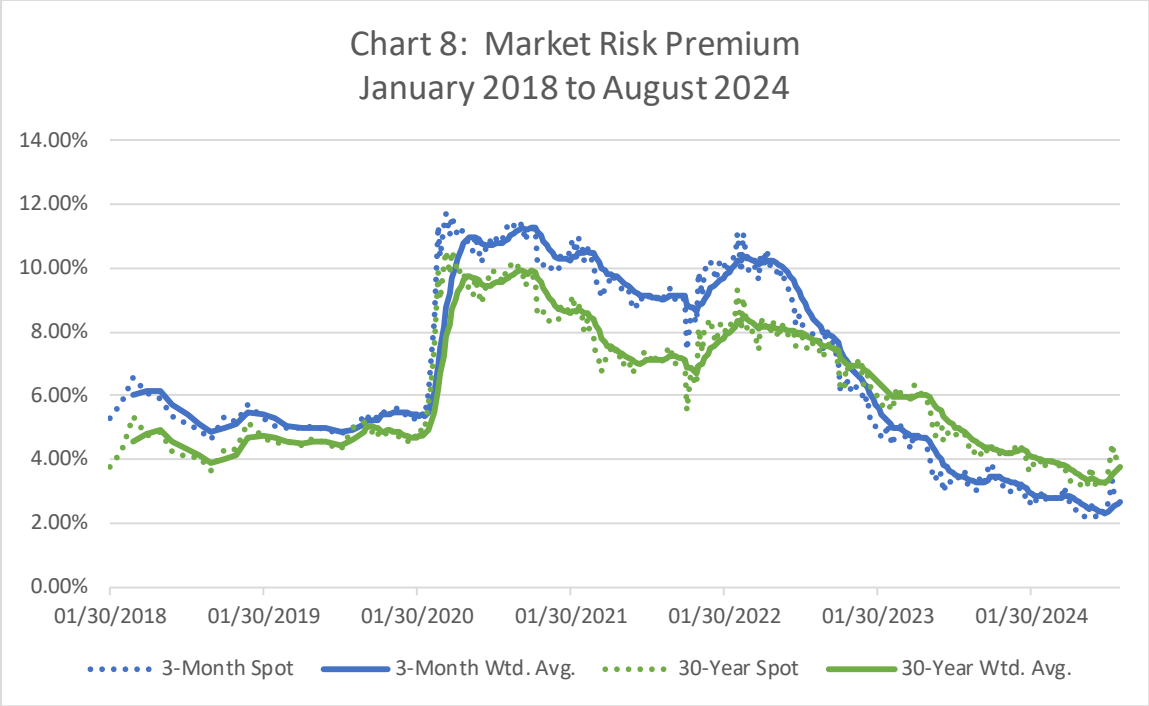
A. Yes. I discussed that increasing stock price and price-to-earning ratios show that the cost of equity for the overall market and for water utility stocks indicates that the cost of equity has been trending down and is likely low by historical standards. Another common way to think about the cost of equity is the following:

COE = risk free interest rate + market risk premium

As the equation above indicates, investors require a premium (i.e., higher return on investment) to invest in equity over debt. This makes sense because investors face more risk when they buy equity than when they buy debt. Debt holders are paid first. We often refer to this premium as the equity risk premium or market risk premium ("MRP"). Leading scholars on the topic have determined that investors generally demand an MRP of 4.0% on average. However, MRP for utilities is not always 4%; it can be higher or lower depending on current market conditions.

Q. HOW HAS THE MRP CHANGED OVER TIME?

A. As shown on Chart 8 below, the market risk premium mostly declined since peaking in 2020 and as the COVID-19 pandemic spread around the world in 2020. The market risk premium over the 3-month U.S. Treasury bill exceeded 10% for portions of February 2022 and declined to just over 3% by November 2023. The market risk premium over the 30-year U.S. Treasury bond was about 8% in February 2022, declining to just over 4% by January 2023 and is 3.77% as of Augst 27, 2024. These calculations are discussed in more detail in the portion of my testimony regarding my CAPM analysis.



C. Volatility Expectations

Q. PLEASE DISCUSS CURRENT STOCK PRICE VOLATILITY EXPECTATIONS AND WHAT THEY INDICATE REGARDING THE COST OF EQUITY.

A. Volatility, uncertainty, and risk are synonymous. There are two primary types of volatility: "realized volatility" and "implied volatility." The former is based on historical returns,

which may or may not represent future volatility. On the other hand, implied volatility is calculated from options data, which indicates investors' future expectations for volatility. As discussed below, the "term structure" of volatility indicates investors' volatility expectations over different forward-looking time periods (i.e., 1 month, 1 year, etc.).

Q. WHAT IS A STOCK OPTION, AND HOW DOES IT IMPLY VOLATILITY?

A. A stock option is the right to buy or sell a stock at a specific price for a specified amount of time. A call option is the right to buy a stock at a specified exercise or strike price on or before a maturity date. A put option is the right to sell a stock at a specified exercise or strike price on or before a maturity date. For example, a call option to purchase 100 shares of Apple Computer stock for $230 on January 17, 2020, allows the owner the option (not the obligation) to buy Apple stock for $230 on that date. At the end of July 2019, Apple stock was trading at about $215 per share. Why would anyone pay for the right to buy a stock higher than the current price? Investors who purchased those call options thought there was a chance Apple stock would be trading higher than $230 on January 17, 2020, and those options gave those investors the right to buy Apple stock for $230 and profit by selling it at the market price on that date, if it was higher. The price of Apple's stock was $317.98 at the close of trading on January 17, 2020. Therefore, the investor who purchased this call option for $635 on July 31, 2019, earned a profit of $8,163[43] at expiry on January 17, 2020. On the other hand, the investor who purchased an Apple put option with the same expiration date and strike price on July 31, 2019, would have lost the price of the

[43] $8,163 profit from exercising call option ($31,798 from selling at $317.98 market price - $23,000 cost to purchase at $230) - $635 ($6.35 X 100) option purchase price. Note: Each call option is the right to purchase 100 shares.

option ($2,248) and gained nothing on the expiration date because the right to sell Apple stock for $230 when the price is over $300 is worthless.

Options can be used to assess future expectations for volatility because they track the type of variation in market price that investors bet will occur within the time frame during which an option can be exercised based on what type of option is purchased and what the difference is between the market price of stock and the option price, or the price that the option bets the stock will reach. As the distance between the market price and option price grows, more volatility is implied in the value of the stock over time. I used this option data to create an "implied volatility" value.

Q. PLEASE EXPLAIN THE TERM "STRUCTURE OF VOLATILITY."

A. Investors can expect volatility to increase or decrease over time. In general (i.e., in "normal" financial markets), investors expect higher volatility for longer time horizons. For example, investors generally expect that the chance stock prices will increase or decrease by 10% in 1 year to be greater than the chance of a 10% (annualized) move over the next 30 days. This makes sense because there is more uncertainty regarding economic and stock market changes the further in the future you look out.

However, during the height of a crisis, when volatility generally tends to rise in the short-term, investors often expect volatility to decrease in coming months or years. In other words, investors expect the current capital market hurricane to pass and the winds to die down. During the peak of implied volatility in mid-March 2020, shortly after the World Health Organization declared COVID-19 a pandemic, the data indicated that investors expected stock price volatility to decrease over time. This implies that investors expected the riskiness of equity investments to decrease over time. As shown in Chart 9 on page 41,

before the COVID-19 outbreak, investors expected volatility to increase from less than 15% annually at the 1-month time frame to about 20% annually at the 24-month time frame. Investors' volatility expectations peaked in March 2020. At that time, investors expected stock price volatility would decrease from over 70% at the 1-month time frame to about 38% at the 24-month time frame. Chart 9 also shows that investors' volatility expectations were higher for all time frames when Russia invaded Ukraine as compared to 2021, but as of August 31, 2024 volatility expectations have dropped back to only slightly higher than 2019 levels over the full term structure of volatility.

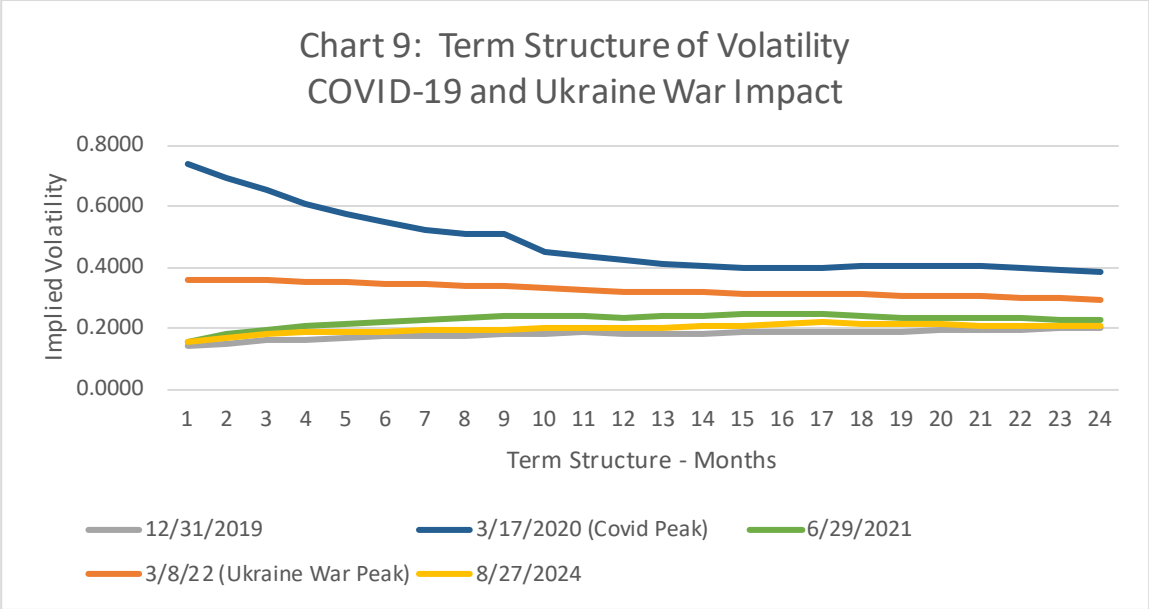
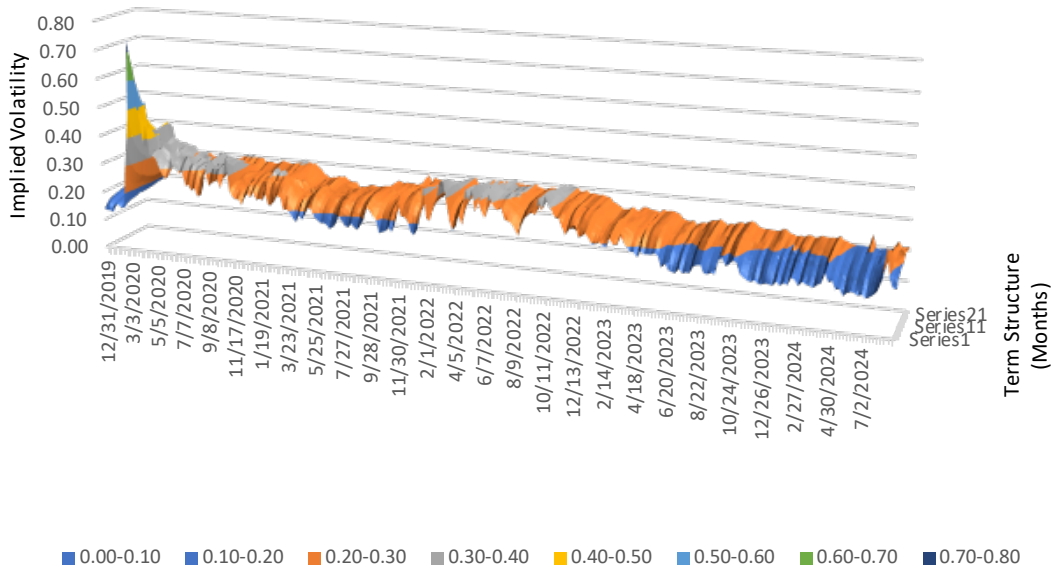


Chart 10 on page 42 provides a 3-dimensional surface[44] to show how the term structure of volatility has evolved since before the COVID-19 outbreak and how it has changed during and since the outbreak. As seen above in Chart 9 above, which shows five cross-sections of this data, during periods of low implied volatility – such as before the

[44] The X axis shows the implied volatility. The Y axis shows the data. The Z axis shows market expectation of future implied volatility of different time frames. Series1 = 1 month, Series11 = 11 months, and Series24 = 24 months.

COVID-19 outbreak and at present – the slope of volatility expectations over time gently curves upwards, indicating lesser expectations of volatility in the short-term and greater in the long term. In Chart 10, this is represented by the surface of the line curving up and away during times of low volatility, while appearing to move downwards along the z-axis during the period of high volatility in March-April 2020 during the initial outbreak of the pandemic. Implied volatility can be seen to peak for both 1-month and 24-month time frames in mid-March 2020, with less dramatic spikes in February through October of 2022. As of the end of August 2024, the term structure of volatility has returned to near pre-COVID levels.

Chart 10: VIX Volatility Term Structure Surface

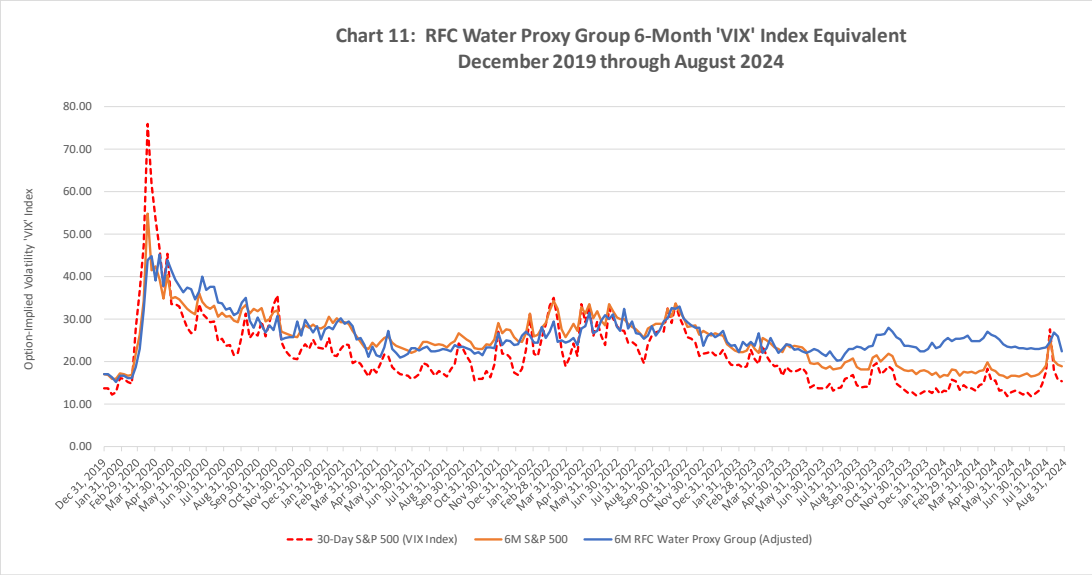


Q. HOW HAVE VOLATILITY EXPECTATIONS FOR WATER UTILITY COMPANIES COMPARED TO VOLATILITY EXPECTATIONS FOR THE S&P 500?

A. Chart 11 on page 44 shows investors' stock price volatility expectations for the overall market (S&P 500) increased significantly as COVID-19 infections spread to the U.S. and continued to grow exponentially around the world. The solid orange line shows volatility expectations over the next 6 months, while the dashed red line shows volatility expectations over the next 30 days. On December 31, 2019, investors expected an annualized change of 13.78% over the next 30 days. In mid-March 2020, investors' volatility expectations peaked at over 80%. As of the end of August 27, 2024, investors expected an annualized change of 15.43%, even below pre-Covid levels.

The solid blue line in Chart 11 shows that investors' adjusted[45] 6-month volatility expectations for my RFC Water Proxy Group, as indicated by their stock option prices, increased along with the market in mid-March 2020, but to a significantly lesser degree. Investors' 6-month adjusted volatility expectations for water utility companies were for the most part higher than for the S&P 500 from May through August 2020, remained very comparable through March 2020, and have increased above the expectations for the market since then through the end of August 2024. However, in recent weeks the volatility of water utility stocks have started to fall considerably.

[45] The implied volatility for individual stocks and small groups of stocks is almost always higher than the overall market because of the effects of diversification, even when the underlying stocks in the smaller portfolio are less risky, as is the case with water utility companies. As a result, Chart 11 adjusts the 6-month expected volatility for the RFC Water Proxy Group by the difference with the 6-month expected volatility for the S&P 500 Index on December 31, 2019 to facilitate the comparison throughout the chart.



As discussed above, changes in implied volatility do not paint the full cost of equity picture. We must consider implied covariance, or how much investors expect the volatility of returns for water utility companies to correlate with the overall market (e.g., S&P 500 Index).

D. Investor-Perceived Downside Risk (Option-Implied Skewness)

Q. YOU EXPLAINED EARLIER THAT WATER UTILITY STOCKS HAVE OVERPERFORMED THE OVERALL MARKET RECENTLY. WHAT DOES STOCK OPTION DATA SHOW REGARDING INVESTORS' CONCERN THAT WATER UTILITY STOCKS WILL HAVE A LARGE DROP COMPARED TO THAT OF THE OVERALL MARKET?

A. Stock option prices provide considerable information regarding investors' expectations. The most well-known measure of investors' expectations as measured by stock option prices is the VIX Index (or Volatility Index). The VIX Index is a measure of investors' volatility expectations and is referred to as the "fear index" because, all else equal, higher

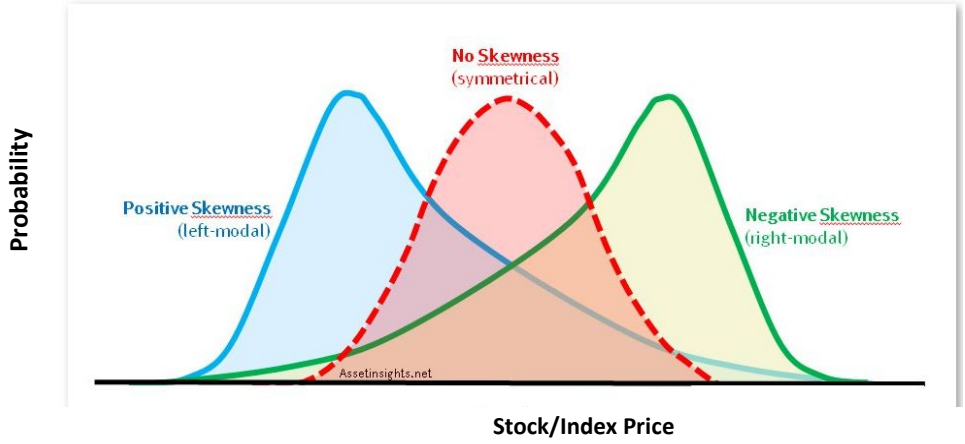
volatility expectations indicate higher uncertainty, risk, and scared investors.[46] However, volatility expectations are only one piece of a multi-dimensional puzzle that reveals the market-based cost of equity. After volatility expectations, the next dimension to explore (referred to as the "third moment" in statistics) is skewness. Option-Implied skewness reflects investors' expectations regarding the asymmetry of the probability distribution.

Option-implied probability distributions are almost always negatively skewed for stock market indices (e.g., S&P 500) and individual stocks, which means that investors almost always think there is a greater chance of a large decrease in stock prices than large increases. The Chicago Board of Options Exchange ("CBOE") also publishes an index based on option-implied skewness referred to as the SKEW Index.

As shown in Chart 12 on page 46, the probability distribution that is negatively skewed has a tail that is longer on the left. A probability distribution with positive skewness has a longer tail on the right. The right and left tails of a probability distribution with no skewness are symmetrical. If the option-implied skewness looked like the red probability distribution in Chart 12 on page 46, it would mean that investors believed there was an equal chance that stock prices would move up or down by a certain amount.

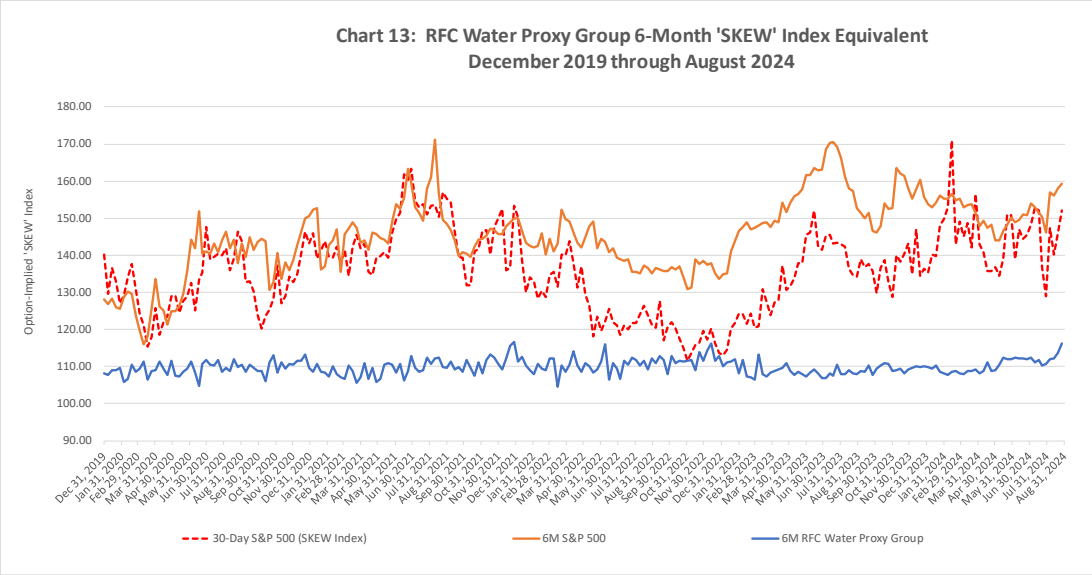
[46] Some investors like high volatility because it provides the opportunity to earn a lot of money quickly if the market moves in their favor. For example, an investor that shorts Microsoft, will make a lot of money if the stock drops by a large amount. However, investors who buy utility stocks generally prefer low volatility and low risk.

Chart 12: Probability Distributions with and without Skewness



Q. WHAT DOES THE SKEW INDEX REVEAL REGARDING THE IMPACT OF THE COVID PANDEMIC AND THE WAR IN UKRAINE ON TAWC'S COST OF EQUITY?

A. As shown in Chart 13 on page 47, comparing the SKEW Index to an equivalent metric based on water utility company stock options indicates that, as 2023 came to a close, investors expected the chance of water utility stocks suffering from a large drop in investment to be much lower than the chance that the overall market will experience a large drop. This indicates the cost of equity for water utility companies has likely remained lower relative to the overall market as interest rates have increased.



E. Recent Capital Market Developments

Q. YOUR DISCUSSION OF CAPITAL MARKETS FOCUSES ON MARKET DYNAMICS THROUGH AUGUST 31, 2024. DO ANY OF THE MORE RECENT MARKET DEVELOPMENTS, INCLUDING IN PARTICULAR THE PERFORMANCE OF WATER UTILITY STOCKS DURING THE FIRST WEEKS OF SEPTEMBER 2024, CHANGE YOUR VIEW OF THE EFFECT OF CAPITAL MARKETS ON THE COST OF EQUITY OF WATER UTILITIES?

A. Safe heaven investments like water utility stocks remain in favor as investors increasingly expect the Fed to start cutting the Fed Funds Rate soon which indicates a decreasing cost of equity for TAWC. In the first two weeks of September, the RFC Water Proxy Group is up about 3% while the price of the S&P 500 index is nearly identical to what is was at the end of August. A Wall Street Journal article published on September 12, 2024, stated the following

> [investors] are piling into corners of the market that are considered safety plays, after a roaring first half powered by big technology stocks.

Shares of real estate, utilities and consumer-staples companies are among the best performers to start September.[47]

V. COST OF EQUITY CALCULATION

A. Overview

Q. PLEASE PROVIDE AN OVERVIEW OF YOUR PERSPECTIVE REGARDING HOW CAPITAL MARKETS RELATE TO THE COE AND THE OVERALL COST OF CAPITAL.

A. The cost of capital is the return investors require to provide capital to TAWC based on current capital markets. To measure the cost of equity accurately, it is critical to use current market data because it increases that chance that the authorized ROE will match TAWC's market-based COE when it needs to raise equity capital.

As discussed above, my COE recommendation is my opinion of the return investors require to provide equity capital to TAWC based on current capital markets. My recommendation is consistent with the following legal standards set by the United States Supreme Court for a fair rate of return: "[t]he return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks"[48] and "sufficient to… support its credit and… raise the money necessary for the proper discharge of its public duties."[49]

[47] Investors Adopt Defensive Crouch Ahead of Fed Rate Cut, WSJ, September 12, 2024.
[48] *Fed. Power Comm'n v. Hope Nat. Gas Co.* v. Hope Nat. Gas Co., 320 U.S. 591, 603 (1944).
[49] *Bluefield Water Works & Improvement Co. v. Pub. Serv. Comm'n of the State of W. Va*, 262 U.S. 679, 692-693 (1923).

Because the cost of equity is not a published figure like a bond yield, some interpretation is required to determine the appropriate market price. My cost of equity recommendation is based on my computation of what the market indicates investors require (return on investment) to provide capital to companies with comparable risk to TAWC.

As explained below, I use current market prices (e.g., stocks, bonds, options), which measure investors' expectations directly, instead of relying solely on historical data and analyst forecasts.

A COE based on current market prices (market-based) is superior to a COE based on historical data (non-market-based) for two reasons:

1. The COE that TAWC has to pay investors is based on capital markets. Recent high inflation and increases in interest rates are not a secret and therefore market-based COE models will reflect investors' changing expectations.
2. Capital markets are unpredictable. Regarding capital markets' unpredictability, investment guru Warren Buffet recently gave the following advice to investors: "[t]hey should not listen to a lot of the jabbering about what the market is going to do tomorrow, or next week or next month because nobody knows."[50]

Current capital markets are our best source of investors' expectations regarding future capital markets. Current market prices of stocks and bonds reflect investors' forecasts for long-term interest rates and capital markets in general.

[50] PBS News Hour, Part 1 – America should stand for more than just wealth, says Warren Buffett (June 26, 2017,) at www.pbs.org/newshour/show/pbs-newshour-full-episode-june-26-2017.

Q. HOW DID YOU ARRIVE AT YOUR COE RECOMMENDATION?

A. To arrive at my recommendation, I applied the DCF, including a Constant Growth and a Non-Constant Growth method and a CAPM analysis to a group of similar companies ("RFC Water Proxy Group") using data available through August 31, 2024, as discussed below. In all of my models, I use both historical averages and the most recently available spot data for the inputs wherever it is possible and applicable.

Q. CONSIDERING THAT STOCK AND OPTION PRICES AND BOND YIELDS CHANGE DAILY, WOULD IT NOT BE BETTER TO USE HISTORICAL AVERAGES EXCLUSIVELY FOR THE INPUTS IN YOUR MODELS?

A. Not necessarily. Most people would agree that the use of spot market data, the value of a particular input on a particular day, can lead to COE results that can vary over short periods of time. It may therefore be tempting to find a more stable value based on historical averages that are not overly influenced by short-term fluctuations in capital markets. When doing a forward-looking analysis, however, it is equally important to look at the most recent market data as an indication of trends and where a given value is more likely to be in the future. This is a broad and generally accepted principle, as made clear in the following example.

As a simple example using historical stock prices to make the point clear, if Company A's stock price were to go up linearly over the course of one year from $50 to $100, its average stock price over that year would be $75. If Company B's stock price declined linearly from $100 to $50 over the same year, it would have the same exact average stock price of $75. But most people would agree that predicting both stock prices at $75 over the near future would be overly simplistic and leave readily accessible data

unused. Without relying on any additional data, at the very least, it would stand to reason that in the near future, Company A's stock price is more likely to be between $75 and $100 than Company B's stock price, and that Company B's stock price is more likely to be between $50 and $75 than Company A's stock price. These observations cannot be made by looking at the yearly averages alone and must take the most recent data into special consideration.

This does not eliminate concerns regarding the effect of daily fluctuations in market data, especially during periods of volatility. As a result, it is important to consider both averages and recent spot values when using market data for forward-looking analyses. That is precisely my approach when using market data that are expected to continue to fluctuate, such as stock prices, dividend yields, betas, and market risk premia.

Q. CAN A DIFFERENCE OF ONE DAY IN THE SELECTION OF SPOT DATA HAVE A SIGNIFICANT POSITIVE OR NEGATIVE EFFECT ON ROE RESULTS? IF SO, HOW DO YOU GO ABOUT CHOOSING WHICH DAY TO USE FOR MARKET-BASED SPOT DATA?

A. Daily fluctuations in stock prices, resulting dividend yields, betas, etc., all have an impact on resulting ROE calculations, especially when using recent spot values for market data. Such is the nature of market data, which change from day to day. This is rightfully noted as a potential risk of using spot data, but given the stated benefits of using recent spot data for forward-looking analyses, there are ways to address such potential pitfalls.

For this reason, it is very important to establish consistent methodologies that eliminate the possibility of personal bias, especially when using spot market data. I consistently use the last trading day of the month as the reference point for all market-based

spot data. Additionally, this day serves as the cutoff for calculating all historical market-data averages.

It is important to keep in mind that even averages fluctuate over time, and all responsible data analysts must find a consistent and reproducible way to "freeze time" to work with such fluctuations while eliminating bias.

It is also important to point out once again that I use recent spot market data to establish one benchmark for market-based inputs, which are balanced by the use of historical averages, as stated previously.

B. Proxy Group Selection

Q. WHAT PROXY GROUPS DID YOU USE TO CALCULATE TAWC'S COE?

A. My comparable proxy group, shown on Table 6 below and referred as the RFC Water Proxy Group, consists of the following 6 publicly traded water utility companies covered by Value Line:

TABLE 6: RFC WATER PROXY GROUP COMPOSITION

	Company Name	Ticker
1	AMER. STATES WATER	AWR
2	AMERICAN WATER	AWK
3	ESSENTIAL UTIL.	WTRG
4	CALIFORNIA WATER	CWT
5	MIDDLESEX WATER	MSEX
6	SJW GROUP	SJW

I chose this proxy group because I believe it contains companies that are comparable in risk to TAWC.

C. Discounted Cash Flow

Q. PLEASE SUMMARIZE THE RESULTS OF YOUR DCF MODELS.

A. I used both the constant growth form of the DCF method, which determines growth based on the sustainable retention growth procedure, and a non-constant growth DCF method. The results of my constant growth DCF model range between 7.65% and 7.69% when using a sustainable growth rate and between 8.03% and 8.38% when using an option-implied growth rate.[51] The results of my non-constant growth DCF method indicate a COE of between 5.89% and 6.03% for the RFC Water Proxy Group.[52]

Q. WHAT IS THE DISCOUNTED CASH FLOW METHOD?

A. The DCF method is an approach to determine the COE. The method recognizes that investors purchase common stock to receive future cash payments. These payments come from: (a) current and future dividends, and (b) proceeds from selling stock. A rational investor will buy stock to receive dividends and ultimately to sell the stock to another investor at a gain. The price the new owner is willing to pay for stock is related to that buyer's expectation of future flow of dividends and the future expected selling price. The value of the stock is the discounted value of all future dividends until the stock is sold plus the value of proceeds from the sale of the stock.

[51] Exhibit ALR-3, page 1.
[52] Exhibit ALR-3, page 3 and Exhibit ALR-3, page 4.

D. Constant Growth Form of the DCF Model

Q. YOU STATE YOU USED THE CONSTANT GROWTH FORM OF THE DCF MODEL. WHAT IS THE CONSTANT GROWTH FORM OF THE DCF MODEL?

A. The constant growth form of the DCF model is a form of the DCF method that can be used in determining the COE when investors can reasonably expect that the growth of retained earnings and dividends will be constant.

Retained earnings are funds that a company keeps in its treasury, so that they are available for future needs, such aa capital expenditures, debt payments, and new investments. These retained earnings show investors whether the company is growing, which, in turn, is a measure of the future indicator of dividends and the value of a company's stock.

Q. DESCRIBE HOW THE CONSTANT GROWTH MODEL WORKS.

A. The constant growth model is described by this equation k= D/P + g, where: [53]

k= cost of equity (COE);
D=Dividend; and
P=Market price of stock at time of the analysis

and where:

g=the growth rate, where g= br + sv;
b=the earnings retention rate;
r=return on common equity investment (referred to below as "book equity");
v=the fraction of funds raised by the sale of stock that increases the book value of the existing shareholders' common equity; and
s=the rate of continuous new stock financing

The constant growth model is therefore correctly recognized to be:

[53] MYRON J GORDON, *Cost of Capital to a Public Utility*, p. 32-33 (MSU Public Utility Studies 1974).

k=D/P + (br +sv)

The COE demanded by investors is the sum of two factors. The first factor is the dividend yield. The second factor is growth (dividends and stock price). The logical relationship among these factors is as follows: the dividend yield is calculated based on current dividend payments while growth indicates what dividends and stock price will be in the future.

Q. WHAT OTHER FACTORS IMPACT HOW ONE USES THE CONSTANT GROWTH FORM OF THE DCF MODEL?

A. Sufficient care must be taken to be sure that the growth rate "g" is representative of the constant sustainable growth. To obtain an accurate constant growth DCF result, the mathematical relationship between earnings, dividends, book value and stock price must be respected.

The basic difference between the use of an analysts' earnings per share growth rate in the constant growth DCF formula and using the "br" (b (the earnings retention rate) X r (rate of return on common equity investment)) approach is that the "br" form, if properly applied, eliminates the mathematical error caused by an inconsistency between the expectations for earnings per share growth and dividends per share growth. Because it eliminates that error, the results of a properly applied "br" approach will be superior to the answer obtained from other approaches to the constant growth form of the DCF model. This is not to say that even a properly applied "br" approach will be perfect. The self-correcting nature of a properly applied "br" to forecasted differences in earnings per share and dividends per share growth rates helps to mitigate the resultant error but should not be viewed as the perfect way to quantify the impact of expected non-constant growth rates.

Q. HOW HAVE YOU IMPLEMENTED THE CONSTANT GROWTH FORM OF THE DCF MODEL IN THIS CASE?

A. I have applied the constant growth form of the DCF model by staying true to the mathematically derived "k=D/P + (br + sv)" form of the DCF model. I have also taken care to fully allocate all future expected earnings to either future cash flow in the form of dividends ("D") or to retained earnings (the retention rate, "b"). This extra accuracy is obtained only when the retention rate "b" is derived from the values used for "D" and "r," rather than independently.

Q. PLEASE EXPLAIN HOW YOU OBTAINED THE VALUES YOU USED IN THE CONSTANT GROWTH FORM OF THE DCF METHOD.

A. The DCF model generally calls for the use of the dividend expected over the next year. A reasonable way to estimate next year's dividend rate is to increase the quarterly dividend rate by half of the current actual quarterly dividend rate. This is a good approximation of the rate that would be obtained if the full prior year's dividend were escalated by the entire growth rate.[54]

I obtained the stock price—"P"—used in my DCF analysis from the closing prices of the stocks on August 31, 2024. I also obtained an average stock price for the 12 months ending August 31, 2024 by averaging the high and low stock prices for the year.

[54] For example, assume a company paid a dividend of $0.50 in the first quarter a year ago, and has a dividend growth rate of 4 % per year. This dividend growth rate equals (1.04)^4-1=0.00985 % per quarter. Thus, the dividend is $0.5049 in the second quarter, $0.5099 in the third quarter, and $0.5149 in the fourth quarter. If that 4 % per annum growth continues into the following year, then the dividend would be $0.5199 in the 1st quarter, $0.5251 in the 2nd quarter, $0.5303 in the 3rd quarter, and $0.5355 in the 4th quarter. Thus, the total dividends for the following year equal $2.111 (0.5199 + 0.5251 + 0.5303 + 0.5355). I computed the dividend yield by taking the current quarter (the $0.5149 in the 4th quarter in this example) and multiplying it by 4 to get an annual rate of $2.06. I then escalated this $2.06 by half the 4 % growth rate, which means it is increased by 2 %. $2.06 x 1.02= $2.101, which is within one cent of the $2.111 obtained in the example.

I based the value of the future expected return on equity— "r" —on the average return on book equity expected by Value Line, adjusted in consideration of recent returns. I also made a computation that was based on a review of both the earned return on equity consistent with analysts' consensus earnings growth rate expectations and on the actual earned returns on equity. For a stable industry such as utility companies, investors will typically look at actual earned returns on equity as one meaningful input into what can be expected for future earned returns on book equity.[55]

This return on book equity expectation used in the DCF method to compute growth must *not* be confused with the COE. Since the stock prices for the comparative companies are substantially higher than their book value, the return investors expect to receive on their market price investment is considerably less than the anticipated return on book value. If the market price is low relative to book value, the COE will be higher than the future expected return on book equity, and if the market price is high, then the return on book equity will be less than the COE.

In addition to growing through the retention of earnings, utility companies also grow by selling new common stock. Selling new common stock increases a company's growth. I quantified this growth caused by the sale of new common stock by multiplying the amount that the actual market-to-book ratio exceeds 1.0, by the compound annual growth rate of stock that Value Line forecasts. The results of that computation are shown on line 4 of Exhibit ALR-3, page 1.

Pure financial theory prefers concentrating on the results from the most current price because investors cannot purchase stock at historical prices. There is a legitimate

[55] Exhibit ALR-3, page 1.

concern, however, about the potential distortion of using just a single price. I present DCF results based on the most recent stock pricing data (August 31, 2024) as well as the average of the high and low stock price over the past 12 months to obtain a range of reasonable values. The DCF result based on the average of the high and low stock price for the year ending August 31, 2024 is 7.65%. As shown in Exhibit ALR-3, page 1, the DCF result based on the stock price as of August 31, 2024 is 7.69%. Exhibit ALR-3, page 1, shows more of the specifics of how I implemented the constant growth form of the DCF model for the RFC Water Proxy Group.

Q. PLEASE EXPLAIN HOW YOU DETERMINED WHAT VALUE TO USE FOR "r" WHEN COMPUTING GROWTH IN YOUR CONSTANT GROWTH FORM OF THE DCF MODEL.

A. The inputs I considered are shown in Footnote [C] of Exhibit ALR-3, page 1. The value of "r" that is appropriate to use in the DCF formula is the value anticipated by investors to be maintained on average in the future. This Exhibit shows that the average future return on equity forecasted by Value Line for the RFC Water Proxy Group between 2024 and 2027-29 is 10.75%. The same footnote also shows that the future expected return on equity derived from the Zacks consensus forecast is 11.04%, and that the actual returns on equity earned by the RFC Water Proxy Group on average were 11.16% in 2021, 9.40% in 2022, and 9.13% in 2023. Based on the combination of the forecasted return on equity derived from the Zacks consensus, the recent historical actual earned returns, and Value Line's forecast, I made the DCF growth computation using a 10.20%[56] value of "r".

[56] I used 10.20% in consideration of historical returns, Zacks's projections, and Value Line projected returns for the RFC Water Proxy Group.

Q. WHAT COE IS INDICATED BY THE CONSTANT GROWTH FORM OF THE DCF METHOD THAT YOU RELY ON FOR YOUR RECOMMENDATION?

A. The result of my DCF analysis using the Constant Growth form of the DCF indicates a COE range of between 7.65% and 7.69% for the RFC Water Proxy Group.[57] Since these DCF findings use analysts' forecasts to derive sustainable growth (in part) and on analysts' forecasts of dividend growth and book value growth in the non-constant form of the DCF method, the results should be considered as conservatively high. This is because, as previously mentioned above, analysts' forecasts of such growth have been notoriously overstated.

My results are not as influenced by overly-optimistic analysts' forecasts as would have been the case had I merely used analysts' five-year earnings growth rate forecasts as a proxy for long-term growth. This is because the DCF methods I use compute sustainable growth rates, rather than growth rates that can exaggerate the growth rate due to assuming that a relatively short-term forecast (5 years) will remain indefinitely.

E. Non-Constant Growth Form of the DCF Model

Q. PLEASE EXPLAIN HOW YOU IMPLEMENTED THE NON-CONSTANT GROWTH FORM OF THE DCF MODEL.

A. The non-constant growth form of the DCF model determines the return on investment expected by investors based on an estimate of each separate annual cash flow the investor expects to receive. For the purpose of this computation, I have incorporated Value Line's detailed annual forecasts to arrive at the specific non-constant growth expectations that an

[57] Exhibit ALR-3, page 1.

investor who trusts Value Line would expect. This implementation is shown on Exhibit ALR-3, page 3 and Exhibit ALR-3, page 4. In the first stage, cash flow entry is the cash outflow an investor would experience when buying a share of stock at the market price. The subsequent years of cash flow are equal to the dividends per share that Value Line forecasts. For the intermediate years of the forecast period in which Value Line does not provide a specific dividend, the annual dividends were obtained by estimating that dividend growth would persist at a compound annual rate. The cash flow at the end of the forecast period consists of both the last year's dividend forecast by Value Line, and the proceeds from the sale of the stock. The stock price used to determine the proceeds from selling the stock was obtained by estimating that the stock price would grow at the same rate at which Value Line forecasts book value to grow.

Q. WHY DID YOU USE BOOK VALUE GROWTH TO PROVIDE THE ESTIMATE OF THE FUTURE STOCK PRICE?

A. For any given earned return on book equity, earnings are directly proportional to the book value. Furthermore, book value growth is the net result after the company produces earnings, pays a dividend and also, perhaps, either sells new common stock at market price or repurchases its own common stock at market price.

Once these cash flows are entered into an Excel spreadsheet, the compound annual return an investor would achieve as a result of making this investment was obtained by using the Internal Rate of Return (IRR) function built into the spreadsheet. This multi-stage DCF model produced an average indicated COE of 5.89% based on the year-end stock price, and 6.03% based on average prices for the year ending August 31, 2024 for

the RFC Water Proxy Group as shown on Exhibit ALR-3, page 3 and Exhibit ALR-3, page 4.

Q. WHAT COST OF EQUITY DOES YOUR NON-CONSTANT GROWTH DCF METHOD INDICATE?

A. My non-constant growth DCF method indicates a cost of equity of between 5.89% and 6.03%.[58]

F. Capital Asset Pricing Model

Q. PLEASE DESCRIBE THE CAPM.

A. CAPM stands for "Capital Asset Pricing Model." The CAPM relates return to risk; specifically, it relates the expected return on an investment in a security to the risk of investing in that security. The riskier the investment, the greater the expected return (i.e., the cost of equity) investors require to make that investment.

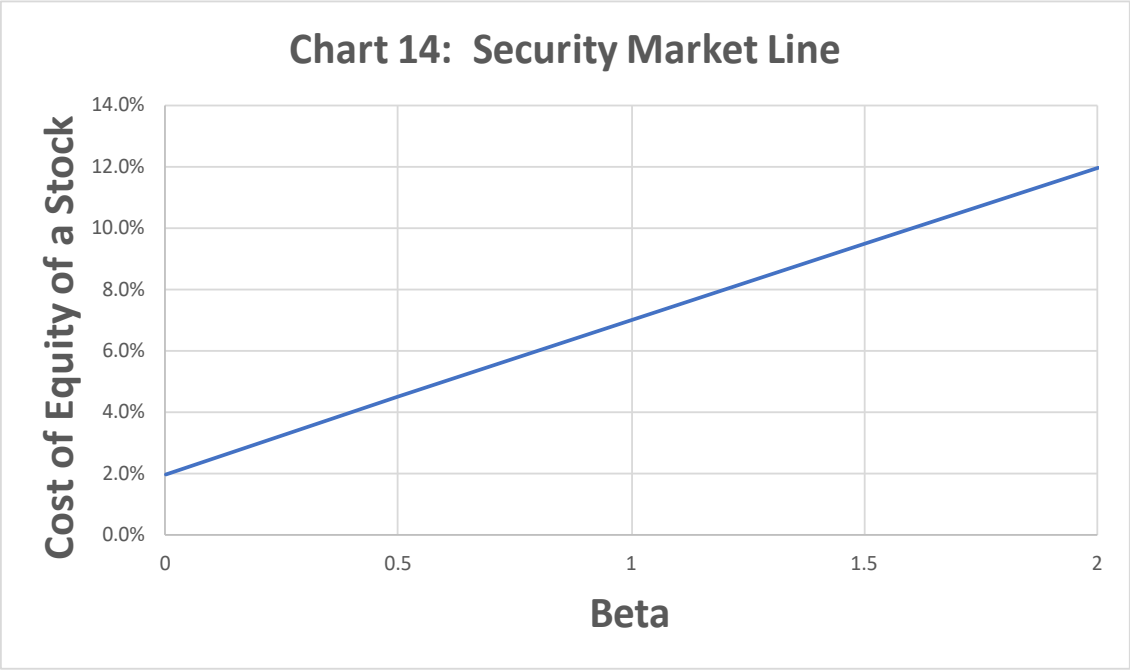
Investors in a firm's equity face two types of risks: (1) firm-specific risk and (2) market risk (financial analysts refer to this market risk as systematic risk). Firm-specific risk refers to risks unique to the firm, such as management performance and losing market share to a new competitor. Investors can reduce firm-specific risk by purchasing stocks as part of a diverse portfolio of companies if they construct the portfolio to cause the firm-specific risk of individual companies to balance out. Market-related risk refers to potential impacts from the overall market, such as a recession or interest rate changes. This risk cannot be removed by diversification, so the investor must bear it no matter what. Because

[58] Exhibit ALR-3, page 3 and Exhibit ALR-3, page 4.

the investor has no option but to bear market risk, the investor's cost of equity will reflect that risk.

The price of a stock with a beta of 1 tends to move with the market. If the market increases by 1%, the stock is also expected to increase by about 1%, and vice versa. The price of a stock with a beta greater than 1 tends to be more volatile than the market. For example, a stock with a beta of 1.5 will on average be 50% more volatile than the market. If the market rises by 1%, the price of a stock with a beta of 1.5 is expected to rise by 1.5%, and if the market falls by 1%, the stock price is expected to decrease by 1.5%. The price of a stock with a beta less than 1 tends to be less volatile than the market.

The CAPM predicts that for a given equity security, the cost of equity has a positive linear relationship to how sensitive the stock's returns are to movements in the overall market (e.g., S&P 500). A security's market sensitivity is measured by its beta. As shown in Chart 14 below, the higher the beta of a stock, the higher the company's cost of equity—the return required by the investor to invest in the stock.



Here is the standard CAPM formula:

$$K = Rf + \beta i * (Rm - Rf)$$

Where:

K is the cost of equity;
Rf is the risk-free interest rate;
Rm is the expected return on the overall market (e.g., S&P 500);
[Rm – Rf] is the premium investors expect to earn above the risk-free rate for investing in the overall market ("equity risk premium" or "market risk premium"); and
βi (Beta) is a measure of non-diversifiable, or systematic, risk.

Q. PLEASE EXPLAIN HOW YOU IMPLEMENTED THE CAPM.

A. First, I determined appropriate values or ranges for each of the three model inputs: (a) Risk-Free Rate, (b) Beta, and (c) Equity Risk Premium. Second, I used the equation above to calculate the cost of equity implied by the model. Below I will explain how I calculated the three model inputs and summarize the CAPM cost of equity numbers resulting from those inputs. Table 7 and Table 8 on page 77 show the results of my CAPM.

Risk-Free Rate

Q. WHAT RISK-FREE RATE DID YOU USE IN YOUR CAPM?

A. It is generally preferable to use the market yield on short-term U.S. Treasury yields as the risk-free rate because these bonds have a beta close to zero. *Principles of Corporate Finance* states "The CAPM… calls for a short-term interest rate."[59] I chose to use a risk-free rate based on both long- and short-term Treasury yields, however, because, as indicated by the inverted yield curve,[60] investors with a longer investment horizon would

[59] RICHARD BREALEY, STEWART MYERS, & FRANKLIN ALLEN, *Principles of Corporate Finance*, p. 228, (McGraw-Hill Irwin, New York, 12th ed. 2017).

[60] The yield curve on U.S. Treasury bonds relates the yield to its time to maturity. We say the current yield curve is steep because the difference in yield between short-term (near 0%) and long-term (over 1%) bonds is large in percentage terms.

likely use a lower risk-free rate as an opportunity cost for their investment decisions. It is reasonable to consider a risk-free rate that would apply to both long- and short-term investors. My short-term risk-free rate is based on the yield of 3-month U.S. Treasury bills and my long-term risk-free rate is based on the yield of 30-year U.S. Treasury bonds. In line with my Spot and Weighted Average CAPM approaches, I use both spot values as of August 31, 2024 and weighted averages over the 3 months ending on that date for these two yields.

As outlined in Exhibit ALR-4, page 2, my spot and weighted average short-term risk-free rates are 5.21% and 5.34%, respectively. My spot and weighted average long-term risk-free rates are 4.20% and 4.33%, respectively.

U.S. government bonds are reasonable to use as a risk-free rate because they have a negligible risk of default. The value of short-term U.S. Treasury bills has a relatively low exposure to swings in the overall market. The value of long-term U.S. Treasury bonds is relatively more exposed to the market and therefore must be used with caution.

Q. WHAT IS YOUR RESPONSE TO ANALYSTS WHO CLAIM THAT THE CAPM SHOULD BE IMPLEMENTED WITH A RISK-FREE RATE BASED ON A LONG-TERM INTEREST RATE (E.G., YIELD ON 30-YEAR TREASURY BOND) AND/OR BASED ON INTEREST RATE FORECASTS INSTEAD OF MARKET YIELDS.

A. As discussed in Appendix D, a CAPM analysis that uses a risk-free rate based only on long-term interest rates may overstate the COE because these bonds do not have a zero beta. It is not appropriate to use a risk-free rate based on interest rate forecasts because it often does not represent investors' expectations.

Beta

Q. WHAT BETA DID YOU USE IN YOUR CAPM?

A. Since the cost of equity should be based on investor expectations, I chose to use two betas. My "forward beta" is based on forward-looking investor expectations of non-diversifiable risk. My "historical blended" is based on historical return data over 6-month, 2-year, and 5-year periods.

Most published betas are based exclusively on historical return data. For example, Value Line publishes a 5-year historical beta for each of the companies it covers. However, it is also possible to calculate betas based on investors' expectations of the probability distribution of future returns. This probability distribution of future returns expected by investors can be calculated based on the market prices of stock options.

Q. WHAT IS A STOCK OPTION?

A. A stock option is the right to buy or sell a stock at a specific price for a specified amount of time. A call option is the right to buy a stock at a specified exercise or strike price on or before a maturity date. A put option is the right to sell a stock at a specified exercise or strike price on or before a maturity date. For example, a call option to purchase 100 shares of Apple Computer stock for $230 on January 17, 2020, allows the owner the option (not the obligation) to buy Apple stock for $230 on that date. At the end of July 2019, Apple stock was trading at about $215 per share. Why would anyone pay for the right to buy a stock higher than the current price? Investors who purchased those call options thought there was a chance Apple stock would be trading higher than $230 on January 17, 2020, and those options gave those investors the right to buy Apple stock for $230 and profit by selling it at the market price on that date, if it was higher. The price of Apple's stock was

$317.98 at the close of trading on January 17, 2020. Therefore, the investor who purchased this call option for $635 on July 31, 2019, earned a profit of $8,163[61] at expiry on January 17, 2020. On the other hand, the investor who purchased an Apple put option with the same expiration date and strike price on July 31, 2019, would have lost the price of the option ($2,248) and gained nothing on the expiration date because the right to sell Apple stock for $230 when the price is over $300 is worthless.

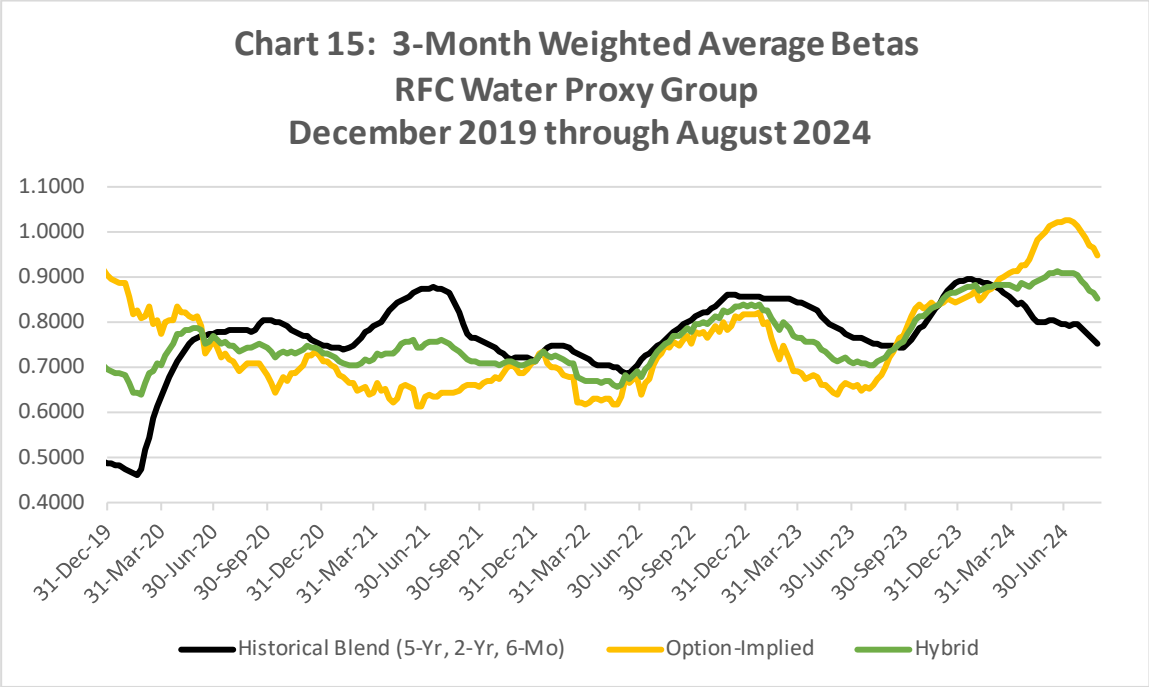
The market prices of put options and call options provide information regarding the probability distribution of future stock prices expected by investors. Using established techniques, I am able to use price data for stock options of my RFC Water Proxy Group companies and the S&P 500 Index to determine investors' return expectations, including the relationship (covariance) between the return expectations for individual RFC Water Proxy Group companies and those for the overall market (S&P 500). This covariance between the expected returns for my RFC Water Proxy Group and for the S&P 500 indicates what investors expect betas will be in the future. I refer to betas based on option price calculations as "option-implied betas."

Q. PLEASE EXPLAIN HOW YOU CALCULATED THE BETAS USED IN YOUR CAPM.

A. Traditionally, the betas used in CAPM calculations are calculated from historical returns. This approach has strengths and weaknesses. An alternative way to calculate betas is to incorporate investors' return expectations by calculating option-implied betas as explained in the previous paragraph. As discussed below, I have chosen to use both historical and

[61] $8,163 profit from exercising call option ($31,798 from selling at $317.98 market price - $23,000 cost to purchase at $230) - $635 ($6.35 X 100) option purchase price. Note: Each call option is the right to purchase 100 shares.

option-implied betas in my CAPM analysis. I chose to use option-implied betas in my CAPM analysis because, among other reasons, studies have found that betas calculated based on investor expectations (option-implied) provide information regarding future perceived risks and expectations.[62]



As shown in Chart 15 above, stock option prices indicate that investors likely expect lower betas for the RFC Water Proxy Group in the future.

Exhibit ALR-4, page 3 contains the last three months of data used in creating Chart 15 above, which is what I use in my CAPM analysis. Specifically, I use the following two betas in my CAPM analysis:

1. **Historical Blend:** 50% (6 months) + 30% (2 years) + 20% (5 years).
2. **Forward Beta:** 100% Option-Implied Beta (6 months).

[62] Bo-Young Chang, Peter Christoffersen, Kris Jacobs & Gregory Vainberg. Option-Implied Measures of Equity Risk, *Review of Finance*, Vol. 16, Issue 2, pp. 385-428 (April 2012) available at https://academic.oup.com/rof/article/16/2/385/1584560. .

Q. WHY DO YOU USE PERIODS OF 6 MONTHS, 2 YEARS, AND 5 YEARS FOR YOUR HISTORICAL BETA CALCULATIONS, AS OPPOSED TO RELYING EXCLUSIVELY ON THE 5-YEAR PERIOD USED BY VALUE LINE?

A. Using shorter periods for the return regression analysis portion of the historical beta calculation allows me to see if the correlation between the returns of each of the companies in my RFC Water Proxy Group and those of the S&P 500 Index has changed in the last 2 years or 6 months. Using a 5-year period exclusively tends to make recent changes in the correlation more difficult to identify because of the weight of 5 years of data.

Q. WOULD YOU AGREE THAT CHANGES IN MARKET DYNAMICS WILL HAVE A LARGER EFFECT ON 6-MONTH HISTORICAL BETAS THAN THEY WILL ON 2-YEAR OR 5-YEAR HISTORICAL BETAS?

A. Yes. As with other historical metrics based on a given time period, say, average stock prices, the longer the time horizon under consideration, the more data points are considered, and the smaller the effect of any one given change in the data set.

Q. IS THIS LARGER EFFECT ON 6-MONTH HISTORICAL BETAS FROM CHANGES IN MARKET DYNAMICS A GOOD OR A BAD THING?

A. The answer depends on what the beta will be used for. I would argue that in any attempt to forecast the beta coefficient of a company for any forward-looking analysis such as the cost of capital calculations in this proceeding, more recent historical data should be given more relevance than data from 5 or 10 years ago. The weight of 10 years of data makes a beta coefficient react extremely slowly to market developments. Even pronounced permanent market changes can take more than 6 months to have a detectable effect on a 10-year beta.

As with using spot values and averages of historical market data, I believe the right answer is not to use *either* 6-month historical betas or historical betas with longer horizons, but to consider *both*. For this reason, I have created my historical blended betas, which take into consideration 6-month, 2-year, and 5-year historical betas.

Q. DO YOU THINK IT IS A GOOD IDEA TO RELY ON 6-MONTH HISTORICAL BETAS DESPITE MARKET DEVELOPMENTS IN THE PAST YEAR THAT SOME WOULD CALL "MARKET DISLOCATIONS?"

A. Financial markets are constantly in flux due to the influence of countless factors. So-called "market dislocations," are just some of the numerous factors that are constantly affecting markets. To attempt to separate any one specific factor from "real" underlying market dynamics would be an exercise in futility.

Furthermore, predicting the duration and impact of any single influencing factor on financial markets is extremely challenging, if not impossible. In 2008, when interest rates plummeted to unprecedented lows, numerous analysts deemed this a temporary anomaly. Contrary to these expectations, rates not only persisted at these low levels for more than ten years but dropped even further in response to the unforeseen COVID-19 pandemic, which significantly affected the global economy and financial markets.

So, in response, yes, I think it is a good idea to use 6-month historical betas to measure recent and current market dynamics regardless of recent developments. I use them as part of my historical blended betas in conjunction with longer-term historical betas and forward-looking, option-implied betas to achieve the most reasonable result.

Q. GIVEN THE SHORTER PERIOD COVERED BY 6-MONTH HISTORICAL BETAS, CAN THEY STILL BE CONSIDERED STATISTICALLY

SIGNIFICANT? HOW MANY DATA POINT PAIRS ARE USED IN THE CALCULATION OF YOUR 6-MONTH HISTORICAL BETA COEFFICIENTS?

A. A 6-month historical beta based on weekly returns calculated weekly is calculated using 26 closing price points for a company and for its corresponding market index, in this case the S&P 500 Index. This translates into 25 pairs of return data that are then used in the regression analysis. This is most certainly enough data to achieve statistical significance as addressed further below.

Furthermore, as stated above, the recent improvement in my calculation of historical betas of using weekly returns on every day of the week as opposed to using only one day of the week, as Value Line does, has the added benefit of providing significantly more data pairs to be used in the regression analysis used to calculate beta. For 6-month historical betas, instead of relying on 25 return pairs, the regression is performed on 117 return pairs.

Q. PLEASE EXPLAIN HOW YOU CALCULATED OPTION-IMPLIED BETAS.

A. Calculating option-implied betas of a company requires (1) obtaining stock option data for that company and a market index, (2) filtering the stock option data, (3) calculating the option-implied volatility for the company and for the index, (4) calculating the option-implied skewness for the company and for the index, and (5) calculating option-implied betas for the company based on implied volatility and skewness for the company and for the index. There are various ways one could choose to perform the steps above, but I chose

to filter stock option data and calculate option-implied volatility[63] and skewness[64] following exactly the same methodology used by the Chicago Board of Options Exchange (CBOE) in the calculation of their widely-used VIX (or Volatility Index) and SKEW Index, respectively.

I start my process with publicly available trading information for all the options for a given security (company or index) for a complete trading day. I then filter the option data as described by the CBOE using the following guidelines:

1. Use the mid-quote or mark (average of bid and ask) as the option price.
2. Use only out-of-the-money call and put options.
    - Determine the "moneyness" threshold where absolute difference between call and put prices is smallest (using CBOE "Forward Index Price" formula).
    - Include "at-the-money" call and put options and use average of call and put prices as price for "blended" option.
3. Exclude all zero bids.
4. Exclude remaining (more out-of-the-money) options when two sequential zero bids are found.

I then apply the series of formulas clearly described in both of the CBOE's white papers to the remaining options to calculate Option-Implied Volatility and Option-Implied Skewness. In the words of the CBOE, each of its two indices is "an amalgam of the

[63] CBOE Volatility Index White Paper (2018) available at https://cdn.cboe.com/resources/indices/srvix-white-paper.pdf. Please note that the cover page says, "proprietary information." However, this document has been in the public domain for over 3 years.

[64] The CBOE SKEW Index (2010) available at: https://cdn.cboe.com/resources/indices/documents/SKEWwhitepaperjan2011.pdf. Please note that the cover page says, "proprietary information." However, this document has been in the public domain for over 3 years.

information reflected in the prices of all of the selected options." To be clear, Implied Volatility is not exactly the same as the VIX Index, and Implied Skewness is not exactly the same as the SKEW Index, but both indices are directly based on their corresponding statistical value.

Option-Implied Volatility reflects investors' expectations regarding future stock price movements. Option-Implied Skewness reflects investors' expectations regarding how implied volatility changes for strike prices that are closer and further to the current value of the underlying stock price.

The CBOE calculates Times to Expiration by the minute—as do I. The Time to Expiration of traded options cannot be changed and varies from day to day. For the sake of consistency, the CBOE calculates the VIX and SKEW indices on a "30-day" basis by interpolating for two sets of options with Times to Expiration closest to the 30-day mark. I prefer to focus on as long of a time horizon as possible for forecasting purposes. Option Times to Expiration vary significantly for various stocks but can consistently be found to go out to 6 months (180 days) for utility companies. Therefore, for the sake of consistency, I have chosen to calculate 6-month volatility and skewness where possible. Occasionally, Times to Expiration for a given stock do not go out to 180 days. If the greatest Time to Expiration available is 171 days (95%) or greater, I use the volatility and skewness for that group of options as a proxy for the 180-day volatility and skewness, respectively.

Finally, once I have calculated the option-implied volatility and skewness for each company and index using the methodology described above, I calculate option-implied

betas using the following formula developed by Christoffersen, Chang, Jacobs and Vainberg (2011): [65]

$$\beta_i = \left(\frac{SKEW_i}{SKEW_m}\right)^{1/3} \quad \left(\frac{VAR_i}{VAR_m}\right)^{1/2}$$

Where:

β_i: $option - implied\ beta\ of\ security\ (e.g. stock, fund)$;
$SKEW_i$: $skewness\ of\ security$;
$SKEW_m$: $skewness\ of\ overall\ market\ (S\&P\ 500)$;
VAR_i: $variance\ of\ company$;
VAR_m: $variance\ of\ overall\ market\ (S\&P\ 500)$.

Q. YOU CALCULATE YOUR OPTION-IMPLIED BETAS BASED ON A 6-MONTH HORIZON. WOULD IT NOT BE BETTER TO USE A LONGER FORECASTING HORIZON?

A. The methodology I use to calculate my option-implied betas "allows for the computation of a complete term structure of beta for each company so long as the options data are available,"[66] so there is nothing inherent in the methodology that limits it to a certain time horizon.

For many applications, including cost of capital, one could argue that the longer the time horizon for the option-implied betas, the better. However, the limitation on the forecasting horizon is always set by the longest expiration period of the options currently traded in the market. Some companies trade options with expiration periods up to 2 or 3 years into the future. As evidenced by the exhaustive option data in my working papers,

[65] Bo-Young Chang, Peter Christoffersen, Kris Jacobs & Gregory Vainberg, Option-Implied Measures of Equity Risk, *Review of Finance* Volume 16, Issue 2, pp. 385-428 (April 2012) at https://academic.oup.com/rof/article/16/2/385/1584560

[66] Peter Christoffersen, Kris Jacobs, and Gregory Vainberg, *Forward-Looking Betas*, p. 24 (April 25, 2008) at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=891467.

the maximum expiration period for the options of the companies in my RFC Water Proxy Group is approximately 8 months. None of the 6 companies ever trade options with expiration periods of more than 8 months. New options are issued roughly every 3 months for all of these companies, so the maximum expiration period on any given trading day is somewhere between 5 and 8 months. For consistency across companies in my proxy group and across dates within the 3-month period on which my analysis is focused (June through August 2024), I chose to use 6 months for the time horizon of my option-implied betas. If the maximum expiration period for the options of a given company on a given day is less than 6 months, I use the maximum expiration period as an approximation for the target 6-month horizon.

Simply because some may argue that it may be preferable to use longer time horizons in place of or in addition to a 6-month horizon, it does not mean that a 6-month option-implied beta is of no relevance or cannot be used. That would be tantamount to saying you cannot use a 1-year Value Line Earnings Per Share estimate, or that the minimum relevant forecast is 2 or 3 years. In fact, for purposes of option-implied betas, it would be difficult to say if a time horizon of 1 year, for instance, is necessarily always better than a time horizon of 6 months. An option-implied forward-looking beta, even with a time horizon of less than 6 months, is still a useful tool in interpreting the current expectations of investors at any given time.

A final strong argument in support of using 6-month option-implied betas in a cost of capital calculation looking years into the future is that the authors of the paper on which I based my option-implied betas concluded that their predictive powers are not limited to

6 months into the future.[67] In fact, they conclude that 6-month option-implied betas have stronger predictive power than 6-month, 1-year, or 5-year historical betas when attempting to forecast betas 1 or 2 years into the future.

Market Risk Premium

Q. PLEASE EXPLAIN HOW YOU CALCULATED THE EQUITY RISK PREMIUM USED IN YOUR CAPM.

A. Traditionally, the risk premium used in CAPM calculations is derived from historical returns and/or equity analyst projections. The former approach is historically accurate but does not take into account investors' expectations for future market risks and returns. The latter approach is based on analyst projections, which are not appropriate since they do not reflect current investor expectations. A superior market-based way to calculate the equity risk premium is to use option-implied return expectations, which is the approach I have used.

My equity risk premium is the expected return on the S&P 500 minus the risk-free rate. I calculate an expected return on the S&P 500 by using stock options traded on this index. To begin with, I use exactly the same methodology used by the Chicago Board of Options Exchange to filter stock option data and calculate option-implied volatility and skewness,[68] as described in detail in the Beta section on page 70. The volatility and skewness calculated in this way describe a probability function representing the possible trajectories for the S&P 500 implied by the options market. The resulting skewed probability function can be closely approximated by a log-normal function using

[67] This is further expanded upon in my testimony starting on page 124

[68] As used in the calculation of their widely-used VIX (or Volatility Index) and SKEW Index, respectively.

established statistical formulas, which then make it straightforward to calculate the expected growth for the S&P 500 for any given cumulative probability. A cumulative probability of 50% represents the median of the probability distribution, or the option-implied market consensus, which is how I arrive at my calculation of expected market growth.

Once the option-implied growth rate of the S&P 500 has been estimated as described above, I add the dividend yield and subtract the risk-free rate to arrive at the market risk premium, as laid out in Exhibit ALR-4, page 4 and Exhibit ALR-4, page 6. In line with my Spot and Weighted Average CAPM approaches, I use both spot values as of August 31, 2024 and weighted averages over the 3 months ending on that date for option-implied growth, dividend yields, and short- and long-term risk-free rates in these calculations to arrive at a total of 4 estimated values for the market risk premium. The market risk premia I use in my Weighted Average CAPM analysis with short- and long-term risk-free rates are 2.71% and 3.72%, respectively. The market risk premia I use in my Spot CAPM analysis with short- and long-term risk-free rates are 2.98% and 3.99%, respectively.

Q. DID YOU TAKE INTO CONSIDERATION THE DIFFERENCE IN VOLATILITIES ACROSS EXPIRATION PERIODS IN THE OPTIONS TRADED ON THE S&P 500?

A. Yes. The volatility implied by the options market changes over time as investors' perception of risk changes. For example, during a crisis, implied volatility generally increases as investors expect that stock market prices have a greater chance of large swings compared to times when there is no crisis. As discussed earlier, investors also often have

different volatility expectations over different time periods. For example, on any given day, investors might expect volatility to be relatively high over the next 30 days and to decrease over the next year or longer. The same holds true for skewness, even though it is less intuitive to understand changes in skewness than in volatility. Because of these changes across option expiration periods, I take a weighted average of the entire term structure of the option-implied volatility and skewness, which for the S&P 500 typically goes out to 54 to 61 months[69], interpolating where necessary, and giving the most weight to the option expiration period of 12 months.

CAPM Results

Q. PLEASE SUMMARIZE THE RESULTS OF YOUR CAPM.

A. Table 7 and Table 8 below show the results of my Weighted Average CAPM and Spot CAPM Analyses, respectively.

Weighted Average CAPM

TABLE 7: CAPITAL ASSET PRICING MODEL (CAPM) - INDICATED COST OF EQUITY
WEIGHTED - All Inputs Weighted From June to August 2024

	3-Month Treasury Bill		30-Year Treasury Bond	
	Historical Blended Beta	Forward Beta	Historical Blended Beta	Forward Beta
Risk-Free Rate	5.34%	5.34%	4.33%	4.33%
Beta	0.75	0.95	0.75	0.95
Risk Premium	2.71%	2.71%	3.72%	3.72%
CAPM	7.39%	7.91%	7.14%	7.85%

Source: Exhibit ALR-4, page 1

[69] Prior to November 2021, the longest expiration period for stock options traded on the S&P 500 was 36 months.

Spot CAPM

TABLE 8: CAPITAL ASSET PRICING MODEL (CAPM) - INDICATED COST OF EQUITY (SPOT)
SPOT - All Inputs Based on Last Available Data as of August 31, 2024

	3-Month Treasury Bill		30-Year Treasury Bond	
	Historical Blended Beta	Forward Beta	Historical Blended Beta	Forward Beta
Risk-Free Rate	5.21%	5.21%	4.20%	4.20%
Beta	0.72	0.86	0.72	0.86
Risk Premium	2.98%	2.98%	3.99%	3.99%
CAPM	7.35%	7.77%	7.07%	7.62%

Source: Exhibit ALR-4, page 5

Please see Appendix E for a chart showing how the results of my CAPM analysis applied to the RFC Water Proxy Group have changed over time since the onset of the Covid pandemic.

VI. CAPITAL STRUCTURE AND COST OF DEBT

Q. IS TAWC'S REQUESTED CAPITAL STRUCTURE OF 54.52% COMMON EQUITY AND 43.49% APPROPRIATE?

A. No. TAWC's requested capital structures are not appropriate for setting rates in this proceeding. It has a higher common equity ratio (54.52%) than the average common equity ratio used by other water utility companies in the country (50.9%).[70]

[70] Exhibit ALR-5, page 5

Q. WHAT CAPITAL STRUCTURE DO YOU RECOMMEND BE USED FOR TAWC'S OVERALL COST OF CAPITAL?

A. I recommend using a capital structure consisting of 50.90% equity and 47.11% debt, based on the average common equity ratios of the companies in my proxy group. Absent evidence from TAWC in support of the need for a different capital structure, using the average capital structure of the proxy group is consistent with the TPUC's duty to set reasonable rates because otherwise, using a common equity ratio higher than other companies creates unreasonably higher rates. My recommendations, including my capital structure recommendation, result in an overall rate of return of 6.46% as shown in Table 3 on page 15. Ms. Bulkley's recommendations result in an overall rate of return of 7.94%. And, as discussed above, capital structure has a major impact on revenue requirement. If TPUC adopts an equity component of the capital structure ratio that is higher than I've recommended, there should be a corresponding reduction to ROE.

It can be overlooked that the authorized capital structure can have a large impact on the utility company's revenue requirement. If my cost of equity recommendation is applied to Ms. Bulkley's recommended capital structure it will require an approximately $0.7 million larger revenue requirement.

If Ms. Bulkley's capital structure recommendations are adopted it is important to make an adjustment the overall ROR to account for the financial risk difference between her capital structure recommendation and that of the companies in the RFC Water Proxy Group which have a significantly lower average common equity ratio (50.9%) than the common equity ratios recommend by Ms. Bulkley. A higher common equity ratio means less debt, a lower chance of financial stress (financial risk), and therefore a lower COE.

On the other hand, a lower common equity ratio means more debt, a higher chance of financial stress (financial risk), and therefore a higher COE. Based on a regression analysis of dozens of utility companies, I found a 0.04% reduction in the cost of equity results for every 1% increase in the common equity ratio. Therefore, if TPUC authorizes a capital structure with a higher common equity ratio for a specific applicant, then the authorized ROE for that applicant should be reduced by 0.04% for every 1% its authorized common equity ratio exceeds that of the proxy group.[71]

Q. WHAT COST OF DEBT DO YOU RECOMMEND?

A. I recommend adopting TAWC's requested cost of long-term debt of 4.59% and cost of short-term debt of 4.27%.

VII. EVALUATION OF TAWC'S RATE OF RETURN TESTIMONY

Q. PLEASE SUMMARIZE THE TESTIMONY OF MS. BULKLEY.

A. Ms. Bulkley concluded that a 10.75% ROE is appropriate from within an ROE range of 10.25% to 11.25%.[72] Her 10.75% ROE is based on the results of her own modified versions of the following COE models to a proxy group applied to a proxy group of 11 water, electric and gas utility companies: 1) DCF model, 2) CAPM, and 3) ECAPM. Ms. Bulkley also considered additional factors, including TAWC's capital expenditures and regulatory risks relative to the proxy group companies. However, she states that she does

[71] Earlier in testimony I provide the specific adjustments required if Ms. Bulkley's capital structure recommendation is used to set rates.

[72] Direct Testimony of Ann E. Bulkley.at 10:1-3.

not make any specific adjustments to her ROE recommendation to account for these additional factors.[73]

As outlined in Table 9 below, Ms. Bulkley's COE models provide equity cost rate estimates between 8.78% and 11.76%.

Ms. Bulkley claims that current market conditions indicate that the cost of equity is likely to increase in the near-term which supports consideration of forward-looking cost of equity models such as the CAPM and ECAPM.[74]

TABLE 9: MS. BULKLEY'S COST OF EQUITY RESULTS

METHOD	Model Results
Constant Growth DCF	8.75% - 11.20%
CAPM	10.49% - 11.44%
ECAPM	11.05% - 11.76%
Ms. Bulkley's Cost of Equity Model Results	**8.75% - 11.76%**

[1] Ms. Bulkley's Direct Testimony, Page 67, Figure 11

Q. IS HER CONCLUSION BASED ON INVESTORS' EQUITY RETURN EXPECTATIONS AS INDICATED BY MARKET DATA?

A. No. Ms. Bulkley says that "the Company's authorized ROE should be forward-looking"[75] and determined by using analytical techniques that rely on "market-based data."[76] She states that "A key consideration in determining the cost of equity is to ensure that the methodologies employed reasonably reflect investors' general views"[77] However, when applying her approaches, there are key places where she uses analyst forecasts (non-

[73] *Id.* at 5:1-20.
[74] *Id.* at 27:2-18.
[75] *Id.* at 7:3-8.
[76] *Id.* at 33:2-3.
[77] *Id.* at 33:6-7.

market-based) instead of market-based data (e.g., stock and stock option prices) and/or uses backward looking data. For example, the risk premium component of her CAPM analysis, which is based on analyst forecasts, includes a higher expected return on the overall market (12.70%) than my market-based analysis indicates.[78] A market-based analysis shows that the COE for the overall market is about 7% at a 12-month investment horizon and beyond.[79]

The forecasts of individual analysts, even from respected sources like Bloomberg, may or may not reflect investors' views on the market because, if for no other reason, the analyst who covers a particular stock could be on vacation. Therefore, I believe it is preferable to use market data as much as possible to best measure investors' expectations and the cost of equity for utility companies.

Q. DO MS. BULKLEY'S SOURCES CONTRADICT HER OWN CONCLUSIONS?

A. Yes. Ms. Bulkley approach to determining, and justifying, the equity risk premium component of her CAPM analysis involve using isolated data from her sources contradict the big picture conclusions made by her own sources. For instance, she uses Bloomberg's forecasted earnings per share growth rate data to calculate an equity risk premium of about 9%. This figure significantly differs from Bloomberg's published equity risk premium of 5.5%. The latter was utilized by Ms. Bulkley's Brattle Group colleague in a cost of capital proceeding I was involved in earlier this year.[80] This discrepancy suggests a cherry-picking

[78] *Id.* at 45:19-20 and 46:1-2.
[79] 2024.08.31 - TAWC Cost of Capital (RFC Water PG), tab "MRP".
[80] Direct Testimony of Michael R. Tolleth, *In Re: Application of Great Oaks Water Company (U162W) for an Order Establishing its Authorized Cost of Capital for the Period from July 1, 2024 through June 30, 2027*, CPUC Docket No. A23-05-002 (May 1, 2023) at https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M507/K388/507388194.PDF.

approach, favoring data that aligns with her higher estimation while disregarding the broader context provided by Bloomberg.

Furthermore, Ms. Bulkley uses historical data from Kroll 2023 SBBI Yearbook to support her forward-looking equity return expectations and the equity risk premium component of her CAPM analysis.[81] She claims that annual equity returns over the past century indicate the current expected market return of 12.70% that she used to calculate the equity risk premium component of 8.32% to 8.60% is "not unreasonable."[82] However, her justification is flawed because she failed to consider if investors expect future returns to be different than past returns. Her own source, the Kroll 2023 SBBI Yearbook, considered if investors might consider future equity returns to be different than the past. The authors of this book looked beyond historical data and concluded that "the current [price-to-earnings] ratio is the market's best guess for the future of corporate earnings."[83] Based on this current market data, the Kroll 2023 SBBI Yearbook calculated a long-term market return of only 9.45% and a geometric supply-side equity risk premium of 4.39%."[84]

Ms. Bulkley's selective use of data from her sources raises significant doubts about the reasonableness and reliability of the equity risk portion of her CAPM analysis.

81 Direct Testimony of Ann E. Bulkley at 46:3-10, Figure 19.
82 *Id.* at 46:5-6.
83 Kroll 2023 SBBI Yearbook, P. 199.
84 *Id.* at pp.197-199.

Q. YOU STATED EARLIER THAT MS. BULKLEY'S CLAIM THAT THE DCF MODEL IS CURRENTLY UNDERSTATING COST OF EQUITY IS NOT VALID. PLEASE EXPLAIN MORE ABOUT WHY HER CLAIM IS NOT ACCURATE.

A. Her claim that utility stocks are expected to underperform in the near term[85] is problematic for at least the following two reasons. First, she does not base her claim regarding future utility stock price performance on market data. Her claim is based on personal opinions and speculation. Second, she do not use a multi-stage DCF model to directly test how the COE results would be impacted if, in fact, investors expect utility stocks to underperform in the near term. The multi-stage DCF model is able to measure how the cost of equity is impacted by periods of utility stock price underperformance because it can account for different growth rates over different time periods. For example, in a multi-stage DCF model, it is possible to use a relatively low growth rate during a period of expected underperformance, like Ms. Bulkley is claiming in this case, followed by a higher growth rate. All else equal, if investors expect utility stocks to decline in value, the DCF indicated COE would be lower. All else equal, if investors expect utility stocks to decline in value, the DCF indicated COE would be lower. This makes sense because if investors expect lower stock prices, all else equal, they are expecting to bring in less money when they sell the stocks. If they expect to bring in less money, they are expecting a lower return on their equity investment.

[85] Direct Testimony of Ann E. Bulkley at 35:2-10.

Q. DO THE RESULTS OF MS. BULKLEY'S COST OF EQUITY MODELS PROVIDE A RELIABLE INDICATION OF TAWC'S COST OF EQUITY?

A. No. Ms. Bulkley's 10.75% ROE recommendation is significantly higher than TAWC's market-based cost of equity. If her recommendation is used to set rates, consumers will be significantly overcharged. Ms. Bulkley's 10.75% ROE recommendation is excessive largely because: (1) her COE calculations are based on a flawed analytical approach and an inappropriate definition of the cost of equity, despite defining it correctly in considerable portions of filed testimony, (2) her interpretation of current capital markets includes unknowable and/or speculative predictions, and (3) her claims regarding how current capital markets are impacting the DCF model are incorrect.

Additionally, each of her COE models has specific issues that contribute to her unreasonably high results. First, I will address how her constant growth DCF method is unreliable because it mechanically uses analyst 5-year EPS growth rates as a proxy for growth without considering the mathematical relationship between retention rates, dividend payments, and growth. A company cannot invest and grow with money it has paid out to investors as a dividend. Second, I will explain how her CAPM/ECAPM methodologies overstate the cost of equity by using an inflated equity risk premium component.

DCF Method

Q. WHAT FORMULA DOES MS. BULKLEY USE IN HER DCF ANALYSIS?

A. $$k = \frac{D_0(1+g)}{P_0} + \text{g}$$ [86]

Where:

k: discount rate (required ROE);
P_0: current $stock\ price$;
D_0: expected $dividend\ yield$;
g: expected long − term $growth\ rate$. [87]

Q. DOES MS. BULKLEY PROPERLY APPLY THE SIMPLIFIED OR CONSTANT GROWTH DCF METHOD?

A. No. Ms. Bulkley explains correctly that the constant growth DCF method "assumes" a single growth rate in perpetuity and that "one must assume that the dividend payout ratio remains constant and that earnings per share ("EPS"), dividends per share, and book value per share all grow at the same constant rate."[88] However, her DCF method contradicts her own description of how the constant growth model should be implemented. Her growth estimate relies entirely on analyst five-year EPS growth forecasts.[89] The correct application of the DCF method requires that the dividend yield be computed properly, and that the growth rate used to be derived from a careful study of what future *sustainable* growth in cash flow is anticipated by investors. As discussed above, major financial

[86] *Id.* at 35:16.
[87] *Id.* at 35:13-19.
[88] *Id.* at 37:6-9.
[89] *Id.* at 37:20-23 -- 38:1-8.

institutions like J.P. Morgan Chase do not use a growth rate based on analyst 5-year EPS growth rates as Ms. Bulkley has done. Please see Appendix B for explanation of why a future-oriented "B X R" method is superior to Ms. Bulkley's DCF method.

Q. ARE THERE ADDITIONAL REASONS WHY IT IS NOT APPROPRIATE TO USE ANALYSTS' EARNINGS GROWTH RATE PROJECTIONS AS A PROXY FOR GROWTH IN THE DCF MODEL?

A. Yes. A study conducted by McKinsey & Company in 2010 found that "analysts have been persistently over optimistic for the past 25 years with estimates ranging from 10 to 12 percent a year, compared with actual earnings growth."[90]

On average, analysts' forecasts have been almost 100 percent too high.[91] Capital markets, on the other hand, are notably less giddy in their predictions. Except during the market bubble of 1999-2001, actual price-to-earnings (P/E) ratios have been 25 percent lower than implied P/E ratios based on analyst forecasts.

To my knowledge, financial publications do not recommend using EPS growth rates to calculate the cost of equity in a DCF model. McKinsey & Company continues to advise its clients to be cautious about the reliability of analysts' forecasts. On May 16, 2022, McKinsey stated that "analysts' near-term forecasts are often overly optimistic and don't always correctly reflect operating performance."[92]

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[90] Marc Goedhart, Rishi Raj and Abhishek Saxena, Equity Analysts: Still too bullish (April 1, 2010) at. https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/equity-analysts-still-too-bullish.

[91] *Id.*

[92] David Kohn, Vartika Gupta, Tim Koller & Werner Rehm, *Do consensus estimates accurately reflect operating performance?* (May 16, 2022) at https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/the-strategy-and-corporate-finance-blog/do-consensus-estimates-accurately-reflect-operating-performance

Even if equity analysts' forecasts were not upwardly biased, as discussed above, adding earnings per share growth forecasts to a dividend yield without considering the retention rate produces a flawed result. Using an earnings per share growth forecast as the growth component in a DCF model is like measuring how much money you will have in your bank account by simply adding up your paychecks. This only works if you spend no money. If you do not consider what percentage of your paycheck you will retain in your account and what percentage you will spend, your calculations will be wildly optimistic and inaccurate similar to using earnings per share growth in a DCF.

Q. WHY DOES MS. BULKLEY'S DCF MODEL PRODUCE A HIGHER RESULT THAN YOUR CONSTANT GROWTH DCF METHODS?

A. The primary reason our DCF models produce different COE results is because of the growth rate component. Ms. Bulkley's DCF analysis using analyst 5-year EPS growth rate projections produces a cost of equity result of between 8.14% and 13.68%.[93] My sustainable growth DCF and option-implied growth DCF methods produce cost of equity results of 7.65% - 7.69% and 8.03% - 8.38% respectively.[94] Ms. Bulkley uses an average growth rate component of between 4.32% and 8.65%[95] for each of the companies in her proxy group.[96] I use growth rate components of 5.70% to 5.95%.[97] The low end of Ms. Bulkley's DCF results are within range of my results, lower in some cases, but the high

[93] Direct Testimony of Ann E. Bulkley at Schedule AEB-4.
[94] Exhibit ALR-2.
[95] Direct Testimony of Ann E. Bulkley at Schedule AEB-4, Pages 1-3.
[96] Ms. Bulkley excludes Middlesex Waer Company form her DCF analysis because of an unreasonable equity risk premium.
[97] Exhibit ALR-3, Page 1 and 2.

end of her DCF results (13.35%) is so high because she use unsustainable growth rates as high as 10.80%.[98]

CAPM Method

Q. PLEASE DESCRIBE MS. BULKLEY'S CAPM METHOD.

A. Ms. Bulkley explains that the CAPM method "estimates the cost of equity for a given security as a function of a risk-free return plus a risk premium to compensate investors for the non-diversifiable or 'systematic' risk of that security."[99] She says that this method is defined by the following four components:

$$K_e = r_f + \beta\ (r_{m-}r_f)$$

Where:

K_e	=	the required market ROE;
β	=	Beta coefficient of an individual security;
r_f	=	the risk-free rate of return; and
r_m	=	the required return on the market as a whole.[100]

She also considers an Empirical CAPM (ECAPM). Ms. Bulkley claims the ECAPM is necessary because academic research indicates that the risk return relationship is different than the one estimated by the CAPM.[101] This method includes the same four components as the CAPM, but she applies a 75% weighting to the beta coefficient and the market risk premium portion of the equation and a 25% weighting to the market risk premium, without the beta coefficient impact. ECAPM formula:

98 Direct Testimony of Ann E. Bulkley at Schedule AEB-4, Pages 1-3.
99 *Id*. at 43:21-23.
100 *Id*. at 44:3-9.
101 *Id*. at 47:14-19.

$$K_e = r_f + 0.75\beta\ (r_{m-}r_f) + \ 0.25\ (r_{m-}r_f)$$[102]

The specific weightings (0.75 and 0.25) in the formula above flatten the security market line to be consistent with historical return data. In other words, these weightings make the cost of equity for a company with a beta under one higher and the cost of equity for a company with a beta above 1 lower. The effect of this adjustment is to increase the cost of equity for regulated utility companies because they almost always have a beta less than one.

Q. WHAT RISK-FREE RATE DOES MS. BULKLEY USE IN HER CAPM?

A. She used the following three risk-free rates: (1) Current yield on 30-year Treasury bonds (4.38%), (2) Projected (Q1 2024 through Q2 2025) yield on 30-year Treasury bonds (4.12%), and (3) Projected (between 2025 and 2029) yield on 30-year Treasury bonds (4.10%).[103]

Q. WHAT BETA COEFFICIENT DOES MS. BULKLEY USE IN HER CAPM?

A. She used the following two historical beta coefficients of each of the companies in her proxy group: (1) Bloomberg 10-year weekly return relative to the S&P 500 index, (2) Value Line 5-year historical weekly return relative to the New York stock exchange composite index, and (3) long-term averages from 2013 through 2023.[104]

102 *Id*. at 47:8.
103 *Id*. at Exhibit AEB-5.
104 *Id*. at 45:6-14.

Q. WHAT RISK PREMIUM DOES MS. BULKLEY USE IN HER CAPM?

A. The market risk premium of Ms. Bulkley's CAPM analysis is based on the difference between an implied expected equity market return (12.70%) and a risk-free rate (4.10% - 4.38%).[105] She calculated the implied expected equity market return of 12.70% by using a DCF model with a dividend yield equal to that of the current dividend yield of S&P 500 (1.57%) and a growth rate component equal to Bloomberg's published consensus annual EPS growth rate of the S&P 500 over the next five years (11.05%).[106] She estimated a market risk premium of between 8.32% and 8.60%.[107]

Q. DOES MS. BULKLEY USE AN APPROPRIATE RISK-FREE RATE IN HER CAPM?

A. In principle, no. The risk-free rate component of Ms. Bulkley's CAPM is not appropriate because it is based considerably on economist published projections and not investors' expectations as indicated by current market yields. Interest rates have increased since Ms. Bulkley filed her testimony, and the forecasted yields she used in her CAPM are now lower than the market-based risk-free rates that I used in my CAPM analysis. As outlined in Exhibit ALR-4, page 2, my spot and weighted average short-term risk-free rates are 5.21% and 5.34%, respectively. My spot and weighted average long-term risk-free rates are 4.20% and 4.33%, respectively. These four rates average 4.77%. The risk-free rate component of Ms. Bulkley's CAPM analysis is between 4.10% for the projected yield on 30-year U.S. Treasury bonds and 4.38% for the current 30-day average market yield.[108]

105 *Id*. at Exhibit AEB-5.
106 *Id*. at Exhibit AEB-7.
107 *Id*. at Exhibit AEB-5.
108 *Id*. at Exhibit AEB-5.

Ms. Bulkley's use of interest rate forecasts is wrong in principle because current market yields on U.S. Treasury bonds indicate market expectations. As discussed above, TAWC's authorized ROE should be market-based because investors provide the capital. In this case, Ms. Bulkley's use of interest rate forecasts to determine the risk-free rate component does not inflate her CAPM result. However, her CAPM method should not be used to set rates in future Tennessee proceedings because it could produce inaccurate cost of equity results (too high or too low) in different capital market conditions.

Q. DO MS. BULKLEY'S BETA COEFFICIENTS OVERSTATE THE COST OF EQUITY?

A. Not currently. Ms. Bulkley's CAPM results are not a reliable indicator of the cost of equity because she uses historical beta coefficients. However, in this case the 10-year and 5-year historical betas she uses in her CAPM analysis are not excessive, averaging 0.76 and 0.85 respectively.[109] Ms. Bulkley also used beta coefficients based on long term averages of 0.74.[110] Over the past 3 months, my forward-looking option-implied betas have had a weighted average of 0.95[111] and my 6-month and 2-year historical betas for the RFC Water Proxy Group have had a weighted average of 0.687 and 0.833, respectively, over the past 3 months.[112]

Q. UPON CLOSER EXAMINATION OF MS. BULKLEY'S SOURCES AND OTHER PROMINENT SOURCES, DO YOU BELIEVE THAT THE EQUITY RISK

109 *Id*. at Schedule AEB-5.
110 *Id*. at Schedule AEB-5.
111 Exhibit ALR-4, page 3.
112 Exhibit ALR-4, page 3.

PREMIUM PORTION OF MS. BULKLEY'S CAPM ANALYSIS IS REASONABLE?

A. No, I believe Ms. Bulkley's equity risk premium component of between 8.32% and 8.60% is excessive and leads to an inflated CAPM result. The CAPM indicates a COE averaging under 8% using a reasonable equity risk premium component. As explained in the CAPM section starting on page 61, I determined that investors are demanding a significantly lower equity risk premium of between 2.71% and 3.99%. Closer examination shows that Ms. Bulkley's own sources (Kroll and Bloomberg) and other prominent sources arrive at substantially lower numbers than Ms. Bulkley.

Kroll

Ms. Bulkley cites Kroll SBBI Yearbook to justify her claim that her equity risk premium is "not unreasonable" because in 50 of the past 97 years (about 52% of observations), the realized return was at least 12.70%.[113] Her conclusion that this analysis supports her equity risk premium of 8.32% to 8.60% is flawed for at least two reasons.[114] First, it is not reasonable to conclude that investors expect that equity returns will be as high in the future as in the past. Kroll calculates a supply-side equity risk premium to account for evidence that equity returns may be lower in the future than they were since 1926. Ms. Bulkley's equity risk premium is inflated because she do not conduct a comprehensive analysis to consider if historical equity returns are sustainable or not. Second, Ms. Bulkley base her analysis on a one-year timeframe, which is problematic. The cost of equity should be measured over long periods, not just yearly returns. A one-year view is arbitrary and inconsistent with the long-term perspective needed, especially when

[113] *Id*. at 46:3-9.
[114] *Id*. at Exhibit AEB-5.

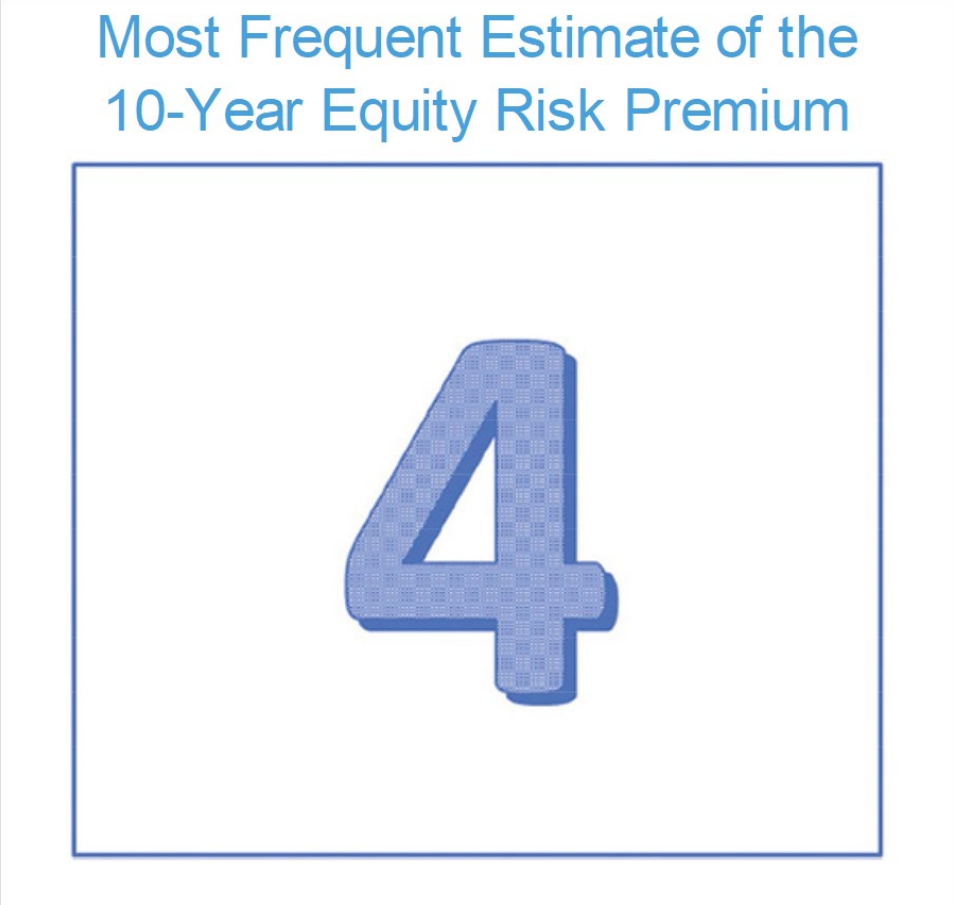
juxtaposed with the 30-year treasury bonds used as a risk-free rate benchmark. Ideally, a five-year rolling return average, or better yet, a 30-year period, should be used to align with the long-term investment horizon we are trying to measure.

Other Prominent Sources

This discrepancy is evident even when consulting other respected sources, like Professor Aswath Damodaran from NYU (who finds an equity risk premium of 4.06% as of September 2024),[115] and further supports the argument that Ms. Bulkley equity risk premium estimation is excessively high.

Additionally, based on calculations by P. Brett Hammond and Martin L. Leibowitz, which were based on a literature survey and estimates from participants in the 2001 Equity Risk Premium Forum, they found the most frequent estimate of the 10-year equity risk premium to be 4. Some attendees at the Equity Risk Premium Forum in 2012 found the following slide regarding the equity risk premium to be most memorable.

[115] Aswath Damodaran, PhD., Stern School of Business, New York University, *Damodaram Online*, at https://pages.stern.nyu.edu/~adamodar/.



The authors of *Revisiting the Equity Risk Premium* noted "Despite radically different market environments, it is striking that the estimates in all three forums and were so similar. They tended to be in the 3%–5% range, and notably and notably, in comparison to historical returns, none of them included estimates above 7% or below zero." The three forums were in 2001, 2011, and 2021.[116]

In summary, Ms. Bulkley's CAPM results are unreasonably high, because her equity risk premium component is above current market-based indicators (my own analysis

[116] P. Brett Hammond & Martin L. Leibowitz, CFA Institute Research Foundation, Revisiting the Equity Risk Premium, *Introduction: Three Decades of Equity Risk Premium Forums, p. vi, (2023)* available at https://www.cfainstitute.org/-/media/documents/article/rf-brief/Revisiting-the-Equity-Risk-Premium.pdf.

based on stock option prices, the sources she uses, which are Kroll, and the conclusions of other prominent research).

Q. DO MS. BULKLEY'S CAPM RESULTS OVERSTATE THE COE BECAUSE THE MARKET RISK PREMIUM PORTION OF HER ANALYSIS IS HIGHER THAN INVESTORS' EXPECTATIONS?

A. Yes. Ms. Bulkley's CAPM uses a market risk premium of 8.32% to 8.60% based on an expected market return on the S&P 500 of 12.70%.[117] The equity risk premium portion of my CAPM, which is based on a directly measure of investors' expectations, is significantly lower than Ms. Bulkley's. The market risk premia I use in my Weighted Average CAPM analysis with short- and long-term risk-free rates are 2.71% and 3.72%, respectively.[118] The market risk premia I use in my Spot CAPM analysis with short- and long-term risk-free rates are 2.98% and 3.99%, respectively.[119,]

Q. PLEASE LIST THE ADDITIONAL FACTORS THAT MS. BULKLEY CLAIMS MUST BE TAKEN INTO CONSIDERATION WHEN DETERMINING THE COMPANY'S COST OF EQUITY.

A. Ms. Bulkley believes the following additional factors must be considered when determining TAWC's Cost of Equity:

A. TAWC's capital expenditures relative to her proxy group companies
B. Flotation costs associate with AWK's recent equity issuances;
C. TAWC's regulatory risk relative to her proxy group companies;
D. TAWC's proposed capital structure as compared to the capital structures of her proxy group companies.

117 Direct Testimony of Ann E. Bulkley at Exhibit AEB-5.
118 Exhibit ALR-4, page 1.
119 Exhibit ALR-4, page 5.

Q. DO YOU AGREE WITH MS. BULKLEY THAT THE REGULATORY AND BUSINESS RISKS SHE CONSIDERS IMPACT TAWC'S COE?

A. No. I do not believe that TAWC's COE is impacted significantly by any of these factors and its authorized ROE should not be any higher.

Risks associated with capital expenditure program

Q. MS. BULKLEY DISCUSES POSSIBLE NEGATIVE IMPACTS OF CAPITAL SPENDING ON THE CREDIT RATINGS OF UTILITY COMPANIES. SHOULD TAWC RECEIVE A HIGHER ROE TO ACCOUTN FOR THIS TREND IN CAPITAL SPENDING?

A. No. In general, a capital spending program is an opportunity for TAWC to increase its rate base and therefore its earnings. In a recent presentation to investors, TAWC's parent American Water Works Company, Inc., explained that "investments drive continued growth in rate base" and explain that rate base growth is a major driver of earnings.[120] With the market-to-book ratios of water utility companies significantly higher than one, every dollar that is invested in rate base has a market value that is significantly higher than the value it is investing. For example, if TAWC increases its rate base by $100 million it would increase its market value to about $280 million because the market-to-book ratio of water utility stocks is about 2.8 to 1. I am not convinced that such a business opportunity should in any way, make TPUC consider increasing TAWC's authorized ROE in this proceeding. Additionally, as acknowledged by Ms. Bulkley, TAWC has a Qualified

[120] American Water's 2024 Second Quarter Earnings Call Presentation (July 31, 2024) at https://ir.amwater.com/news-and-events/investor-presentations/presentation-details/2024/2024-Second-Quarter-Earnings-Call-Presentation/default.aspx.

Infrastructure Investment Program ("QIIP") to recover capital investment costs.[121] This type of program reduces pressure on cash flow and the risk from possible negative impacts from regulatory lag.

Flotation Costs

Q. MS. BULKLEY CLAIMS THAT IF A REGULATED UTILITY COMPANY ID DENIED THE OPPORTUNITY TO RECOVERY FLOTATION COSTS, ACTUAL RETURNS WILL FALL SHORT OF EXPECTED (OR REQUIRED) RETURNS. PLEASE RESPOND.

A. In current market conditions, issuing new common stock is profitable for water utility stock investors and therefore it would be unfair for consumers to pay more for this profitable opportunity. The common stock of water utility companies is currently selling at a market price which is nearly 250 percent above book value.[122] As a result, when an water company sells new common stock, the effect is for the book value per share to increase. This makes selling new common stock a net profit to water utility companies, not a cost. Therefore, it is not necessary at this time to allow for flotation costs.

Small Size Risk

Q. PLEASE RESPOND TO MS. BULKLEY'S CLAIM THAT TAWC'S SMALL SIZE SUPPORTS AN ROE THAT IS ABOVE THE AVERAGE OF THE RANGE OF RESULTS PRODUCED BY COST OF EQUTIY MODELS.

A. I believe my COE models applied to the RFC Water Proxy Group reflect TAWC's COE for two reasons. First, TAWC is not a small company because it is a subsidiary of

[121] Direct Testimony of Ann E. Bulkley at 55:15-18.
[122] Exhibit ALR-3, page 1, 2 Retention Rate a) Market-to-Book Ratio.

American Water Works Company, Inc. that has a market capitalization of over $27 billion as of August 31, 2024. Second, even if we assume TAWC is a small company, the evidence indicates that investors do not demand a higher expected return on equity to invest in small companies as compared to larger ones. The 2021 SBBI Yearbook states the following regarding the theory that investors require higher returns to invest in smaller firms:

> The size effect is not without controversy, nor is this controversy something new. Traditionally, small companies are believed to have greater required rates of return than large companies because smaller companies are inherently riskier. It is not clear, however, whether this is due to size itself, or to other factors closely related to or correlated with size…
>
> Many scholars have expressed concerns with the results of older studies (1980s and 1990s) that found that smaller companies have higher required returns. Professor Aswath Damodaran said the following regarding the supposed "small cap premium:"[123]
>
> Even if you believe that small cap companies are more exposed to market risk than large cap ones, this is a sloppy and lazy way of dealing with that risk, since risk ultimately has to come from something fundamental (and size is not a fundamental factor).

Q. HAVE RECENT STUDIES FOUND THAT THE RELATIONSHIP BETWEEN SIZE AND EXPECTED RETURN IS WEAK?

A. Yes. A 2018 study conducted by scholars at AQR Capital Management and Yale University found that "the size effect diminished shortly after its discovery and publication." The authors of this research found that data errors plagued the early studies regarding the relationship between firm size and return. They found that the data in the earlier studies did not include delisted companies and since smaller firms are delisted more

[123] Aswath Damodaran, New York University, Stern School of Business, *Equity Risk Premiums (ERP): Determinants, Estimation, and Implications – the 2022 Edition*, pp. 53-54 (Updated March 23, 2022) at https://pages.stern.nyu.edu/~adamodar/pdfiles/papers/ERP2022Formatted.pdf.

often than larger stocks, the biased data (referred to as a "delisting bias") made the returns of smaller stocks look higher than reality. In light of this recent data, Ms. Bulkley's claim that TAWC's smaller size justifies an authorized ROE toward the upper end of the range of her COE model results is unjustified and should be disregarded.

Regulatory Risk

Q. MS. BULKLEY STATES THAT THE RATEMAKING PROCESS IS PREMISED ON THE PRINCIPLE THAT A UTILITY MUST HAVE A REASONABLE OPPORTUNITY TO RECOVER THE MARKET-REQUIRED RETURN ON ITS INVESTED CAPITAL. DO YOU AGREE?

A. Yes. As stated throughout my testimony, TAWC's authorized ROE should be set equal to its market-based COE.

Q. MS. BULKLEY CLAIMS ON PAGE 12, LINES 18-20 OF HER DIRECT TESTIMONY THAT IF THE TPUC AUTHORIZES ROES THAT ARE SIGNIFICANTLY BELOW ROES AUTHORIZED FOR OTHER UTILITIES IT COULD INHIBIT ITS ABILITY TO ATTRACT CAPITAL. PLEAE RESPOND.

A. Even if it were assumed that all historical authorized ROEs of water utility companies in other proceedings are based on accurate market-based cost of equity calculations, they are from the past. The cost of equity should be based on current market conditions. Unless authorized ROEs are set based on investors' current expectations as indicated by market data at the time of the proceeding, the resulting rates charged to consumers would either be too low to permit a utility to raise capital on reasonable terms or too high such that ratepayers would be overcharged. For these reasons, I strongly recommend using the

results of my market-based methods as confirmed by the equity return expectations of leading financial institutions (6.2 to 8.5% return on equity for the overall market).

Q. REGARDLESS OF WHAT THE MARKET-BASED COST OF EQUITY IS WOULDN'T INVESTORS PREFER TO EARN A 9.50% RETURN THAN 8.00%?

A. Yes. Investors would prefer to earn 9.5% rather than 8.0% return on book equity because this would lead to a higher return on the market price of equity as well. And investors would prefer to earn a 30% return rather than 9.5% return; however, allowing utilities to earn a return on book equity above the returns required by investors goes against utility regulation principles and would be unfair to consumers.

Q. PLEASE SUMMARIZE YOUR CONCERNS WITH MS. BULKLEY'S TESTIMONY.

A. Ms. Bulkley's 10.75% ROE recommendation is significantly higher than TAWC's market-based cost of equity. Ms. Bulkley's 10.75% ROE recommendation is excessive largely because: (1) the high end of her DCF results (11.20%) is based on unsustainably high growth rates, and (2) her CAPM analysis is based on excessive market risk premia that exceed the expectations of investors as indicated by stock option data, including the equity risk premium figures published by her own sources. If her recommendations are used to set rates, consumers will be significantly overcharged.

VIII. CONCLUSION

Q. PLEASE SUMMARIZE YOUR RECOMMENDATIONS IN THIS CASE.

A. Based on the evidence presented in my testimony, I conclude that the cost of equity allowed for TAWC should be between 7.09% to 8.28% (recommended at 8.28%). Based on my recommended common equity ratio of 50.90%, that results in an overall cost of capital of between 5.86% and 6.46% (recommended at 6.46%).

If the TPUC decides to use TAWC's requested capital structure of 54.52% common equity and 43.49% debt instead of my recommended capital structure, I recommend a reduced authorized ROE of 8.13% (6.94% - 8.13%) to account for the lower financial risk of a capital structure with more equity.

My recommendations satisfy the requirements of *Hope* and *Bluefield* that regulated utility companies should have the opportunity to earn a return commensurate with returns on investments in other enterprises having corresponding risks. My recommendations are consistent with legal standards set by the United States Supreme Court and market data and will allow TAWC to raise capital on reasonable terms while fulfilling its obligation to provide safe and reliable service.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes.

APPENDIX A. MARKET TO BOOK RATIOS AND THE MARKET-BASED COE

Q. PLEASE EXPLAIN WHY A MARKET TO BOOK RATIO OF SIGNIFICANTLY ABOVE ONE INDICATES THAT THE COST OF EQUITY FOR WATER UTILITY COMPANIES IS LOWER THAN THE EXPECTED RETURN ON BOOK EQUITY?

A. Calculating the cost of equity (investors' equity return expectations) is more complicated than calculating the return on a rental property, but the same concept applies regarding the relationship between market returns and book returns. If an investor purchases an apartment for $100,000 and expects to receive $500 per month ($500 X 12 = $6,000 per year) in rent, he or she will expect an annual return of 6% ($6,000/$100,000) on their investment. When the investor purchases the apartment, he would record the book value as $100,000 and the market value as $100,000 unless he determined that the purchase price was higher or lower than the market value. If the value of the apartment increases to $350,000, for example, the market to book ratio would increase to approximately 3.5, and therefore, his return on book value would remain at about 6% while his return on the market value of the apartment would decrease to about 1.7%.

In this rental property example, an increasing market value results in a lower expected return on market (1.7%) compared to expected return on book (6%) if the rent price remains constant. Rent prices do not increase to maintain an expected 6% return on book value; they are set by what the rental market reasonably can bear. The same is true of utility stocks. You do not establish an ROE based on a constant return on book (accounting) returns, it is set based on what investors in the market expect that market to return. In the case of a utility stock, an increasing market value results in a lower return on

market for the same expected return on book. As this rental property example demonstrates, there is nothing inconsistent about investors expecting a lower return on the market price of an investment than on the book value of an investment. In fact, with market to book ratios of water utility companies significantly above one it would be surprising if investors expected a return on market equal, or anywhere close, to return on book.

APPENDIX B. FUTURE-ORIENTED "B X R" METHOD

Q. ARE YOU AWARE OF CLAIMS ALLEGING THAT THE "BR" APPROACH TO THE CONSTANT GROWTH DCF MODEL IS FLAWED BECAUSE IT RELIES ON THE VALUE OF THE FUTURE EXPECTED RETURN ON BOOK EQUITY "R" TO ESTIMATE WHAT THE EARNED RETURN ON EQUITY SHOULD BE?

A. Yes. One common criticism is that it is not reasonable for the DCF to indicate a COE (market return) that is different (lower or higher) than the expected return on book equity (accounting). There are multiple reasons why this concern is unfounded:

1. The constant growth form of the equation using "br" is:

$$k = D/P + (br + sv)$$

In this equation, "k" is the variable for the COE, and "r" is the future expected return on equity. The COE, "k," is not the same variable as the future expected earned return on equity, "r." In fact, there often is a large difference between the two.

2. The correct value to use for "r" is the return on book equity expected by investors as of the time the stock price and dividend data are used to quantify the D/P term in the equation. Therefore, even if future events occur that may change what investors expect for "r," the computation of the COE "k" remains correct as of the time the computation was made.

3. The ability of a commission's ROE decision to influence future cash flow expectations is not unique to the retention growth DCF approach. The five-year analysts' earnings per share growth rate is a computation that is directly influenced by what earnings per share will be in 5 years. Allowed ROEs

impact earning – higher allowed returns lead to higher earnings growth because the higher allowed returns the more earnings are available for reinvestment.

Q. CAN CHANGES IN THE ACTUAL EARNED RETURNS IMPACT GROWTH ABOVE AND BEYOND WHATEVER GROWTH RESULTS FROM EARNINGS RETENTION?

A. Yes, but large short-term changes in earnings per share caused by a perceived change in the future expected earned returns are unsustainable. The new perceived earned return on book equity should be part of the computation, but the one-time growth spurt to get there is no more indicative of the sustainable growth required in the constant growth DCF formula than the temporary negative growth that occurs when a company has a bad year.

Q. CAN YOU PLEASE SUMMARIZE WHY A FUTURE-ORIENTED "B X R" METHOD IS SUPERIOR TO A FIVE-YEAR EARNINGS PER SHARE GROWTH RATE FORECAST IN PROVIDING A LONG-TERM SUSTAINABLE GROWTH RATE?

A. The primary cause of sustainable earnings growth is the retention of earnings. A company is able to create higher future earnings by retaining a portion of the prior year's earnings in the business and purchasing new business assets with those retained earnings. There are many factors that can cause short-term swings in earnings growth rates, but the long-term sustainable growth is caused by retaining earnings and reinvesting those earnings. Factors that cause short-term swings include anything that causes a company to earn a return on book equity at a rate different from the long-term sustainable rate. Assume, for example, that a particular utility company is regulated so that it is provided with a reasonable

opportunity to earn 9% on its equity. Should the company experience an event such as the loss of several key customers, or unfavorable weather conditions, which cause it to earn only 6% on equity in a given year, the drop from a 9% earned return on equity to a 6% earned return on equity would be concurrent with a very large drop in earnings per share. In fact, if a company did not issue any new shares of stock during the year, a drop from a 9% earned return on book equity to a 6% earned return on book equity would result in a 33.3% decline in earnings per share over the period.[124] However, such a drop in earnings would not be an indication of what is a long-term sustainable earnings per share growth rate. If the drop were caused by weather conditions, the drop in earnings would be immediately offset once normal weather conditions return. If the drop were from the loss of some key customers, the company would replace the lost earnings by filing for a rate increase to bring revenues up to the level required for the company to be given a reasonable opportunity to recover its cost of equity.

For the reasons above, changes in earnings per share growth rates that are caused by non-recurring changes in the earned return on book equity are inconsistent with long-term sustainable growth, but changes in earnings per share because of the reinvestment of additional assets is a cause of sustainable earnings growth. The "b x r" term in the DCF equation computes sustainable growth because it measures only the growth which a company can expect to achieve when its earned return on book equity "r" remains in equilibrium. If analysts have sufficient data to be able to forecast varying values of "r" in future years, then a complex, or multi-stage DCF method must be used to accurately

[124] By definition, earned return on equity is earnings divided by book value. Therefore, whatever level of earnings is required to produce earnings of 6% of book would have to be 33.3% lower than the level of earnings required to produce a return on book equity of 9%.

quantify the effect. Averaging growth rates over sub-periods, such as averaging growth over the first five years with a growth rate expected over the subsequent period, will not provide an appropriate representation of the cash flows expected by investors in the future and, therefore, will not provide an acceptable method of quantifying the cost of equity using the DCF method. The choices are either a constant growth DCF, in which one growth rate derived using "b x r" should be used, or a complex DCF method in which the cash flow anticipated in each future year is separately estimated. Ms. Bulkley has done neither. Instead, she mechanically adds analysts' five-year earnings per share growth rate to the dividend yield.

Q. WHY ARE ANALYSTS' FIVE-YEAR CONSENSUS GROWTH RATES NOT INDICATIVE OF LONG-TERM SUSTAINABLE GROWTH RATES?

A. Analysts' five-year earnings per share growth rates are earnings per share growth rates that measure earnings growth from the most currently completed fiscal year to projected earnings five years into the future. These growth rates are not indicative of future sustainable growth rates in part because the sources of cash flow to an investor are dividends and stock price appreciation. While both stock price and dividends are impacted in the long run by the level of earnings a company is capable of achieving, earnings growth over a period as short as five years is rarely in synchronization with the cash flow growth from increases in dividends and stock prices. For example, if a company experiences a year in which investors perceive that earnings temporarily dipped below normal trend levels, stock prices generally do not decline at the same percentage that earnings decline, and dividends are usually not cut just because of a temporary decline in a company's earnings. Unless both the stock price and dividends mirror every down swing in earnings,

they cannot be expected to recover at the same growth rate that earnings recover. Therefore, growth rates such as five-year projected growth in earnings per share are not indicative of long-term sustainable growth rates in cash flow. As a result, they are not applicable for direct use in the simplified DCF method.

Q. IS THE USE OF FIVE-YEAR EARNINGS PER SHARE GROWTH RATES IN THE DCF MODEL ALSO IMPROPER?

A. Yes. A raw, unadjusted, five-year earnings per share growth rate is usually a poor proxy for either short-term or long-term cash flow growth that an investor expects to receive. When implementing the DCF method, the time value of money is considered by equating the current stock price of a company to the present value of the future cash flows that an investor expects to receive over the entire time that he or she owns the stock. The discount rate required to make the future cash flow stream, on a net present value basis, equal to the current stock price is the cost of equity. The only two sources of cash flow to an investor are dividends and the net proceeds from the sale of stock at whatever time in the future the investor finally sells. Therefore, the DCF method is discounting future cash flows that investors expect to receive from dividends and from the eventual sale of the stock. Five-year earnings growth rate forecasts are especially poor indicators of cash flow growth, even over the five years being measured by the five-year earnings per share growth rate number.

Q. WHY IS A FIVE-YEAR EARNINGS PER SHARE GROWTH RATE A POOR INDICATOR OF THE FIVE-YEAR CASH DIVIDEND GROWTH EXPECTATIONS?

A. The board of directors of a company changes dividend rates based upon long-term earnings expectations combined with the capital needs of a company. Most companies do not

decrease dividends simply because a company has a year in which earnings were below sustainable trends, and similarly they do not increase dividends simply because earnings for one year happened to be above long-term sustainable trends. Therefore, over any given five-year period, earnings growth is frequently very different from dividend growth. In order for earnings growth to equal dividend growth, at a minimum, earnings per share in the first year of the five-year earnings growth rate period would have to be exactly on the long-term earnings trend line expected by investors. Since earnings in most years are above or below the trend line, the earnings per share growth rate over most five-year periods is different from what is expected for dividend growth.

Q. WHY IS THE FIVE-YEAR EARNINGS PER SHARE GROWTH RATE A POOR INDICATION OF FUTURE STOCK PRICE GROWTH?

A. If a company happens to experience a year in which earnings decline below what investors believe is consistent with the long-term trend, then the stock price does not drop anywhere near as much as earnings drop. Similarly, if a company happens to experience a year in which earnings are higher than the investor-perceived long-term sustainable trend, the stock price will not increase as much as the earnings. In other words, the P/E ratio of a company will increase after a year in which investors believe earnings are below sustainable levels, and the P/E ratio will decline in a year in which investors believe earnings are higher than expected. Since stock price is one of the important cash flow sources to an investor, a five-year earnings growth rate is a poor indicator of cash flow, both because it is a poor indicator of stock price growth over the five years being examined, and because it is equally a poor predictor of dividend growth over the period.

Q. ARE YOU SAYING THAT ANALYSTS' CONSENSUS EARNINGS PER SHARE GROWTH RATES ARE USELESS AS AN AID TO PROJECTING THE FUTURE?

A. No. Analysts' EPS growth rates are, however, very dangerous if used in a simplified DCF without proper interpretation. While they are not useful if used in their "raw" form, they can be very useful in computing estimates of what earned return on equity investors expect will be sustained in the future, and as such, are useful in developing long-term sustainable growth rates. This is exactly what I do in the application of my Constant Growth DCF Analysis.

APPENDIX C. NON-CONSTANT GROWTH FORM OF THE DCF MODEL

Q. YOUR NON-CONSTANT GROWTH DCF MODEL USES ANNUAL EXPECTED CASH FLOWS. SINCE DIVIDENDS ARE PAID QUARTERLY RATHER THAN ANNUALLY, HOW DOES THIS SIMPLIFICATION IMPACT YOUR RESULTS?

A. I used the annual model because it is easier for observers to visualize what is happening. Modeling cash flows to be annual rather than when they are actually expected to occur causes a small overstatement of the COE.

Q. WHY IS IT A SMALL OVERSTATEMENT OF THE COE IF YOU HAVE MODELED DIVIDENDS TO BE RECEIVED SOME MONTHS AFTER INVESTORS ACTUALLY EXPECT TO RECEIVE THEM?

A. The process of changing from an annual model to a quarterly model would require two changes, not just one. A quarterly model would show dividends being paid sooner and would also show earnings being available sooner. A company that receives its earnings sooner, rather than at the end of the year, has the opportunity to compound them. Since revenues, and therefore earnings, are essentially received every day, a company that is supposed to earn an annual rate of 9.00% on equity would have to earn only 8.62% if the return were compounded daily.[125] This reduction from 9.00% to 8.62% would then be partially offset by the impact of the quarterly dividend payment to bring the result of switching from the simplifying annual model closer to, but still a bit below 9.00%.

[125] (1+.0862/365)^365=1.09=9.00%.

Q. BY USING CASH FLOW EXPECTATIONS AS THE VALUATION PARAMETER, DOES THE NON-CONSTANT DCF MODEL STILL RELY ON EARNINGS?

A. Yes. It relies on an expectation of future cash flows. Future cash flows come from dividends during the time the stock is owned and capital gains from the sale of the stock once it is sold. Since earnings impact both dividends and stock price, the non-constant DCF model still relies on earnings.

Every dollar of earnings is used for the benefit of stockholders, either in the form of a dividend payment, or earnings reinvested for future growth in earnings and/or dividends. Earnings paid out as a dividend have a different value to investors than earnings retained in the business. Recognizing this difference and properly considering it in the quantification process is a major strength of the DCF model and is why the non-constant DCF model as I have set forth is an improvement over either the price-to-earnings ratio (P/E ratio) or dividend/price (D/P) methods. Comparing the P/E ratios and the dividend yield (D/P) are helpful as a rule of thumb, but they must be used with caution because, among other reasons, two companies with the same dividend yield can have a different COE if they have different retention rates. A DCF model is more reliable than these rules of thumb because it can account for different retention rates, among other factors.

Q. WHY IS THERE A DIFFERENCE TO INVESTORS IN THE VALUE OF EARNINGS PAID OUT AS A DIVIDEND COMPARED TO THE VALUE OF EARNINGS RETAINED IN THE BUSINESS?

A. The return on earnings retained in the business depends upon the opportunities available to that company. If a regulated utility reinvests earnings in needed "used and useful" utility assets, then those reinvested earnings have the potential to earn at whatever return is

consistent with ratemaking procedures allowed and the skill of management in prudently operating the system.

When an investor receives a dividend, she can either reinvest it in the same or another company or use it for other things, such as paying down debt or paying living expenses. Although an investor could theoretically use the proceeds from any dividend payments to simply buy more stock in the same company, when an investor increases her investment in a company by purchasing more stock, the transaction occurs at market price. However, when the same investor sees her investment in a company increase because earnings are retained rather than paid as a dividend, the reinvestment occurs at book value. Stated within the context of the DCF terminology: earnings retained in the business earn at the future expected return on book equity "r," and dividends used to purchase new stock earn at the rate "k." When the market price exceeds book value (that is, the market-to-book ratio exceeds 1.0), retained earnings are worth more than earnings paid out as a dividend because "r" will be higher than "k." Conversely, when the market price is below book value, "k" will be higher than "r," meaning that earnings paid out as a dividend earn a higher rate than retained earnings.

Q. IF RETAINED EARNINGS WERE MORE VALUABLE WHEN THE MARKET-TO-BOOK RATIO IS ABOVE 1.0, WHY WOULD A COMPANY WITH A MARKET-TO-BOOK RATIO ABOVE 1.0 PAY A DIVIDEND RATHER THAN RETAIN ALL OF THE EARNINGS?

A. Retained earnings are more valuable than dividends only if there are sufficient opportunities to profitably reinvest those earnings. Regulated utility companies are allowed to earn the cost of capital only on assets that are used and useful in providing utility

service. Investing in assets that are not needed may not produce any return at all. For unregulated companies, opportunities to reinvest funds are limited by the demands of the business. For example, how many new computer chips can Intel profitably develop at the same time?

Q. UNDER THE NON-CONSTANT DCF MODEL, IS IT NECESSARY FOR EARNINGS AND DIVIDENDS TO GROW AT A CONSTANT RATE FOR THE MODEL TO BE ABLE TO ACCURATELY DETERMINE THE COST OF EQUITY?

A. No. Because the non-constant form of the DCF model separately discounts each and every future expected cash flow, it does *not* rely on any assumptions of constant growth. The dividend yield can be different from period to period, and growth can bounce around in any imaginable pattern without harming the accuracy of the answer obtained from quantifying those expectations. When the non-constant DCF model is correctly used, the answer obtained is as accurate as the estimates of future cash flow.

APPENDIX D. CAPITAL ASSET PRICING MODEL

Risk Free Rate

Q. WHAT IS YOUR RESPONSE TO ANALYSTS WHO CLAIM THAT THE CAPM MUST BE IMPLEMENTED WITH A LONG-TERM INTEREST RATE (E.G., YIELD ON 30-YEAR TREASURY BOND) AS AN ESTIMATE OF THE RISK-FREE RATE COMPONENT OF THE CAPM?

A. When looking for a security to calculate an estimate of the risk-free rate, it could be argued that it is appropriate to find one with a term or maturity that best matches the life of the asset being financed. In that sense, the 30-year Treasury bond yield can be argued to be ideal for this specific application. However, it is equally important to find a security that has a beta coefficient with the overall market as close to zero as possible, because by the very definition of the risk-free rate in the CAPM model, its movements should have no correlation to the movements of the market. And this is where the problem with the 30-year Treasury bond yield arises, as it has an established non-zero beta. The 3-month Treasury bill yield has a considerably lower beta, and therefore is superior in that respect to the 30-year Treasury bond yield. Neither one is a perfect fit on both fronts, which is why I have chosen to consider both as proxies for the risk-free rate to establish a range for my CAPM results.

Q. HOW DO YOU RESPOND TO ANALYSTS WHO CLAIM THAT THE RISK-FREE RATE SHOULD BE BASED ON INTEREST RATE FORECASTS FROM FIRMS SUCH AS BLUE CHIP FINANCIAL?

A. It is important to recognize that current long-term Treasury bond yields represent a direct observation of investor expectations and there is no need to use "expert" forecasts such as

Blue Chip to determine the appropriate risk-free rate to use in a CAPM analysis or any other cost of equity calculations.

Many economists and forecasters will continue to be quoted in the press prognosticating on possible developments that are truly unpredictable. The Nobel Laureate Economist Daniel Kahneman stated the following regarding forecasting:

> It is wise to take admissions of uncertainty seriously, but declarations of high confidence mainly tell you that an individual has constructed a coherent story in his mind, not necessarily that the story is true.[126]

Historical Beta

Q. PLEASE EXPLAIN HOW YOU CALCULATE HISTORICAL BETAS.

A. I calculate historical betas following the methodology used by Value Line, with some modifications. Specifically, Value Line adheres to the following guidelines:

1. Returns for each security are regressed against returns for the overall market in the following form:

$$\ln (p^{I}_{t} / p^{I}_{t-1}) = a_{I} + B_{I} * \ln (p^{m}_{t} / p^{m}_{t-1})$$

Where:

- p^{I}_{t} is the price of the security I at time t
- p^{I}_{t-1} is the price of the security I one week before time t
- p^{m}_{t} and p^{m}_{t-1} are the corresponding values of the market index
- B_I is the regression estimate of Beta for the security against the market index

2. The natural log of the price ratio is used as an approximation of each return and no adjustment is made for dividends paid during the week.

[126] DANIEL KAHNEMAN, *Thinking Fast and Slow*, p. 212(New York: Farrar, Straus, and Giroux, 2011).

3. Weekly returns are calculated on one day of the week, with a stated preference for Tuesdays to minimize the effect of holidays as much as possible.
4. Betas calculated using the regression method above are adjusted as per Blume (1971)[127] using the following formula:

$$\text{Adjusted } B_I = 0.35 + 0.67 * \text{Calculated } B_I$$

There are four differences between my historical beta calculations and Value Line's calculations:

1. The first significant difference is that whereas Value Line uses the New York Stock Exchange Composite Index as the market index, I use the S&P 500 Index.
2. Another important difference is that whereas Value Line calculates weekly returns on one day of the week, with a stated preference for Tuesdays, I calculate weekly returns on all days of the week.
3. Value Line only calculates betas every 3 months in their quarterly company reports, whereas I use the same consistent methodology to calculate betas every week during the most recent 3 complete months (June through August 2024).
4. Value Line always uses a 5-year period for the return regression,[128] whereas I calculate historical betas for periods of 6 months, 2 years, and 5 years, as shown in Chart 15 on page 67.

[127] M. Blume, On the Assessment of Risk, *The Journal of Finance*, Vol. XXVI (March 1971) at www.stat.ucla.edu/~nchristo/Fiatlux/blume2.pdf.

[128] They offer betas calculated over different time periods on their website, including 3 years and 10 years.

In the following pages, I explain my rationale for making the four modifications above to Value Line's beta calculation methodology.

Q. WHY DO YOU CALCULATE YOUR HISTORICAL BETAS VS. THE S&P 500 INDEX INSTEAD OF THE NEW YORK STOCK EXCHANGE (NYSE) COMPOSITE INDEX, AS VALUE LINE DOES?

A. A critical factor in the calculation of a beta coefficient is the choice of index to represent the overall market. Using exactly the same beta calculation methodology with a different market index will result in different values of beta for a given company or portfolio – sometimes drastically different values. It is easy to jump to the conclusion that this points to a flaw in CAPM theory, as different values of beta would result in a different implied cost of equity. However, another key component of the CAPM, the market risk premium, also depends on the choice of the market index, which in theory would have an offsetting effect on the cost of equity calculation. This points to the most important aspect of selecting a market index for a CAPM analysis, which is to be consistent and use the same index for the calculation of beta as for the calculation of the market risk premium. This is a fundamental concept of the CAPM and using betas based on one index with a market risk premium based on a different index yields invalid results.

As stated above, Value Line calculates its published betas based on the NYSE Composite Index. Most methodologies used to calculate the market risk premium, including those I rely on, are based on the S&P 500 Index, so using them in the CAPM together with Value Line betas exactly as published would yield invalid results.

For this reason, I calculate my historical betas versus the S&P 500 Index, making my CAPM approach entirely consistent.

As an aside related to my option-implied betas, using the S&P 500 Index consistently throughout my CAPM has the added benefit that this index has a much larger number of options traded, which makes the calculation of option-implied betas more reliable.

Q. WHY DO YOU CALCULATE YOUR HISTORICAL BETAS USING WEEKLY RETURNS ON EVERY DAY OF THE WEEK AS OPPOSED TO USING ONLY ONE DAY OF THE WEEK, AS VALUE LINE DOES?

A. Using one day of the week to calculate weekly returns for use in the regression analysis used to calculate historical betas has the unintended effect of generating different values of betas depending on the day of the week that is used. To clarify, if one were to use Value Line's precise methodology for calculating a 5-year historical beta for a given company using weekly returns calculated on Tuesdays, the resulting beta value would be different than the resulting value if one were to use the same exact methodology, but using weekly returns calculated on Wednesdays, or any other day of the week. Even though 5-year historical betas should in theory be quite stable and should not change very much from one day to the next, calculating returns on only one day of the week results in differences that can be significant and make no sense conceptually.

I only became aware of this side-effect recently, but it is easy to understand why it happens. Even though there is some correlation due to some overlap, the set of weekly returns calculated on Mondays is a completely different set of numbers than the set of weekly returns calculated on Tuesdays. As a result, there are five 5-year betas that can result from Value Line's methodology, and even though the Monday beta for a given

company will change slowly from week to week, the change between the Monday beta and the Tuesday beta, calculated just one trading day apart, can be quite significant.

Since I became aware of this undesirable effect, I began calculating my historical betas based on an all-encompassing set of weekly returns calculated on every trading day in the beta calculation period. This methodology has the effect of averaging out the five possible betas that could result from using only one day of the week for the return calculations,[129] as Value Line does. In this way, a 5-year beta calculated on any two consecutive trading days would only change minimally, as it should.

Using a daily calculation of weekly returns could be criticized for the resulting overlap in a weekly return from Monday to Monday with that from Tuesday to Tuesday. However, given that the overlap is consistent and equal for the net effect of every trading day, no trading day is given undue weight in the regression. Even though the effect of each trading day appears 5 times in the weekly return data, there are also 5 times the total number of weekly returns in the overall set used in the regression, so any individual trading day has the same relative weight than in Value Line's methodology. The fact that the resulting beta value of this aggregate approach turns out to be a sort of average of the five possible values that would result from Value Line's methodology on different days of the week is the final confirmation that this is the superior approach for calculating a historical beta based on weekly returns.

Using a daily calculation of weekly returns has the added marginal benefit of providing more data pairs to be used in historical beta calculations for shorter periods, such

[129] The resulting beta is not a direct arithmetic or geometric average of the other five betas, but rather a regression based on the union of all five possible sets of weekly returns.

as for 6-month historical betas, where instead of 25 return pairs, the regression is performed on 117 return pairs.

Q. ARE THERE ADDITIONAL BENEFITS TO DOING YOUR OWN HISTORICAL BETA CALCULATIONS?

A. Doing my own historical beta calculations using Value Line's established methodology allows me to see how beta values change from week to week and to use the most up-to-date beta calculations instead of relying on stale beta values that can be more than 3 months old.

Q. HOW MANY DATA POINT PAIRS ARE NECESSARY TO ESTABLISH A STATISTICALLY SIGNIFICANT CORRELATION BETWEEN TWO VARIABLES IN A REGRESSION ANALYSIS, SUCH AS THE ONE USED TO ESTABLISH BETA COEFFICIENTS?

A. Establishing a minimum number is somewhat subjective, though various authorities on statistics argue the number is between 3 and 8 data pairs. While one can broadly correctly generalize that the more data point pairs one uses, the more certain one can be about the significance of the results of any correlation analysis, this is very different from stating that one cannot achieve statistical significance with a relatively low number of data pairs. In fact, it is important to realize that one can achieve statistical significance with less than 10 data pairs, and that even hundreds of data pairs do not guarantee statistical significance. For precisely this reason, statisticians have developed a tool that helps determine statistical significance based on the number of data pairs in a regression analysis.

A "table of critical values" of Pearson's correlation, which can be readily found online[130] or in most statistics books, tells a statistician that for 25 data point pairs (implying N-2=23 "degrees of freedom"), a correlation, or beta, coefficient of 0.505 or higher will occur *by chance* with a probability of only 0.01.[131] As explained in more detail in the text regarding how to use the table of critical values,[132] any beta coefficient above this level, and certainly above the 0.687 3-month average for the recent 6-month betas for my RFC Water Proxy Group, by definition are considered statistically significant. The threshold for statistical significance for 117 data point pairs (implying 115 "degrees of freedom"), is so low that it is not even included in the table of critical values. The maximum "degrees of freedom" listed is 100, with an already very low threshold of 0.254.

Historical Blended Beta

Q. HOW DID YOU DECIDE ON THE RELATIVE WEIGHTS YOU ALLOCATE TO EACH COMPONENT OF YOUR HISTORICAL BLENDED BETAS? IS THERE ANY ACADEMIC SUPPORT FOR YOUR APPROACH?

A. I am not aware of any academic study specifically focused on the optimal relative weight of historical betas to predict future betas. However, the authors of the paper I relied upon for guidance on the calculation of my option-implied betas did attempt to quantify the predictive power of 6-month option-implied ("forward-looking") betas as well as that of 6-month ("180-day"), 1-year, and 5-year historical betas by back-testing historical

[130] University of Connecticut, *r Critical Value Table*, available at: https://researchbasics.education.uconn.edu/r_critical_value_table/#

[131] In fact, many researchers use a more lenient "alpha level" of 0.05 for determinations of statistical significance.

[132] University of Connecticut, *Statistical Significance: Is there a relationship (difference) or isn't there a relationship (difference)?* at https://researchbasics.education.uconn.edu/statistical_significance

predictions with actual *expost* results, or "realized" betas, for the 30 companies in the Dow Jones Index. In addition to using each of the betas above independently, they also measured the predictive power of a "mixed" beta consisting of a simple average of the six-month option-implied beta and the 6-month historical beta.

Their conclusions for predicting 6-month future betas are as follows:

> The forward-looking beta outperforms the other methods ten times, and the same is true for the 180-day historical beta. The mixed beta is the best performer in seven cases, and the 1-year historical beta in three cases. The 5-year historical beta is always outperformed by at least one other method, and it often ranks last. The 180-day historical beta clearly dominates the two other historical methods.[133]

Their conclusions for predicting 1-year and 2-year future betas are as follows:

> Somewhat unexpectedly, the performance of the forward-looking beta compared to that of the 180-day historical beta is much better [for the one-year prediction] than [for the six-month prediction], and this conclusion carries over to [the two-year prediction]. The mixed beta also perform [sic] well. It is perhaps not surprising that the performance of the 180-day historical beta [for the one- and two-year predictions] is poorer than [for the six-month prediction], because the horizons used in the construction of realized betas are no longer equal to 180 days. What is harder to explain is why the correlation between realized beta and forward-looking beta is in many cases higher [for the one- and two-year predictions] than [for the six-month prediction]. Finally, it is also interesting that the 1-year and 5-year historical betas do not perform well [for the one-and two-year predictions]. In summary, [for the one-year prediction] either the forward-looking beta or the mixed beta is the best performer in nineteen out of thirty cases. [For the two-year prediction], this the case twenty-two times out of thirty.[134]

Their conclusions strongly support the use of 6-month historical betas, 6-month option-implied betas, and/or an average of the two as predictors of future betas 6 months, 1 year, or 2 years into the future. Therefore, considering a historical blended beta in conjunction with option-implied betas to calculate the cost of equity is consistent with

[133] Peter Christoffersen, Kris Jacobs, & Gregory Vainberg, *Forward-Looking Betas*, p. 16 (April 25, 2008) at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=891467.

[134] *Id. at 17.*

research findings that coming historical and option-implied betas is the best predictor of future betas.

I decided on the composition of my historical blended betas primarily based on the conclusions of the authors above. Though the predictive power of longer-term historical betas seems to be quite reduced, it is not zero, so in an effort to preserve the effect of longer-term market trends in my historical blended betas, I chose incorporate 5-year historical betas.

Market Risk Premium

Q. WHICH CUMULATIVE PROBABILITY DID YOU USE TO ESTIMATE THE OPTION-IMPLIED GROWTH OF THE S&P 500 IN THE CALCULATION OF YOUR MARKET RISK PREMIUM AND WHY?

A. I used a cumulative probability of 50.0% in the calculation of my option-implied growth for the S&P 500, which results in a value of 6.89% as of August 31, 2024 and a value of 6.73% for the weighted average of the 3 months ending on that date. As stated above, a cumulative probability of 50% represents the median of the probability distribution, or in this case the option-implied market consensus, which is why I have chosen to use this level.

As a matter of fact, using the same probability distribution derived from the options market described above, one can also calculate the cumulative probability implied by a given cost of capital. For instance, using the same risk-free rates and betas for the RFC Water Proxy Group in my CAPM analysis, Ms. Bulkley's 10.75%ROE recommendation[135] implies an average market risk premium of 7.4%, an average overall market return of

[135] Direct Testimony of Ann E. Bulkley at 10:1-3.

12.1%, average growth for the S&P 500 of 10.8%, and a cumulative probability of 64.2%. In other words, to achieve the required market growth of 10.8%, reality would have to exceed 64.2% of the scenarios investors currently see as plausible for the market in aggregate, considerably more than the median market consensus at 50%. To put this into perspective, it is important to note that values on the tails of the probability function get increasingly separated, requiring an ever-increasing growth rate for every additional percentage in the cumulative probability, and making it impossible to ever arrive at 100%.

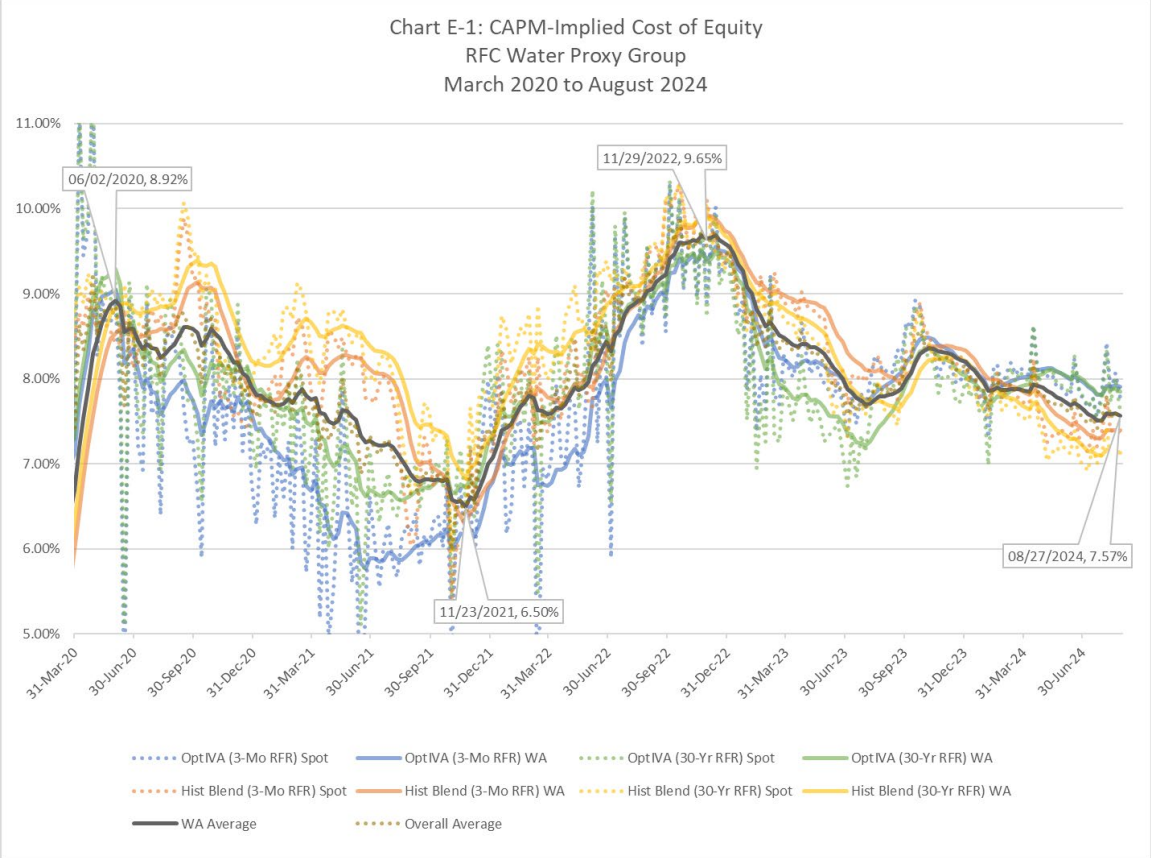
Using exactly the same methodology using the betas of the RFC Water Proxy Group, my recommended 8.28% ROE implies an average market risk premium of 4.3%, an average overall market return of 9.1%, average growth for the S&P 500 of 7.8%, and a cumulative probability of 53.3%.

Q. ARE THE CUMULATIVE PROBABILITIES YOU REFER TO IN THIS CASE DIRECTLY COMPARABLE TO THE CUMULATIVE PROBABILITIES YOU HAVE USED OR REFERRED TO IN PRIOR TESTIMONIES YOU HAVE FILED?

A. In late 2020, after significant efforts related to the complexities in processing extremely large volumes of option data, I was finally able to use option-implied volatility and option-implied skewness to come up with a log-normal function that approximates the probability distribution of the possible trajectories for the S&P 500 implied by the options market as of any given day, as explained above. All of the testimonies I have filed since then, starting in 2021, have used this complete and superior approach along with a cumulative probability of 50%, representing the median of the probability distribution, or the option-implied market consensus, to estimate expected market growth. Any references to cumulative probability in these testimonies are directly comparable.

Prior to incorporating skewness into the approximation, I used a normal function to estimate the same probability distribution referred to above. Using a normal distribution as an approximation is a simplification used commonly in economics, including in the Black-Scholes formula for a single option. However, unlike a skewed log-normal function, a normal function has the same median and mean, meaning that when applied in this case, the option-implied market consensus of this simplified approximation implies market growth of 0%. As a result, before using log-normal functions, I had to resort to finding an adequate level of cumulative probability above 50% to estimate market growth, which is admittedly somewhat subjective. To be conservative, I often used a cumulative probability of 68.3%, which is the probability found within one standard deviation of the mean of a normal distribution, which I understood would lead to a conservatively high estimate for market growth. It is important to point out that the cumulative probabilities of the simplified normal function approximation I used in cases before 2021 cannot be directly compared to the cumulative probabilities of the superior log-normal function approximation, which takes skewness into account. The considerably improved approximation based on a log-normal function eliminates all subjectivity in arriving at the implied market consensus and allows a much better measure of implied cumulative probabilities of deviations from that market consensus.

APPENDIX E. CAPM-IMPLIED COST OF EQUITY FOR RFC WATER PROXY GROUP OVER TIME SINCE ONSET OF COVID PANDEMIC



Notes regarding the content of this chart:

- *The information in this chart is the property of Rothschild Financial Consulting ("RFC") and may not be used for any purpose without the express written consent of RFC. Even when the underlying data are publicly available from another source, the results of analyses performed by RFC and the way of presenting the data are and remain the property of RFC.*

- *The data presented herein may not agree 100% with past recommendations by RFC for numerous reasons, including differences in the underlying proxy group and the fact that this chart represents only results based on the CAPM, whereas RFC usually bases recommendations on the CAPM and other models, such as various forms of the DCF.*

APPENDIX F. RESUME OF AARON L. ROTHSCHILD

SUMMARY

Financial professional providing U.S. public utility commissions financial tools and expert testimony to assist in rate setting for regulated utility companies (e.g., regulated electric distribution providers, natural gas pipelines). Relevant experience includes developing and applying methodologies that directly measure investors' equity return expectations based on stock option prices, applied mathematics research for utility industry as an affiliate of the New England Complex Systems Institute, and serving as Head of Business Analysis for a major U.S. telecom firm in Asia Pacific.

EXPERIENCE

Rothschild Financial Consulting, Ridgefield, CT **November 2001- present**
Independent consulting firm specializing in utility sector
President

- Provide financial expert testimony (e.g., rate of return and M&A) to regulators, policy makers, foundations, and consumer groups in utility rate case proceedings, including representing the California Public Advocates Office and the Wild Tree Foundation in the ongoing California water and energy cost of capital proceedings
- Developed cost of equity models that have been adopted by the Public Service Commission of South Carolina in 2020 (decision upheld by the South Carolina Supreme Court in September 2021) and the Connecticut Public Utilities Regulatory Authority in September 2021
- Developing market-based cost of equity methodology in ongoing regulated natural gas pipeline case before the Federal Energy Regulatory Commission (FERC), including proposing replacing equity analyst earnings per-share forecasts (IBES, Value Line) with options-implied growth expectations to determine authorized return on equity (ROE)
- Present at utility regulation conferences (NARUC/NASUCA and MARC) regarding rate of return, power purchase agreements, complex systems science, and subsidy auctions

360 Networks, Hong Kong **January 2001 - October 2001**
Pioneer of the fiber optic telecommunications industry
Senior Manager

- Business development and investment evaluation
- Negotiated landing rights and formed local partnerships in Korea, Japan, Singapore, and Hong Kong for $1 billion undersea cable project
- Structured fiber optic bandwidth swapping agreement with Enron and Global Crossing
- Established relationships with Hong Kong based Investment Bankers to communicate Asia Pacific objectives and accomplishments to Wall Street

Dantis, Chicago, IL **July 2000- December 2000**
Start-up managed data-hosting services provider
Director

- Built capital raise valuation models and negotiated with potential investors
- Team raised $100M from venture capital firm through valuation negotiations and internal strategic analysis

MFS, MCI-WorldCom, Chicago, Hong Kong, Tokyo September 1996- July 2000
American Telecommunications Company
Head of Business Analysis for Japan operations

- Managed staff of 5 business development analysts
- Raised $80M internally for Japanese national fiber network expansion plan by conducting an investment evaluation and presenting findings to CEO of international operations in London, UK
- Built financial model for local fiber optic investment evaluation that was used by business development offices in Oak Brook, IL and Sydney, Australia

EDUCATION

Vanderbilt University, Nashville, TN 1994-1996
MBA, Finance

- Completed business plan for Nextlink Communications in support of their national fiber optic network expansion, including identifying opportunities from passage of Telecom Act of 1996
- Developed analytical framework to evaluate predictability of rare events
- Provided financial and accounting analysis to Chicago's consumer advocate, the Citizens Utility Board (CUB) as a summer intern

Clark University, Worchester, MA 1990 - 1994
BA, Mathematics

APPENDIX G. TESTIFYING EXPERIENCE OF AARON L. ROTHSCHILD

Filed Rate of Return Testimonies:

California

- Pacific Gas and Electric, Application 22-04-008 et al, Rate of Return/Cost of Capital Mechanism, January 2024
- Liberty Utilities, Application A.23-05-004, Rate of Return, August 2023
- San Gabriel Water Company, Application 23-05-001, Rate of Return, August 2023
- Suburban Water Company, Application 23-05-003, Rate of Return, August 2023
- Great Oaks Water Company, Application 23-05-002, Rate of Return, August 2023
- Incumbent Local Exchange Carriers (ILECs), Application 22-09-003, Rate of Return, May 2023
- Pacific Gas and Electric Company, Application 22-04-008, Rate of Return, August 2022
- Southern California Edison, Application 22-04-009, Rate of Return, August 2022
- San Diego Gas & Electric Company, Application 22-04-012, Rate of Return, August 2022
- California American Water Company, Application 21-05-001, Rate of Return, January 2022
- California Water Service Company, Application 21-05-002, Rate of Return, January 2022
- Golden State Water Company, Application 21-05-003, Rate of Return, January 2022
- San Jose Water Company, Application 21-05-004, Rate of Return, January 2022
- Southern California Edison, Application 21-08-013, Rate of Return/Cost of Capital Mechanism, January 2022
- San Diego Gas & Electric Company, Application 21-08-014, Rate of Return/Cost of Capital Mechanism, January 2022
- Pacific Gas and Electric Company, Application 21-08-015, Rate of Return/Cost of Capital Mechanism, January 2022
- Pacific Gas and Electric Company, Application 21-01-004, Securitization, February 2021
- Pacific Gas and Electric Company, Application 20-04-023, Securitization, October 2020
- Southern California Edison, Application 20-07-008, Securitization, September 2020
- San Diego Gas & Electric Company, Application 19-04-017, Rate of Return, August 2019
- Southern California Gas Company, Application 19-04-016, Rate of Return, August 2019
- Pacific Gas and Electric Company, Application 19-04-015, Rate of Return, August 2019
- Southern California Edison, Application 19-04-014, Rate of Return, August 2019
- Liberty Utilities, Application A.18-05-006, Rate of Return, August 2018
- San Gabriel Water Company, Application 18-05-005, Rate of Return, August 2018
- Suburban Water Company, Application 18-05-004, Rate of Return, August 2018
- Great Oaks Water Company, Application 18-05-001, Rate of Return, August 2018
- California Water Service Company, Application 17-04-006, Rate of Return, August 2017
- California American Water Company, Application 17-04-003, Rate of Return, August 2017
- Golden State Water Company, Application 17-04-002, Rate of Return, August 2017
- San Jose Water Company, Application 17-04-001, Rate of Return, August 2017

Colorado
- Public Service Company of Colorado, Docket No. 11AL-947E, Rate of Return, March 2012

Connecticut
- Connecticut Natural Gas Corporation, Docket No. 23-11-02, February 2024
- The Southern Connecticut Gas Company, Docket No. 23-11-02, February 2024
- United Illuminating Company, Docket No. 22-08-08, Rate of Return, December 2022
- Aquarion Water Company of Connecticut, Docket No. 22-07-01, Rate of Return, October 2022
- Eversource and United Illuminating, Docket No. 17-12-03RE11, Rate of Return / Interim Rate Reduction, April 2021
- United Water Connecticut, Docket No. 07-05-44, Rate of Return, November 2008
- Valley Water Systems, Docket No. 06-10-07, Rate of Return, May 2007

Delaware
- Tidewater Utilities, Inc., PSC Docket No. 11-397, Rate of Return, April 2012

District of Columbia
- Washington Gas Light Company, Formal Case No. 1169, Rate of Return, May 2023

Florida
- Florida Power & Light (FPL), Docket No. 070001-EI, October 2007
- Florida Power Corp., Docket No. 060001 Fuel Clause, September 2007

New Jersey
- Aqua New Jersey, Inc., BPU Docket No. WR11120859, Rate of Return, April 2012

Maryland
- Delmarva Power & Light, Case No. 9317, Rate of Return, June 2013
- Columbia Gas of Maryland, Case No. 9316, Rate of Return, May 2013
- Potomac Electric Power Company, Case No. 9286, Rate of Return, March 2012
- Delmarva Power & Light, Case No. 9285, Rate of Return, March 2012

North Dakota
- Montana-Dakota Utilities Co., Case No. PU-20-379, Rate of Return, January 2021
- Otter Tail Power Company, Case No. PU-17-398, Rate of Return, May 2018
- Montana-Dakota Utilities Co., Case No. PU-15-90, Rate of Return, August 2015
- Northern States Power, Case No. PU-400-04-578, Rate of Return, March 2005

Pennsylvania
- Aqua Pennsylvania, Inc., Docket No. R-2024-3047822, Rate of Return, August 2024
- Peoples Natural Gas Company LLC, Docket No. R-2023-304459, Rate of Return, March 2024
- UGI Utilities, Inc. – Electric Division, Docket No. R-2022-3037368, Rate of Return, April 2023
- Pennsylvania American Water Company, Docket No. R-2022-3031672 and R-2022-3031673, Rate of Return, July 2022
- UGI Utilities, Inc. – Electric Division, Docket No. R-2021-3023618, Rate of Return, May 2021
- Pennsylvania American Water Company, Docket No. P-2021-3022426, Rate of Return, February 2021
- Audubon Water Company, Docket No. R-2020-3020919, Rate of Return, November 2020

- Pennsylvania American Water Company, Docket No. R-2020-3019369 and R-2020-3019371, Rate of Return, September 2020
- Twin Lakes Utilities, Inc., Docket No. R-2019-3010958, Rate of Return, October 2019
- City of Lancaster Sewer Fund, Docket No. R-2019-3010955, Rate of Return, October 2019
- Community Utilities of Pennsylvania Inc. Wastewater Division, Docket No. R-2019-3008948, Rate of Return, July 2019
- Community Utilities of Pennsylvania Inc. Water Division, Docket No. R-2019-3008947, Rate of Return, July 2019
- Newtown Artesian Water Company, Docket No. R-20019-3006904, Rate of Return, May 2019
- Hidden Valley Utility Services, L.P. – Wastewater Division, Docket No. R-2018-3001307, Rate of Return, September 2018
- Hidden Valley Utility Services, L.P. – Water Division, Docket No. R-2018-3001306, Rate of Return, September 2018
- The York Water Company, Docket No. R-2018-3000019, Rate of Return, August 2018
- SUEZ PA Pennsylvania, Inc., Docket No. R-2018-000834, Rate of Return, July 2018
- UGI Utilities, Inc. – Electric Division, Docket No. R-2017-2640058, Rate of Return, April 2018
- Wellsboro Electric Company, Docket No. R-2016-2531551, Rate of Return, December 2016
- Citizens' Electric Company of Lewisburg, PA, Docket No. R-2016-2531550, Rate of Return, December 2016
- Columbia Gas of Pennsylvania, Inc., Docket No. R-2016-2529660, Rate of Return, June 2016
- Columbia Gas of Pennsylvania, Inc., Docket No. R-2015-2468056, Rate of Return, June 2015
- Pike County Light & Power Company, Docket No. R-2013-2397353 (gas), Rate of Return, April 2014
- Pike County Light & Power Company, Docket No. R-2013-2397237 (electric), Rate of Return, April 2014
- Columbia Water Company, Docket No. R-2013-2360798, Rate of Return, August 2013
- Peoples TWP LLC, Docket No. R-2013-2355886, Rate of Return, July 2013
- City of Dubois – Bureau of Water, Docket No. R-2013-2350509, Rate of Return, July 2013
- City of Lancaster – Sewer Fund, Docket No. R-2012-2310366, Rate of Return, December 2012
- Wellsboro Electric Company, Docket No. R-2010-2172665, Rate of Return, September 2010
- Citizens' Electric Company of Lewisburg, PA, Docket No. R-2010-2172662, Rate of Return, September 2010
- T.W. Phillips Gas and Oil Company, Docket No. R-2010-2167797, Rate of Return, August 2010
- York Water Company, Docket No. R-2010-2157140, Rate of Return, August 2010
- Joint Application of The Peoples Natural Gas Company, Dominion Resources, Inc. and Peoples Hope Gas Company LLC, Docket No. A-2008-2063737, Financial Analysis, December 2008
- York Water Company, Docket No. R-2008-2023067, Rate of Return, August 2008

South Carolina

- Dominion Energy South Carolina, Inc., Docket No. 2024-34-E, Rate of Return, June 2024
- Duke Energy Carolinas, LLC., Docket No. 2023-388-E, Rate of Return, April 2024
- Duke Energy Progress, LLC., Docket No. 2023-89-E, Securitization, September 2023
- Dominion Energy South Carolina, Inc., Docket No. 2023-170-G, Rate of Return, July 2023
- Duke Energy Progress, LLC., Docket No. 2022-254-E, Rate of Return, December 2022

- Daufuskie Island Utility Company, Inc., Docket No. 22-142-WS, Rate of Return, September 2022
- Piedmont Natural Gas Company, Inc., Docket No. 22-89-G, Rate of Return, July 2022
- Kiawah Island Utility, Inc., Docket No. 2021-324-WS, Rate of Return, February 2022
- Palmetto Wastewater Reclamation, Inc., Docket No. 2021-153-S, Rate of Return, September 2021
- Dominion Energy South Carolina, Inc., Docket No. 2020-125-E, Rate of Return, November 2020
- Palmetto Utilities, Inc., Docket No. 2019-281-S, Rate of Return, May 2020
- Palmetto Utilities, Inc., Docket No. 2019-281-S, Accounting, May 2020
- Blue Granite Water Company, Docket No. 2019-290-WS, Rate of Return, January 2020

Tennessee

- Kingsport Power Company D/B/A AEP Appalachian Power, Docket No. 21-00107, Rate of Return, March 2022

Vermont

- Central Vermont Public Service Corp., Docket No. 7321, Rate of Return, September 2007

Wisconsin

- American Transmission Company, LLC, ITC, Midwest, LLC, Case No. 19-CV-3418, financial and regulatory analysis regarding requested temporary injunction to halt the construction in Wisconsin of the proposed Cardinal-Hickory Creek transmission line, October 2021

IN THE TENNESSEE PUBLIC UTILITY COMMISSION
AT NASHVILLE, TENNESSEE

IN RE:	)	
	)	
PETITION OF TENNESSEE-AMERICAN WATER COMPANY TO MODIFY TARIFF, CHANGE AND INCREASE CHARGES, FEES, AND RATES, AND FOR APPROVAL OF A GENERAL RATE INCREASE	)	**DOCKET NO. 24-00032**

AFFIDAVIT

I, Aaron Rothschild, on behalf of the Consumer Advocate Division of the Attorney General's Office hereby certify that the attached Testimony represents my opinion in the above-referenced case and the opinion of the Consumer Advocate Division.

Aaron Rothschild

AARON ROTHSCHILD

Sworn to and subscribed before me

This 17th day of September, 2024.

TERRA ALLEN
STATE OF TENNESSEE NOTARY PUBLIC
HICKMAN COUNTY
My Commission Expires JAN 31, 2027

Terra Allen

NOTARY PUBLIC

My Commission Expires: 1/31/2027