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PENNSYLVANIA-AMERICAN WATER COMPANY

2020 GENERAL BASE RATE CASE
R-2020-3019369 (WATER)
R-2020-3019371 (WASTEWATER)

DIRECT TESTIMONY AND EXHIBIT OF
ANN E. BULKLEY

STATEMENT NO. 13
EXHIBIT NO. 13-A

PAWC Statement No. 13

PENNSYLVANIA-AMERICAN WATER COMPANY

Direct Testimony

of

Ann E. Bulkley, Senior Vice President
Concentric Energy Advisors, Inc.

Concerning
Fair Rate of Return and Capital Structure

Docket Nos.
R-2020-3019369 (Water)
R-2020-3019371 (Wastewater)

Date April 29, 2020

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DIRECT TESTIMONY OF ANN E. BULKLEY

I. WITNESS IDENTIFICATION AND QUALIFICATIONS

Q. Please state your name, occupation and business address.

A. My name is Ann E. Bulkley. I am employed by Concentric Energy Advisors, Inc. ("Concentric") as a Senior Vice President. My business address is 293 Boston Post Road West, Suite 500, Marlborough, Massachusetts 01752.

Q. On whose behalf are you submitting this testimony?

A. I am submitting this testimony on behalf of Pennsylvania-American Water Company ("PAWC" or the "Company"), a wholly-owned subsidiary of American Water Works Company, Inc. ("AWK").

Q. Please describe your background and professional experience in the energy and utility industries.

A. I hold a Bachelor's degree in Economics and Finance from Simmons College and a Master's degree in Economics from Boston University, with more than 20 years of experience consulting to the energy industry. I have advised numerous energy and utility clients on a wide range of financial and economic issues with primary concentrations in valuation and utility rate matters. Many of these assignments have included the determination of the cost of capital for valuation and ratemaking purposes. My qualifications and testimony listing are presented in more detail in Attachment A.

Q. Please describe Concentric's activities in energy and utility engagements.

A. Concentric provides financial and economic advisory services to many and various energy and utility clients across North America. Our regulatory, economic, and

market analysis services include utility ratemaking and regulatory advisory services; energy market assessments; market entry and exit analysis; corporate and business unit strategy development; demand forecasting; resource planning; and energy contract negotiations. Our financial advisory activities include buy- and sell-side merger, acquisition, and divestiture assignments; due diligence and valuation assignments; project and corporate finance services; and transaction support services. In addition, we provide litigation support services on a wide range of financial and economic issues on behalf of clients throughout North America.

II. PURPOSE AND OVERVIEW OF TESTIMONY

Q. What is the purpose of your Direct Testimony?

A. The purpose of my Direct Testimony is to present evidence and provide a recommendation regarding PAWC's authorized return on equity ("ROE" or "cost of equity") and to assess the reasonableness of its proposed capital structure for ratemaking purposes.

Q. Are you sponsoring any exhibits in support of your Direct Testimony?

A. Yes. My analyses and recommendations are supported by the data presented in Schedules-1 through 19 of Exhibit 13-A.

Q. Please provide a brief overview of the analysis that led to your ROE recommendation.

A. As discussed in more detail below, it is important to consider the results of several analytical approaches in determining a reasonable recommendation for the

Company's ROE. To develop my ROE recommendation, I first developed a proxy group that consists of water and natural gas utility companies that face risks generally comparable to those faced by PAWC. I included both water and natural gas utilities in the proxy group because a proxy group composed only of water utilities would have resulted in an unreliably small group of only five companies. To that proxy group, I applied the Constant Growth form of the Discounted Cash Flow ("DCF") model, the Capital Asset Pricing Model ("CAPM"), the Empirical Capital Asset Pricing Model ("ECAPM"), and the Expected Earnings Analysis. As discussed in more detail in Section IV of my Direct Testimony, it is appropriate to rely on several ROE analyses because there are concerns among investors and regulators that the DCF model is not producing reasonable results at this time due to current conditions in capital markets. For example, Schedule-3 of Exhibit 13-A demonstrates that the DCF model is producing individual company results as low as 4.34 percent; a result that is only slightly higher than PAWC's cost of long-term debt of 4.40 percent for the first year of the Rate Plan (ending December 31, 2021) and 4.29 percent for the second year of the Rate Plan (ending December 31, 2022), which are not reasonable estimates of the cost of equity.[1]

My recommendation also takes into consideration the following business risk factors as compared with the proxy group: (1) the Company's capital expenditure

[1] Source: Company provided data. Shareholders are the residual claimants on the firm's earnings and assets, therefore, the return to equity holders must be sufficiently higher than the return to bond holders. The very low DCF results do not provide a sufficient risk premium to compensate investors for the additional risk of an equity investment. As discussed in more detail in Section VI of my Direct Testimony, I applied a minimum threshold of 7.00 percent to the DCF results. The results summarized in Figure 1 reflect this lower bound.

requirements; (2) the effect of environmental regulations on water and wastewater utilities and the costs associated with compliance; and (3) the superior management performance of PAWC. Although I did not make any specific adjustments to my ROE estimates for the foregoing factors, I considered each of them when determining where the Company's ROE should fall within the range of analytical results. Finally, I compared PAWC's proposed capital structure to the actual capital structures of the proxy group companies to evaluate the reasonableness of the Company's proposed capital structure and I found that the Company's proposed capital structure was reasonable, appropriate and consistent with the financial risk faced by PAWC's peers.

Q. Please summarize your analytical results.

A. My analytical results are summarized in Figure 1.

Figure 1: Summary of Cost of Equity Results[2]

Constant Growth DCF			
	Median Low	Median	Median High
Including AWK			
30-Day Average Price	9.34%	9.82%	11.15%
90-Day Average Price	9.12%	9.76%	11.15%
180-Day Average Price	8.98%	9.74%	11.02%
Excluding AWK			
30-Day Average Price	9.29%	9.39%	10.48%
90-Day Average Price	9.07%	9.28%	10.34%
180-Day Average Price	8.79%	9.27%	10.24%
Capital Asset Pricing Model			
	Current Risk-Free Rate (1.56%)	Q3 2020 – Q3 2021 Projected Risk-Free Rate (1.80%)	2021-2025 Projected Risk-Free Rate (3.20%)
Including AWK			
Value Line Beta	9.58%	9.67%	10.17%
Bloomberg Beta	11.09%	11.15%	11.48%
Excluding AWK			
Value Line Beta	9.68%	9.76%	10.25%
Bloomberg Beta	11.08%	11.13%	11.47%
Empirical Capital Asset Pricing Model			
Including AWK			
Value Line Beta	10.70%	10.76%	11.14%
Bloomberg Beta	11.83%	11.87%	12.12%
Excluding AWK			
Value Line Beta	10.77%	10.83%	11.20%
Bloomberg Beta	11.82%	11.86%	12.11%
Expected Earnings Analysis			
	Mean	Median	
Including AWK	11.33%	11.72%	
Excluding AWK	11.29%	10.84%	

Q. What is your conclusion regarding the appropriate authorized ROE for PAWC in this proceeding?

A. A reasonable range of ROE estimates for PAWC is from 10.00 percent to 10.80 percent. Considering management performance and the risk factors facing

[2] The analytical results included in Figure 1 reflect the results of the Constant Growth DCF analysis excluding the results for individual companies that did not meet the minimum threshold of 7.00 percent.

PAWC, I believe that an ROE of 10.80 percent is reasonable and appropriate. The required ROE should be a forward-looking estimate; therefore, the analyses supporting my recommendation rely on forward-looking inputs and assumptions (e.g., projected analyst growth rates in the DCF model, forecasted risk-free rate and Market Risk Premium in the CAPM analysis, etc.). I also take into consideration capital market conditions, including the effect of the current low interest rate environment on utility stock valuations and dividend yields, and the market's expectation for long-term interest rates, and tax reform.

Q. How is the remainder of your Direct Testimony organized?

A. The remainder of my Direct Testimony is organized in seven sections. Section III reviews the regulatory principles pertinent to the development of the cost of capital. Section IV discusses the current and prospective capital market conditions and the effect of those conditions on PAWC's cost of equity. Section V explains my selection of a proxy group of water and natural gas utilities. Section VI describes my analyses and the analytical basis for the recommendation of the appropriate ROE for PAWC. Section VII provides a discussion of specific business and financial risks that have a direct bearing on the Company's authorized ROE in this case. Section VIII provides an assessment of the reasonableness of PAWC's proposed capital structure of relative to the capital structures of the proxy group companies. Section IX discusses projected ROEs for the multi-year rate period. Section X presents my conclusions and recommendations on the cost of equity and capital structure.

III. REGULATORY PRINCIPLES

Q. Please describe the principles that guide the establishment of the cost of capital for a regulated utility.

A. The United States Supreme Court's *Hope* and *Bluefield* decisions established the standards for determining the fairness or reasonableness of a utility's authorized ROE. Among the standards established by the Court in those cases are: (1) consistency with other businesses having similar or comparable risks; (2) adequacy of the return to support credit quality and access to capital; and (3) the principle that the specific means of arriving at a fair return are not important, only that the end result leads to just and reasonable rates.[3]

Q. Has the Pennsylvania Public Utility Commission ("Commission") provided similar guidance in establishing the appropriate return on common equity?

A. Yes. The Commission follows the precedents of the *Hope* and *Bluefield* cases and acknowledges that utility investors are entitled to a fair and reasonable return. This position was set forth by the Commission as follows:

[3] *Bluefield*, 262 U.S. at 692-93; *Hope*, 320 U.S., at 603.

> In deciding this or any other general rate increase case brought under Section 1308(d) of the Public Utility Code (Code), 66 Pa. C.S. § 1308(d), certain general principles always apply. A public utility is entitled to an opportunity to earn a fair rate of return on the value of the property dedicated to public service. *Pa. PUC v. Pennsylvania Gas and Water Co.* 341 A.2d 239, 251 (Pa. Cmwlth. 1975). In determining a fair rate of return, the Commission is guided by the criteria provided by the United States Supreme Court in the landmark cases of *Bluefield Water Works and Improvement Co. v. Public Service Comm'n of West Virginia*, 262 U.S. 679 (1923) and *Federal Power Comm'n v. Hope Natural Gas Co.*, 320 U.S. 591 (1944).[4]

Q. Why is it important for a utility to be allowed the opportunity to earn a return that is adequate to attract equity capital on reasonable terms?

A. A return that is adequate to attract capital on reasonable terms enables PAWC to continue providing safe, reliable water and wastewater service while maintaining its financial integrity. That return should be commensurate with returns expected elsewhere in the market for investments of equivalent risk. If it is not, debt and equity investors will seek alternative investment opportunities for which the expected return reflects the perceived risks, thereby inhibiting PAWC's ability to attract capital at reasonable cost.

Q. What are your conclusions regarding regulatory guidelines and financial considerations?

A. The ratemaking process is premised on the principle that, in order for investors and companies to commit the capital needed to provide safe and reliable utility services, a utility must have the opportunity to recover the return of, and the market-required return on, its invested capital. Because utility operations are

[4] Pennsylvania Public Utility Commission, UGI Utilties, Inc. – Electric Division, R-2017-2640058, Opinion and Order adopted October 4, 2018, at 6.

capital-intensive, regulatory decisions should enable the utility to attract capital on reasonable terms; doing so balances the long-term interests of the utility and its customers.

The financial community carefully monitors the current and expected financial condition of utility companies, and the regulatory framework in which they operate. In that respect, the regulatory framework is one of the most important factors in both debt and equity investors' assessments of risk. The Commission's order in this case, therefore, should establish rates that provide PAWC with the opportunity to earn a ROE that is: (1) adequate to attract capital on reasonable terms; (2) sufficient to ensure its financial integrity; and (3) commensurate with returns on investments in enterprises with similar risk. To the extent the Company has the opportunity to earn its market-based cost of capital, the proper balance is achieved between customers' and shareholders' interests.

Q. Does the fact that PAWC is owned by AWK, a publicly traded company, affect your analysis?

A. No, it does not. In this proceeding, consistent with stand-alone ratemaking principles, it is appropriate to establish the cost of equity for PAWC, not AWK. More importantly however, it is important to establish a return on equity and capital structure that provide PAWC the ability to attract capital on reasonable terms, on a stand-alone basis, and within the AWK system. All of the utility operating subsidiaries within the AWK corporate structure compete for discretionary capital. Unless PAWC is provided a reasonable opportunity to earn a market-based ROE

with an appropriate capital structure, it will be at a disadvantage in attracting discretionary capital from parent company resources.

IV. CAPITAL MARKET CONDITIONS

Q. Why is it important to analyze capital market conditions?

A. The ROE estimation models rely on market data that are either specific to the proxy group, in the case of the DCF model, or the expectations of market risk, in the case of the CAPM. The results of the ROE estimation models can be affected by prevailing market conditions at the time the analysis is performed. While the ROE that is established in a rate proceeding is intended to be forward-looking, the practitioner uses current and projected market data, specifically stock prices, dividends, growth rates and interest rates in the ROE estimation models to estimate the required return for the subject company.

As discussed in the remainder of this section, analysts and regulatory commissions have concluded that current market conditions are anomalous and that these conditions have affected the results of the ROE estimation models. As a result, it is important to consider the effect of these conditions on the ROE estimation models when determining the appropriate range and recommended ROE to be determined for a future period. If investors do not expect current market conditions to be sustained in the future, it is possible that the ROE estimation models will not provide an accurate estimate of investors' required return during that rate period. Therefore, it is very important to consider projected market data to estimate the return for that forward-looking period.

Q. What factors are affecting the cost of equity for regulated utilities in the current and prospective capital markets?

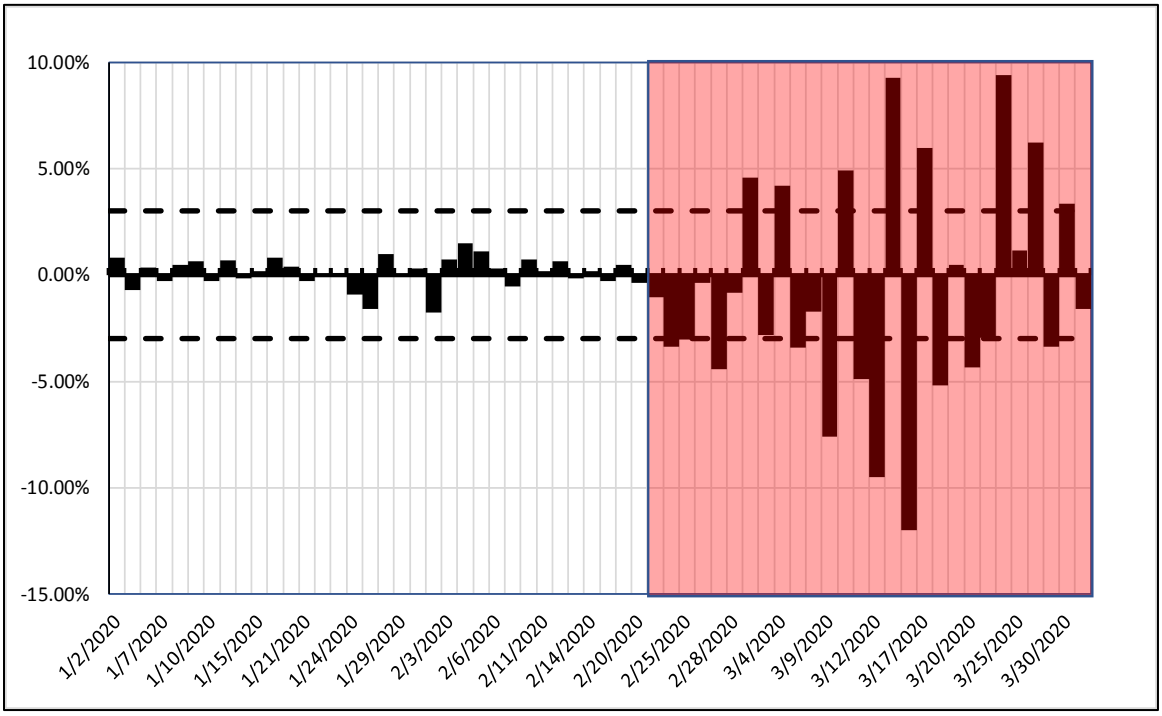
A. The cost of equity for regulated utility companies is being affected by several factors in the current and prospective capital markets, including: (1) the current market volatility has created a short-term aberration in the market which must be carefully considered when selecting the inputs for the ROE estimation models; 2) utility stock valuations, which are inversely related to dividend yields, are currently unsustainably high given investors demand for defensive sectors during the short-term market dislocation; and (3) recent Federal tax reform. In this section, I discuss each of these factors and how it affects the models used to estimate the cost of equity for regulated utilities.

A. Current Market Conditions

Q. Please summarize current market conditions.

A. In 2020, market conditions have been extremely volatile. In January and early February 2020, major market indices were generally increasing, many reaching new threshold levels. By mid-February, as the global health pandemic became more apparent, market conditions became increasingly more volatile. In mid-February utility stock prices reached an all-time high, followed by a significant decline in the overall market and utility stocks. Market conditions in March 2020 were more volatile than the last half of February. As shown in Figure 2 below, the S&P 500 Index swung more than 3 percent in 16 of the 22 trading days in the month of March.

Figure 2: S&P 500 Index – Daily Price Change - January -March 2020

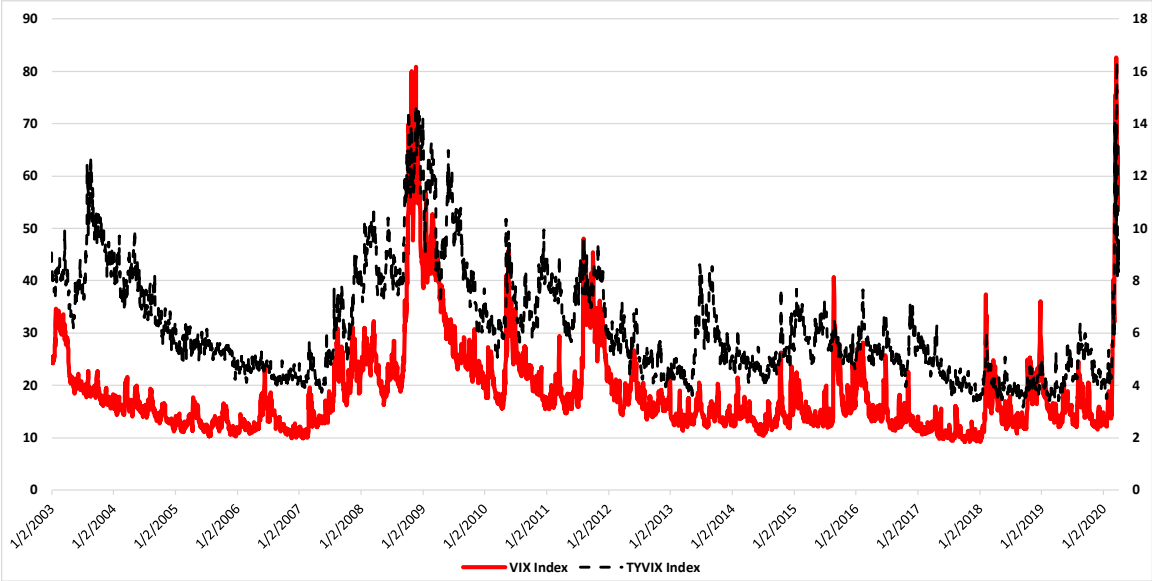


Q. Have you reviewed any other indicators that measure volatility in the financial markets?

A. Yes, I reviewed two other measures of volatility in financial markets; the CBOE Volatility Index ("VIX") and the U.S. Treasury Note Volatility Index ("TYVIX"). The VIX measures investors' expectation of volatility in the S&P 500 over the next 30 days. The TYVIX, also published by CBOE, measures investors' expectation of volatility in the 10-year Treasury Bond over the next 30 days. As shown in Figure 3, the VIX and TYVIX have recently reached levels not seen since the Great Recession of 2008/09. For example, the VIX was 82.69 on March 16, 2020. The VIX has not reached 80.00 since November of 2008; however, it is important to note that the highest level reached during the Great Recession of 2008/09 was

80.86. Similarly, the TYVIX was 16.39 on March 19, 2020. Since at least January 2003, the TYVIX has never exceeded 15.00 including during the Great Recession of 2008/09. As a result, COVID-19 has caused an increase in the level of uncertainty in the market that exceeds the levels seen in the Great Recession of 2008/09.

Figure 3: CBOE VIX and TYVIX – January 2003 – March 2020

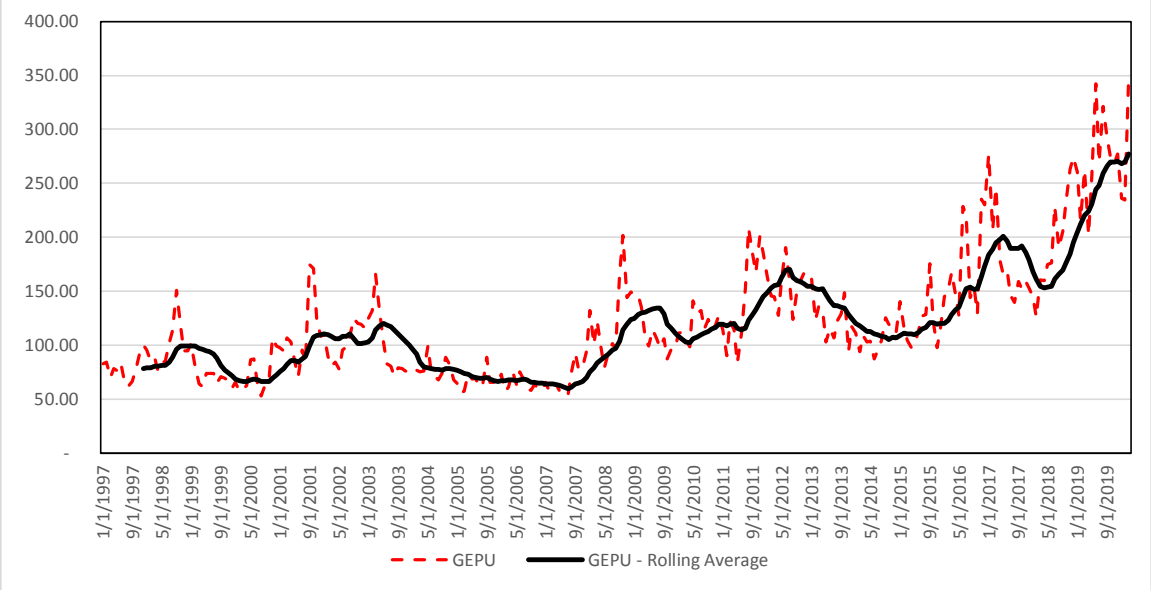


Q. Have you reviewed any indicators that measure the uncertainty in the global economy related to COVID-19?

A. Yes, I have. I reviewed the global economic policy uncertainty index developed by economists Scott Baker, Nicholas Bloom and Steven Davis. The index is a GDP-weighted average of the economic policy uncertainty index of 21 countries. The economic policy uncertainty index measures the frequency that articles in

publications of a country discuss economic policy uncertainty.[5] As shown in Figure 4, uncertainty regarding global economic policy is at its highest level since at least 1997, with the largest increase occurring in the last two years as a result of the escalating trade dispute between the U.S. and China and the spread of COVID-19.

Figure 4: Global Economic Policy Uncertainty Index



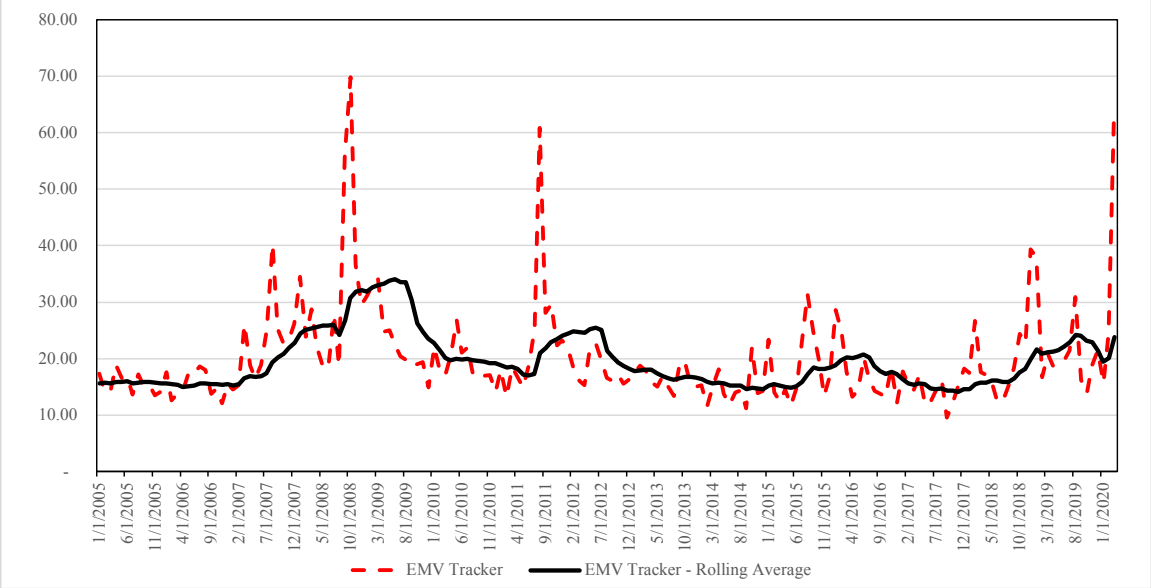
Q. Has the increased global economic uncertainty resulted in increased volatility in financial markets?

A. Yes, it has. In addition, to the global economic policy uncertainty index, Scott Baker, Nicholas Bloom and Steven Davis from the National Bureau of Economic Research also developed a U.S. equity market volatility index which measures the frequency that articles in U.S. publications discuss equity market volatility. In

[5] Source: Economic Policy Uncertainty: https://www.policyuncertainty.com/index.html.

addition, this index tracks VIX and realized volatility of returns on the S&P 500. As shown in Figure 5, the U.S. equity market volatility index has recently increased to its highest level since at least 2011. The increase in the index between 2017 and 2020 can be attributed to recent external events such as the trade war between the U.S. and China and COVID-19 as investors have become increasingly concerned regarding the short-term effects that these events may have on the U.S. economy.

Figure 5: US Equity Market Volatility Index



Q. Have rating agencies commented on the effects of current market conditions on regulated utilities?

A. Yes. Standard & Poor's recently downgraded the outlook on the entire North American utilities sector indicating that 25 percent of the industry was previously on a negative outlook or CreditWatch with negative implications and that S&P

expected that COVID-19 would create incremental pressure and that a recession would lead to an increasing number of downgrades and negative outlooks.[6]

Q. How has the recent uncertainty in the market affected the yields on long-term government bonds?

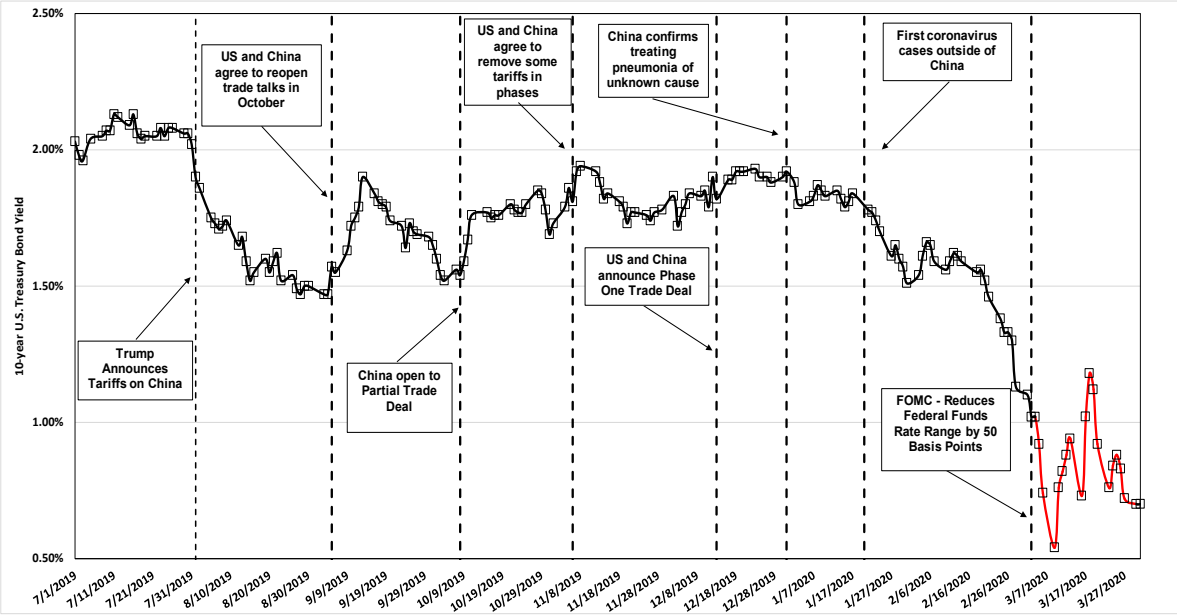
A. The uncertainty surrounding the trade dispute between the U.S. and China and the spread of COVID-19 has resulted in a flight-to-quality as investors have purchased safer assets such as U.S. Treasuries due to increased fears of a possible recession. This has been increasingly evident over the past few months as investors responded to news of increases in tariffs by both China and the U.S. and the number of coronavirus cases outside of China as the effects of the virus spread globally.

To illustrate the recent reactions of investors, I conducted an event study of the yield on the 10-year U.S. Treasury bond between July 1, 2019, and March 31, 2020. As shown in Figure 6, investors responded to both positive and negative developments regarding the trade dispute with China as well as policy announcements from the Federal Reserve. As a result, the yield on the 10-year Treasury Bond has fluctuated between 1.50 percent and 2.00 percent between July and December 2019. However, recently investors have become increasingly concerned with the economic effects of the spread of COVID-19. As a result, the yield on the 10-year Treasury Bond fell to a low of 0.54 percent as of March 9,

[6] Standard & Poor's Ratings Direct, COVID-19: The Outlook for North American Regulated Utilities Turns Negative, April 2, 2020.

2020. Since March 9th, the 10-year Treasury Bond yield has experienced extreme volatility as it has ranged from 0.70 percent to 1.18 percent as investors respond to both positive and negative news regarding the spread of COVID-19 and its economic effects. Therefore, the emergence of COVID-19 in China and subsequent spread across the globe has resulted in unprecedented volatility in the markets

Figure 6: 10-year U.S. Treasury Bond Yield



Q. What are your conclusions regarding the current interest rate environment and its effect on the cost of equity for PAWC?

A. As discussed above, investors have responded to the recent escalation in the trade war between the U.S. and China and more recently the spread of COVID-19 by divesting higher-risk assets and purchasing lower-risk assets such as U.S. Treasury bonds or defensive sector equites such as utilities. Furthermore, the

constant news regarding the spread of COVID-19 and its economic effects has resulted in an abundance of information for investors to consider. This has resulted in unprecedented volatility in financial markets as investors have rotated in and out of various assets classes responding to both positive and negative developments. Therefore, ROE estimation models which rely on recent market data must be interpreted with extreme caution. For example, the Constant Growth DCF model relies on the average share prices for the proxy companies, which have been extremely volatile in the last several months and are not likely representative of what should be expected during the period that PAWC's rates will be in effect. This highlights two key factors that must be considered when determining the ROE for PAWC: 1) current and prospective market conditions should be considered when determining where among the range of results PAWC's ROE should fall and 2) where possible it is necessary to consider projected market data in each of the models which reflect economists' expectations for the market conditions that will exists during the period that PAWC's rates will be in effect.

B. The Effect of Market Conditions on Valuations

Q. Please provide a brief summary of the recent monetary policy actions of the Federal Reserve.

A. The Federal Reserve held a meeting on March 15, 2020 and acknowledged that the recent spread of COVID-19 poses increased risks to economic activity in the U.S. and therefore lowered the federal funds rate by 100 basis points, which

resulted in a range of 0.00 percent to 0.25 percent.[7] This is the second unscheduled meeting to occur in March with first occurring on March 3rd where the Federal Reserve decreased the federal funds rate by 50 basis points. In addition to the reduction in the federal funds rate, the Federal Reserve also announced plans to increase its holdings of both Treasury and mortgage-backed securities.[8] It is important to view the recent Fed policy decisions in the context of the reactions to global exogenous events, in particular COVID-19. The recent spread of COVID-19 has affected the global economy and caused a rise in volatility in the financial markets; thus, the Federal Reserve reacted by reducing the federal funds rate to minimize the effect of COVID-19 on the U.S. economy. During a recent webinar for the Brookings Institute, Chairman Powell noted the following regarding the length of the effects COVID-19:

[7] FOMC, Federal Reserve Press Release, March 15, 2020, at 1.

[8] Id., at 2.

> When the virus does run its course and it's safe to go back to work and it's safe for businesses to open, then we would expect there to be a fairly quick rebound. I think most people expect that to happen in the second half of this year after the second quarter. To try to be precise about where that will be, I don't think that would be appropriate.[9]

Q. How has the Federal Reserve's monetary policy affected capital markets in recent years?

A. Extraordinary and persistent federal intervention in capital markets artificially lowered government bond yields after the Great Recession of 2008-09, as the Federal Reserve Open Market Committee ("FOMC") used monetary policy (both reductions in short-term interest rates and purchases of Treasury bonds and mortgage-backed securities) to stimulate the U.S. economy. As a result of very low or zero returns on short-term government bonds, yield-seeking investors have been forced into longer-term instruments, bidding up prices and reducing yields on those investments. As investors have moved along the risk spectrum in search of yields that meet their return requirements, there has been increased demand for dividend-paying equities, such as water utility stocks.

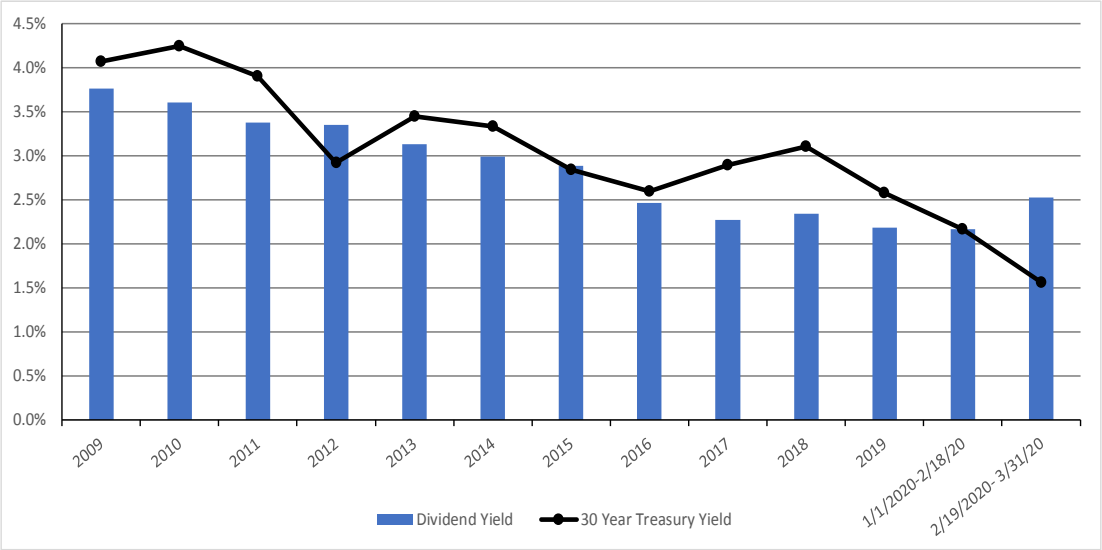
Q. How have recent market conditions affected the valuation and dividend yields of utility shares?

A. The Federal Reserve's accommodative monetary policy has caused investors to seek alternatives to the historically low interest rates available on Treasury bonds.

[9] Cox, Jeff. "Powell Says the Economic Recovery Can Be 'Robust' after the Coronavirus Is Contained." CNBC, CNBC, 9 Apr. 2020, www.cnbc.com/2020/04/09/fed-chair-powell-says-the-economic-recovery-can-be-robust-after-coronavirus.html.

A result of this search for higher yield is that the share prices for many common stocks, especially dividend-paying stocks such as utilities, have been driven higher, while the dividend yields (which are computed by dividing the dividend payment by the stock price) have decreased to levels well below the historical average. As shown in Figure 7, over the period from 2009 through February 18, 2020 (i.e., the peak of the market prior to the recent decline resulting from the effects of COVID-19), Treasury bond yields and utility dividend yields had declined. While investors have responded to the economic effects of COVID-19 resulting heightened volatility and in a recent decline in the market, it is important to highlight the relative performance of natural gas and water utilities during this time period. As shown in Figure 7, while the stock prices of natural gas and water utilities have declined, which has resulted in an increase in dividend yields, the average dividend yield for natural gas and water utilities over the period of February 19, 2020 through March 31, 2020 was 2.53 percent; which is still unreasonably low when compared to historical dividend yields.

Figure 7: Dividend Yields for Water and Natural Gas Utility Stocks[10]



Q. Have equity analysts commented on the valuations of utility stocks?

A. Yes. Several equity analysts have recognized that utility stock valuations are very high relative to historical levels. In the water utilities industry report, Value Line noted the high valuations:

[10] Source: Bloomberg Professional. Figure 7 includes 2020 data through March 31, 2020.

> Over the past five years, the performance from the eight primary stocks in the group has been excellent. Indeed, the typical water equity has outperformed the broader market averages by a wide margin. In the fourth quarter of 2019, this was not the case, however.
>
> Due in part to three cuts by the Federal Reserve, short-term rates have declined. Still, on a comparable basis, they seem more attractive than water utility stocks, which carry an average yield of only about 2.0%.
>
> Based on many key indicators, the valuation of this group is close to a historical high.
>
> Finally, even though several equities in the Water Utility Industry are ranked 1 (Highest) for year-ahead relative price performance, almost all have substantially less than average prospects over the next 18-month- and three- to five-year periods. Most equities here are already trading well within their estimated long-term Target Price Range.[11]

This is further supported by a recent Edward Jones report on the utility sector overall:

> Utility valuations have become more attractive as shares have fallen from recent highs. On a price-to-earnings basis, shares are now trading closer to their historical averages, after trading near all-time highs. Until early this year, we have seen utility valuations moving with interest rate movements, although there have been exceptions to this. Overall, however, we believe the low-interest-rate environment has been the biggest factor in pushing utilities higher since many investors buy them for their dividend yield.[12]

As noted by equity analysts, utility stocks have experienced high valuations and low dividend yields, driven by investors moving into dividend paying stocks. This has occurred as a result of a) the low interest rates in the bond market and b) as discussed above, the increased economic uncertainty in the market which has

[11] Value Line Investment Survey, Water Utility Industry, January 10, 2020, at 1786.

[12] Andy Smith. Edward Jones, Utilities Sector Outlook (March 24, 2020), at 2.

resulted in equity investors rotating into defensive sectors such as utilities from cyclical sectors which are more likely to be affected by economic downturns. Conversely, if economic conditions improve and interest rates increase, bonds become a substitute for utility stocks and equity investors are more likely to rotate back to cyclical sectors, which results in an increase in dividend yields. As noted previously, this change in market conditions that is expected over the long-term implies that the ROE calculated using historical market data in the DCF model may understate the forward-looking cost of equity.

Q. What is the effect of high valuations of utility stocks on the DCF model?

A. High valuations have the effect of depressing the dividend yields, which results in overall lower estimates of the cost of equity resulting from the DCF model.

Q. How do the valuations of public utilities compare to the historical average?

A. Figure 8 summarizes the average historical and projected P/E ratios for the proxy companies calculated using data from Bloomberg Professional and Value Line.[13] As shown in Figure 8, the average P/E ratio for the proxy companies increased from 2018 to 2019 as a result of uncertainty in market surrounding the trade dispute between the U.S. and China and the spread of COVID-19. The uncertainty resulted in investors shifting to defensive sectors such as utilities and consumer staples. Additionally, while investors have become increasingly concerned with the economic effect of COVID-19 in 2020, the average P/E ratio for the proxy companies remains well above the average for 2018. As of March 31, 2020, the

[13] Selection of the Proxy Companies is discussed in detail in Section V of my Direct Testimony.

prices of utility stocks and thus the P/E ratios are still at unsustainable levels. For example, the average P/E ratio for the proxy group from February 18, 2020 through March 31, 2020 (i.e., the period since the decline in the market as a result of COVID-19) was 29.48 which is well above the average for the period of 2000-2020 of 21.10. It is not reasonable to expect the proxy companies to maintain P/E ratios that are well above long-term averages over the long-term. As shown in Figure 8, Value Line projects that P/E ratios will decline over the period of 2020 through 2023. All else equal, if P/E ratios for the proxy companies decline, as Value Line projects, the ROE results from the DCF model would be higher. Therefore, the DCF model using historical market data is likely understating the forward-looking cost of equity for the proxy group companies.

Figure 8: Average Historical Proxy Group P/E Ratios[14]

Q. Have you reviewed any other market indicators that compare the current valuation of utilities to the historical average?

A. Yes. To further assess how the currently low interest rate environment has affected the valuations of the companies in my proxy group, I reviewed the price/earnings to growth ("PEG") ratio for the S&P Utilities Index. The PEG ratio is commonly used by investors to determine if a company is considered over- or under-valued. The ratio compares the P/E ratio of a company to the expected growth rate of future earnings. This allows investors to compare companies with similar P/E ratios but different earnings growth projections. If two companies have a P/E ratio

[14] Bloomberg Professional, Data through March 31, 2020 and Value Line Investment Survey, January 10, 2020 and February 28, 2020.

of 20, but Company A is growing at a rate of 6 percent and Company B is growing at a rate of 15 percent, then on a relative valuation basis Company B is the better investment.

As shown in a report published by Yardeni Research, Inc., the PEG ratio for the S&P Utilities Index is significantly higher than it has historically been because of the accommodative monetary policy pursued by the Federal Reserve following the Great Recession of 2008/09. [15] While the PEG ratio has slightly declined recently as investors have rotated out of defensive sectors and into Treasury Bonds due to the short-term economic effect of COVID-19, the PEG ratio for the S&P Utilities Index is still above the historical average. In general, stocks with lower long-term PEG ratios are considered better values. As the PEG ratio increases above the long-term historical average, as has been the case with the S&P Utilities Index, then the stocks are considered relatively over-valued unless the growth rate increases to support the higher valuation. As of April 2, 2020, the PEG ratio for the S&P Utilities Index is close to 3.6, which indicates that many of the stocks contained in the index are currently trading at levels well above the historical average. This analysis supports the P/E Ratio projections produced by Value Line, which as noted above, are projecting the P/E ratios of utilities to decline over the near-term.

[15] Yardeni Research, Inc. "S&P 500 Industry Briefing: Utilities." April 9, 2020, p. 5.

Q. How do equity investors view the utilities sector based on these recent market conditions?

A. Investment advisors have suggested that defensive sectors such as utility stocks perform well in periods of uncertainty; however, underperform in periods of economic expansion. Barron's recently noted the following regarding the recent performance of utilities considering the increased uncertainty associated with the spread of the coronavirus:

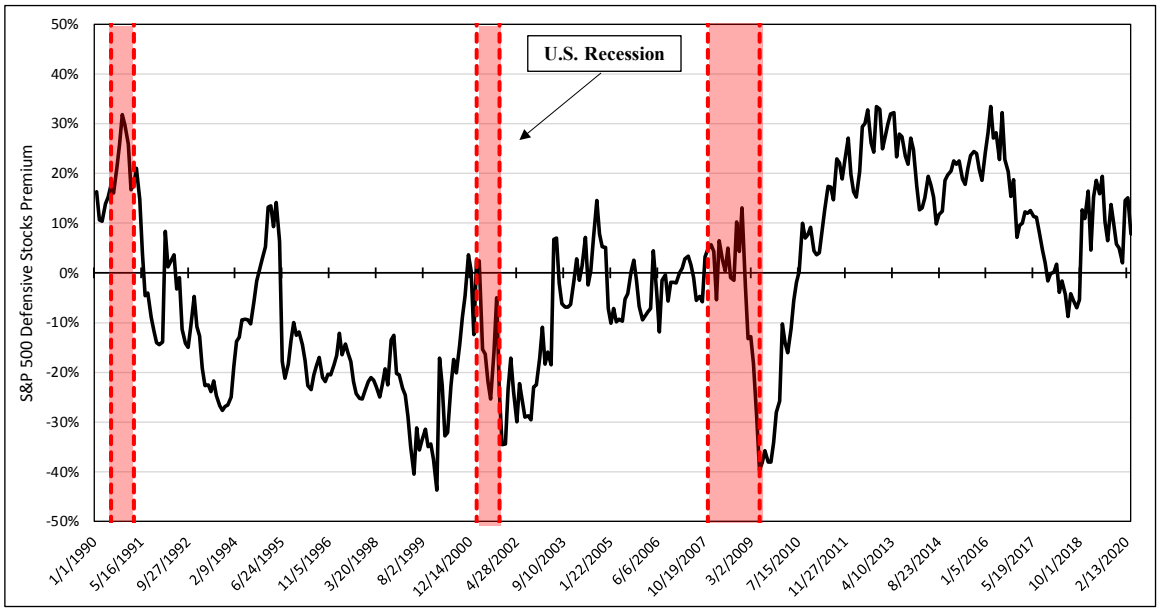
> The outperformance of low-volatility stocks goes further back as well. The group has been holding up relatively well since the stock market stumbled into its current highly volatile phase two weeks ago. As of Tuesday, the S&P 500 had gained or lost at least 3% over nine of the past 12 trading days and declined 13.6% through the entire period. During the same period, the Invesco Low Volatility ETF has lost only 10.7%.
>
> That's not surprising. Low-volatility is historically a risk-off strategy, with large exposure to defensive sectors such as utilities and real estate. Nine out of the top 10 holdings in the Invesco fund are utility stocks, including Eversource Energy (ES), Duke Energy Corp. (DUK), and Consolidated Edison (ED). The group is therefore less affected by the ups and downs of the business cycle, and tends to beat the market during downturns, while underperforming during rallies.[16]

Moreover, to show the current high valuations of defensive sector stocks, I compared the forward P/E ratio of defensive sector stocks in the S&P 500 to the forward P/E ratio of cyclical sector stocks in the S&P 500. This comparison is shown in Figure 9 below. As shown this figure, the defensive stock premium is currently approximately 7.80 percent, well above the long-term average (i.e., a

[16] Liu, Evie. "Low-Volatility Stocks Are Winning as the Market Swings. Thank Falling Interest Rates." Barron's, 11 Mar. 2020, www.barrons.com/articles/low-volatility-stocks-win-as-market-swings-51583876123.

cyclical stock premium) from 1990 to 2020 of -2.09 percent. Thus, defensive sector stocks are currently trading at a very high premium over cyclical sectors stocks, indicating that the valuations of defensive sectors such as utilities are currently too high.

Figure 9: Forward P/E Ratio Comparison of the S&P 500 defensive sector to the S&P 500 cyclical sector[17]



C. Effect of Tax Reform on the ROE and Capital Structure

Q. Are there other factors that should be considered in determining the cost of equity for PAWC?

A. Yes. The effect of the Tax Cuts and Jobs Act of 2017 ("TCJA") should also be considered in the determination of the cost of equity. The credit rating agencies have commented on the effect of the TCJA on regulated utilities. In summary, the

[17] Bloomberg Professional, Data through March 31, 2020.

TCJA is expected to reduce utility revenues due to the lower federal income taxes, the end of bonus depreciation, and the requirement to return excess Accumulated Deferred Income Taxes ("ADIT"). This change in revenue is expected to reduce Funds From Operations ("FFO") metrics across the sector, and absent regulatory mitigation strategies, is expected to lead to weaker credit metrics and negative ratings actions for some utilities.[18]

Q. Have credit or equity analysts commented on the effect of the TCJA on utilities?

A. Yes. Each of the credit rating agencies has indicated that the TCJA is having an overall negative credit impact on regulated operating companies of utilities and their holding companies due to the reduction in cash flow that results from the change in the federal tax rate and the loss of bonus depreciation.

Moody's noted that the rates that regulators allow utilities to charge customers is based on a cost-plus model, with tax expense being one of the pass-through items. Utilities collect less income tax at a lower rate, reducing revenue. In addition, with the loss of bonus depreciation, the timing of future cash tax payments is accelerated. As a result of the lower tax rate, utilities are collecting less tax revenue and retaining less of the collected taxes due to of the loss of bonus depreciation. All else being equal, the changes have a negative effect on utility cash flows and

[18] FitchRatings, Special Report, What Investors Want to Know, "Tax Reform Impact on the U.S. Utilities, Power & Gas Sector," January 24, 2018.

will, ultimately, negatively impact the utilities' ability to fund ongoing operations and capital improvement programs.

In Standard & Poor's ("S&P") 2019 trends report, the rating agency notes that the utility industry's financial measures weakened in 2018 and attributed that to tax reform, capital spending and negative load growth. In addition, S&P expects that weaker credit metrics will continue into 2019 for those utilities operating with minimal financial cushion. S&P further expects that these utilities will look to offset the revenue reductions from tax reform with equity issuances. That rating agency reported that in 2018 regulated utilities issued nearly $35 billion in equity, which is more than twice the equity issuances in either 2016 or 2017.[19]

FitchRatings ("Fitch") also indicated that any ratings actions will be guided by the response of regulators and the management of the utilities. Fitch notes that the solution will depend on the ability of utility management to manage the cash flow implications of the TCJA. Fitch offered several solutions to provide rate stability and to moderate changes to cash flow in the near term, including increasing the authorized ROE and/or equity ratio.[20]

Q. Have any of the rating agencies responded to the TCJA?

A. Yes. Moody's has been very active in considering the effects of the TCJA on the industry. In January 2018, Moody's issued a report changing the rating outlook for

[19] Standard & Poor's Ratings, "Industry Top Trends 2019, North America Regulated Utilities", November 8, 2018.

[20] FitchRatings, Special Report, What Investors Want to Know, "Tax Reform Impact on the U.S. Utilities, Power & Gas Sector", January 24, 2018.

several regulated utilities, including AWK, the parent company of PAWC, from Stable to Negative.[21] Moody's noted that the rating change affected companies with limited cushion in their ratings for deterioration in financial performance. Later that year, Moody's issued a report that downgraded the outlook for the entire regulated utility industry from Stable to Negative for the first time ever, citing ongoing concerns about the negative effect of the TCJA on cash flows of regulated utilities. Since mid-2018, Moody's has downgraded the credit ratings of several utilities based in part on the effects of tax reform on financial metrics. As shown in Figure 10, the downgrades have continued in recent months.

Figure 10: Credit Rating Downgrades Resulting from TCJA

Utility	Rating Agency	Credit Rating before TCJA	Credit Rating after TCJA	Downgrade Date
Consolidated Edison Company of New York	Moody's	A3	Baa1	3/17/2020
Consolidated Edison, Inc.	Moody's	Baa1	Baa2	3/17/2020
Washington Gas Light Company	Moody's	A2	A3	1/30/2020
Public Service Co. of North Carolina, Inc.	Moody's	A3	Baa1	1/30/2020
Wisconsin Power and Light Company	Moody's	A2	A3	12/11/2019
Wisconsin Gas LLC	Moody's	A2	A3	11/20/2019
Vectren Utility Holdings	Moody's	A2	A3	10/25/2019
Southern Indiana Gas & Electric Company	Moody's	A2	A3	10/25/2019
Indiana Gas Company	Moody's	A2	A3	10/25/2019
El Paso Electric Company	Moody's	Baa1	Baa2	9/17/2019
Questar Gas Company	Moody's	A2	A3	8/15/2019
DTE Gas Company	Moody's	A2	A3	7/22/2019
South Jersey Gas Company	Moody's	A2	A3	7/17/2019
Central Hudson Gas & Electric	Moody's	A2	A3	7/12/2019

[21] Moody's Investor Service, Global Credit Research, Rating Action: Moody's changes outlooks on 25 US regulated utilities primarily impacted by tax reform, January 19, 2018.

Utility	Rating Agency	Credit Rating before TCJA	Credit Rating after TCJA	Downgrade Date
Oklahoma Gas & Electric Company	Moody's	A2	A3	5/31/2019
American Water Works	Moody's	A3	Baa1	4/1/2019
Niagara Mohawk Power Corporation	Moody's	A2	A3	3/29/2019
KeySpan Gas East Corporation (KEDLI)	Moody's	A2	A3	3/29/2019
Xcel Energy	Moody's	A3	Baa1	3/28/2019
ALLETE, Inc.	Moody's	A3	Baa1	3/26/2019
Brooklyn Union Gas Company (KEDNY)	Moody's	A2	A3	2/22/2019
Avista Corp.	Moody's	Baa1	Baa2	12/30/2018
Consolidated Edison Company of New York	Moody's	A2	A3	10/30/2018
Consolidated Edison, Inc.	Moody's	A3	Baa1	10/30/2018
Orange and Rockland Utilities	Moody's	A3	Baa1	10/30/2018
Southwestern Public Service Company	Moody's	Baa1	Baa2	10/19/2018
Dominion Energy Gas Holdings	Moody's	A2	A3	9/20/2018
Piedmont Natural Gas Company, Inc.	Moody's	A2	A3	8/1/2018
WEC Energy Group, Inc.	Moody's	A3	Baa1	7/12/2018
Wisconsin Energy Capital	Moody's	A3	Baa1	7/12/2018
Integrys Holdings Inc.	Moody's	A3	Baa1	7/12/2018
OGE Energy Corp.	Moody's	A3	Baa1	7/5/2018
Oklahoma Gas & Electric Company	Moody's	A1	A2	7/5/2018

Q. Has the Company experienced a downgrade related to cash flow metrics resulting from tax reform?

A. No, however, as shown in Figure 10, AWK, the parent company of PAWC, was recently downgraded by Moody's to Baa1 from A3 due, in part, to the effect of the TCJA on the cash flows of AWK. Specifically, Moody's noted:

> The financial profile of the company has steadily declined since 2014 with free cash flow deficits and debt issuance having outpaced cash flow growth, as the company took on nearly $6.5 billion of capital spending. For example, free cash flow deficits have grown at a compound annual growth rate (CAGR) of around 62%, debt has grown at over 9% CAGR and FFO at roughly a 6% CAGR. For most of this time, the company was benefitting from bonus depreciation, which resulted in no cash tax payments. However, 2017 federal tax reform undid these benefits, which has also contributed in key ratios declining, such as funds from operations (FFO) to net debt dropping from 18% in 2014 to 16% in 2018 and retained cash flow (RCF) to net debt falling from 15% in 2014 to just above 12% in 2018.[22]

Although Moody's did indicate in a recent credit opinion that the ratings outlook for AWK is stable, Moody's did list "less supportive regulatory provisions (especially in Pennsylvania and New Jersey)" as a factor that could lead to another downgrade of AWK.[23]

Furthermore, in June 2018, S&P noted that the AWK's consolidated financial metrics will weaken over the next few years due to tax reform, the loss of bonus depreciation and capital spending.[24]

Q. Is it reasonable to expect that investors have included the negative effects of the TCJA on the cash flows of utilities in their valuation models?

A. Not entirely. It is reasonable to expect that investors have reviewed the reports published by the credit rating agencies such as Moody's, S&P and Fitch and are therefore considering the effects of the TCJA. The implementation of the solutions

[22] Moody's Investors Service, American Water Works Company, Inc. Rating Action: Moody's downgrades American Water and American Water Capital Corp. to Baa1 from A3; outlooks stable, April 1, 2019.

[23] Moody's Investors Service, American Water Works Company, Inc. Credit Opinion: Update following downgrade, April 3, 2019.

[24] Standard and Poor's RatingsDirect, "American Water Works Co. Inc. and Subsidiaries 'A' Ratings affirmed; Outlooks Remain Stable," June 11, 2018.

to manage cash flow implications from the TCJA, however, are usually limited to rate proceedings. Therefore, utilities continue to work with regulators in the context of regulatory proceedings to determine appropriate solutions to mitigate the effect of the TCJA on cash flows. Furthermore, as shown in Figure 10, Moody's is continuing to evaluate the effect of the TCJA on the cash flows of individual utilities. As part of the credit evaluation, rating agencies are specifically considering the recent rate case decisions of utilities to determine if the results of these cases help to mitigate the effect of the TCJA on cash flows. Consequently, the credit rating agencies appear to be continuing to monitor the effects of the TCJA on utilities.

Q. Have state regulatory commissions considered market events and the utility's ability to attract capital in determining the equity return?

A. Yes. In a recent rate case for Consumers Energy Company in Michigan, Case No. U-18322, the Michigan Public Service Commission ("Michigan PSC") Staff recommended a 9.80 percent ROE based on the results of the DCF, CAPM and Risk Premium approaches, which was supported by the Administrative Law Judge ("ALJ").[25] In its Order issued on March 29, 2018, however, the Michigan PSC partly disagreed with the ALJ and Staff regarding expected market conditions and authorized a 10.00 percent ROE for Consumers Energy Company. The Michigan PSC noted that:

[25] Michigan Public Service Commission Order, Cause No. U-18322, Consumers Energy Company, March 29, 2018, at 37.

> [i]n setting the ROE at 10.00%, the Commission believes there is an opportunity for the company to earn a fair return during this period of atypical market conditions. This decision also reinforces the Commission's belief that customers do not benefit from a lower ROE if it means the utility has difficulty accessing capital at attractive terms and in a timely manner. The fact that other utilities have been able to access capital despite lower ROEs, as argued by many intervenors, is also a relevant consideration. It is also important to consider how extreme market reactions to singular events, as have occurred in the recent past, may impact how easily capital will be able to be accessed during the future test period should an unforeseen market shock occur. The Commission will continue to monitor a variety of market factors in future rate cases to gauge whether volatility and uncertainty continue to be prevalent issues that merit more consideration in setting the ROE.[26]

The Michigan PSC references "singular events" and the overall effect the events could have on the ability of a utility to access capital. Consistent with the Michigan PSC's views, it is important to consider a) that the TCJA has had a negative effect on the cash flows of utilities and b) the effects of the increase volatility associated with the uncertainty surrounding the economic effects of COVID-19.

Q. What conclusions do you draw from your analysis of capital market conditions?

A. The important conclusions resulting from capital market conditions are:

- The assumptions used in the ROE estimation models have been affected by recent, historically atypical market conditions. Therefore, as the Commission has done in prior cases, it is important to allow the results of multiple ROE

[26] *Id.,* at 43.

estimation models to inform the decision on the appropriate ROE for PAWC in this proceeding.[27]

- Recent market conditions reflect short-term exogenous shocks that are not expected to persist over the long-term. As a result, the recent atypical market conditions do not reflect the market conditions that will be present when the rates for PAWC will be in effect.

- As a result of the recent market volatility, it is critical to consider the results of a variety of ROE estimation models, and to consider the results of the models using forward-looking assumptions to estimate the cost of equity that will be in effect over the proposed rate period.

- Credit rating agencies have demonstrated concern about the cash flow metrics of utilities, related the negative effects of both current market conditions and the TCJA, which increases investor risk expectations for utilities. Therefore, it is increasingly important to consider a rate of return and capital structure that support the Company's cash flow metrics to enable PAWC the ability to attract capital at reasonable terms during the period that rates will be in effect.

V. PROXY GROUP SELECTION

Q. Why have you used a group of proxy companies to estimate the cost of equity for PAWC?

A. In this proceeding, I am estimating the cost of equity for PAWC, which is a rate-regulated subsidiary of AWK. Since the ROE is a market-based concept, and because PAWC's stock is not publicly traded, it is necessary to establish a group of companies that are both publicly traded and are comparable to the Company in certain fundamental business and financial respects to serve as its "proxy" for

[27] Pennsylvania Public Utility Commission, PPL Electric Utilities, R-2012-2290597, meeting held December 5, 2012, at 80-81.

purposes of the ROE estimation process. The proxy companies used in my analyses all possess a set of operating and financial risk characteristics that are substantially comparable to PAWC, and, therefore, provide a reasonable basis for deriving the appropriate ROE.

Q. Please provide a brief profile of PAWC.

A. PAWC is a wholly-owned subsidiary of AWK that provides water distribution service to approximately 666,000 customers and wastewater service to approximately 74,000 customers in Pennsylvania.[28] In 2019, the Company had total operating revenues of $689 million which for PAWC's parent company, AWK, represented 22.30 percent of total regulated operating revenues.[29] The Company generally accesses debt markets through an affiliate, the American Water Capital Corp. ("AWCC"). The current credit ratings on senior unsecured debt for AWK and AWCC are as follows: (1) S&P - A (Outlook: Stable); and (2) Moody's – Baa1 (Outlook: Stable).[30]

Q. How did you select the companies in your proxy group?

A. I began with the group of U.S. utilities that Value Line classifies as "Water Utilities" and "Natural Gas Distribution Companies". That combined group includes 17 domestic U.S. utilities. I simultaneously applied the following screening criteria to select companies that:

28 American Water Works Company, Inc., 2019 SEC Form 10-K, at 4.
29 Ibid.
30 SNL Financial, April 10, 2020.

- pay consistent quarterly cash dividends because companies that do not cannot be analyzed using the Constant Growth DCF model;
- have investment grade long-term issuer ratings from S&P and/or Moody's;
- are covered by at least two utility industry analysts;
- have positive long-term earnings growth forecasts from at least two utility industry equity analysts;
- derive more than 70.00 percent of their total operating income from regulated operations; and
- were not parties to a merger or transformative transaction during the analytical periods relied on.

Q. Did you include AWK in your proxy group?

A. Yes. While my general practice is to exclude the subject company, or its parent holding company, from the proxy group, given the relatively small number of companies that met the screening criteria, I have presented my ROE results both including and excluding AWK.

Q. What is the composition of your proxy group?

A. The screening criteria discussed above resulted in a proxy group consisting of the companies in Figure 11.

Figure 11: Proxy Group

Company	Ticker
American States Water Company	AWR
American Water Works Company, Inc.	AWK
Atmos Energy Corporation	ATO
California Water Service Group	CWT
Middlesex Water Company	MSEX
New Jersey Resources Corporation	NJR
Northwest Natural Gas Company	NWN
ONE Gas Inc.	OGS
San Jose Water	SJW
South Jersey Industries, Inc.	SJI
Southwest Gas Corporation	SWX
Spire, Inc.	SR
York Water Company	YORW

Q. Why did you include natural gas distribution companies in the proxy group?

A. Value Line currently classifies only seven companies as water utilities. Therefore, the group of water utilities is already small before a set of screening criteria are applied. Additionally, there is currently a trend towards consolidation in the utility industry, which reduces the number of available proxy companies.[31] Currently, one of the water utilities covered by Value Line is engaged in M&A activity and must be removed from the proxy group. Aqua America, Inc. agreed to acquire PNG Companies LLC.[32,33] Therefore, because there are a small number of companies

[31] Chediak, Mark, et al. "Utility M&A Is So Hot Not Even Berkshire's Billions Won a Bid." Bloomberg.com, Bloomberg, 3 Jan. 2018, www.bloomberg.com/news/articles/2018-01-03/utility-m-a-is-so-hot-not-even-berkshire-s-billions-won-a-bid.

[32] "Aqua America Announces Agreement to Acquire Peoples." Aqua America, 23 Oct. 2018, ir.aquaamerica.com/news-releases/news-release-details/aqua-america-announces-agreement-acquire-peoples.

[33] On January 16, 2020, this merger received the approval of the Commission. On February 3, 2020, the combined company was renamed Essential Utilities, Inc. Because the transaction closed immediately prior to the end of the analytical period used in the analyses, I have excluded Aqua from the proxy group.

that are available for inclusion in the proxy group, I also included natural gas distribution companies.

Q. Are natural gas distribution companies reasonably comparable to water utilities to be included in a proxy group used to estimate the cost of equity for a water utility?

A. Yes, I believe that it is reasonable to rely on a combined proxy group. As noted above, due to consolidation in the water utility industry, there is only a small group of water companies that can be included in the proxy group. In addition, the screening criteria relied on for my proxy group require that a company derive more than 70 percent of their operating income from regulated operations. Therefore, the natural gas distribution companies included in my proxy group generate a large portion of their operating income from regulated operations similar to PAWC and the water utilities that will be included in the proxy group. As a result, I believe that it is appropriate to include natural gas distribution companies in my proxy group.

Q. Have other regulators considered the inclusion of natural gas distribution companies in the proxy group used to estimate the cost of equity for a water utility?

A. Yes. The Massachusetts Department of Public Utilities ("MDPU"), the Florida Public Service Commission ("FPUC") and the Kentucky Public Service Commission ("KYPSC") have considered the results of a proxy group that includes natural gas companies when determining the authorized ROE for water and wastewater utilities. In Docket No. 17-90, the MDPU determined that the use of a

natural gas utility proxy group was appropriate for the purpose of demonstrating the comparability of the investment risk of the proxy group to Aquarion Water Company.[34]

In Docket No. 20180006-WS, the FPUC modified the methodology used to estimate the ROE for water and wastewater utilities in Florida to include a combined proxy group of natural gas and water utilities.[35] The FPUC has previously relied on a natural gas only proxy group to estimate the ROE for water and wastewater utilities[36]; however, to increase the size of the proxy group, the FPUC decided to rely on a combined proxy group. Specifically, the FPUC noted:

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34 Massachusetts Department of Public Utilities, Docket No. 17-90, Petition of Aquarion Water Company of Massachusetts, Inc., pursuant to G.L. c. 164, § 94, and G.L. c. 165, § 2, for Approval of a General Rate Increase as set forth in M.D.P.U. No. 3., October 31, 2018, p. 286-287.

35 Docket No. 20180006-WS, In re. Water and wastewater industry annual reestablishment of authorized range of return on common equity for water and wastewater utilities pursuant to Section 367.081(4)(f),F.S., Order No. PSC-2018-0327-PAA-WS, at 7.

36 Docket No. 170006-WS, In re. Water and wastewater industry annual reestablishment of authorized range of return on common equity for water and wastewater utilities pursuant to Section 367.081(4)(f),F.S., Order No. PSC-17-0249-PAA-WS, at 2.

> The leverage formula methodology shall be modified to include a combined proxy group of natural gas and WAW utilities as proxy companies in calculating the leverage formula. We find that the selected natural gas utilities and WAW utilities that derive at least 50 percent of their revenue from regulated rates. These utilities have market power and are influenced significantly by economic regulation. In Attachment 1, the returns calculated using the proxy group are adjusted to reflect the risks faced by Florida WAW utilities. The updated index consists of five natural gas companies and seven WAW companies that derive at least 50 percent of their total revenue from regulated operations. These companies have a median Standard and Poor's bond rating of "A"[37]

In Case No. 2018-00358 for Kentucky-American Water Company ("Kentucky American"), the KYPSC noted that the authorized ROE for Kentucky-American was within the range of DCF and CAPM results produced by Kentucky-American and the Attorney General.[38] To develop the DCF and CAPM models, Kentucky American and the Attorney General relied on two proxy groups: (1) a water only proxy group; and (2) a combined proxy group which included natural gas utilities.[39] Therefore, the KYPSC has also considered, when determining the authorized ROE for a water company, ROE results based on a proxy group that includes both natural gas and water utilities.

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37 Docket No. 20180006-WS, In re. Water and wastewater industry annual reestablishment of authorized range of return on common equity for water and wastewater utilities pursuant to Section 367.081(4)(f),F.S., Order No. PSC-2018-0327-PAA-WS, at 8.

38 Case No. 2018-00358, In the matter of: Electronic Application of Kentucky-American Water Company for an Adjustment of Rates, Order, June 27, 2019, at 66.

39 *Id*., at 55-56.

VI. COST OF EQUITY ESTIMATION

Q. Please briefly discuss the ROE in the context of the regulated ("ROR").

A. The overall ROR for a regulated utility is based on its weighted average cost of capital, in which the costs of the individual sources of capital are weighted by their respective book values. While the costs of debt and preferred stock can be directly observed, the cost of equity is market-based and, therefore, must be estimated based on observable market data.

Q. How is the required ROE determined?

A. The required ROE is estimated by using multiple analytical techniques that rely on market-based data to quantify investor expectations regarding required equity returns, adjusted for certain incremental costs and risks. Quantitative models produce a range of reasonable results from which the market-required ROE is selected. That selection must be based on a comprehensive review of relevant data and information and does not necessarily lend itself to a strict mathematical solution. The key consideration in determining the cost of equity is to ensure that the methodologies employed reasonably reflect investors' views of the financial markets in general and of the subject company (in the context of the proxy group) in particular.

Q. What methods did you use to determine PAWC's cost of equity?

A. I considered the results of the Constant Growth DCF model, the CAPM, the ECAPM, and an Expected Earnings analysis. As discussed in more detail below,

a reasonable ROE estimate appropriately considers alternative methodologies and the reasonableness of their individual and collective results.

A. Importance of Multiple Analytical Approaches

Q. Why is it important to use more than one analytical approach?

A. Because the cost of equity is not directly observable, it must be estimated based on both quantitative and qualitative information. When faced with the task of estimating the cost of equity, analysts and investors are inclined to gather and evaluate as much relevant data as reasonably can be analyzed. Several models have been developed to estimate the cost of equity, and I use multiple approaches to estimate the cost of equity. As a practical matter, however, all of the models available for estimating the cost of equity are subject to limiting assumptions or other methodological constraints. Consequently, many well-regarded finance texts recommend using multiple approaches when estimating the cost of equity. For example, Copeland, Koller, and Murrin[40] suggest using the CAPM and Arbitrage Pricing Theory model.

Q. Is it important given the current market conditions to use more than one analytical approach?

A. Yes. Low interest rates and the effects of the investor "flight to quality" can be seen in high utility share valuations, relative to historical levels and relative to the broader market. Higher utility stock valuations produce lower dividend yields and

[40] Tom Copeland, Tim Koller and Jack Murrin, Valuation: Measuring and Managing the Value of Companies, 3rd Ed. (New York: McKinsey & Company, Inc., 2000), at 214.

result in lower cost of equity estimates from a DCF analysis. Low interest rates also affect the CAPM in two ways: (1) the risk-free rate is lower, and (2) because the market risk premium is a function of interest rates, (i.e., it is the return on the broad stock market less the risk-free interest rate), the risk premium should move higher when interest rates are lower. Therefore, it is important to use multiple analytical approaches to moderate the impact that the current low interest rate environment is having on the ROE estimates for the proxy group and, where possible, consider using projected market data in the models to estimate the return for the forward-looking period.

Q. Has the Commission made similar findings regarding the reliance on multiple models?

A. Yes, it has. In a 2012 decision for PPL Electric Utilities, while noting that the Commission has traditionally relied primarily on the DCF method to estimate the cost of equity for regulated utilities, the Commission recognized that market conditions were causing the DCF model to produce results that were much lower than other models such as the CAPM and Risk Premium. The Commission's Order explained:

> Sole reliance on one methodology without checking the validity of the results of that methodology with other cost of equity analyses does not always lend itself to responsible ratemaking. We conclude that methodologies other than the DCF can be used as a check upon the reasonableness of the DCF derived equity return calculation.[41]

The Commission ultimately concluded:

> As such, where evidence based on the CAPM and RP methods suggest that the DCF-only results may understate the utility's current cost of equity capital, we will give consideration to those other methods, to some degree, in determining the appropriate range of reasonableness for our equity return determination.[42]

Q. What are your conclusions about the results of the DCF and CAPM models?

A. Recent market data that is used as the basis for the assumptions for both models have been affected by market conditions. As a result, relying exclusively on historical assumptions in these models, without considering whether these assumptions are consistent with investors' future expectations, will underestimate the cost of equity that investors would require over the period that the rates in this case are to be in effect. In this instance, relying on the historically low dividend yields that are not expected to continue over the period that the new rates will be in effect will underestimate the ROE for PAWC.

Furthermore, as discussed in Section IV above, Treasury bond yields have experienced unprecedented volatility in recent months due to the economic effects of COVID-19. Therefore, the use of current averages of Treasury bond yields as the estimate of the risk-free rate in the CAPM is not appropriate since recent

[41] Pennsylvania Public Utility Commission, PPL Electric Utilities, R-2012-2290597, meeting held December 5, 2012, at 80.

[42] *Id.*, at 81.

market conditions are not expected to continue over the long-term. Instead, analysts should rely on projected yields of Treasury Bonds in the CAPM. The projected Treasury Bond yields results in CAPM estimates that are more reflective of the market conditions that investors expect during the period that the Company's rates will be in effect.

B. Constant Growth DCF Model

Q. Please describe the DCF approach.

A. The DCF approach is based on the theory that a stock's current price represents the present value of all expected future cash flows. In its most general form, the DCF model is expressed as follows:

$$P_0 = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \ldots + \frac{D_\infty}{(1+k)^\infty} \quad [1]$$

Where P_0 represents the current stock price, D1…D∞ are all expected future dividends, and k is the discount rate, or required ROE. Equation [1] is a standard present value calculation that can be simplified and rearranged into the following form:

$$k = \frac{D_0(1+g)}{P_0} + g \quad [2]$$

Equation [2] is often referred to as the Constant Growth DCF model in which the first term is the expected dividend yield and the second term is the expected long-term growth rate.

Q. What assumptions are required for the Constant Growth DCF model?

A. The Constant Growth DCF model requires the following assumptions: (1) a constant growth rate for earnings and dividends; (2) a stable dividend payout ratio; (3) a constant price-to-earnings ("P/E") ratio; and (4) a discount rate greater than the expected growth rate. To the extent any of these assumptions is violated, considered judgment and/or specific adjustments should be applied to the results.

Q. What market data did you use to calculate the dividend yield in your Constant Growth DCF model?

A. The dividend yield in my Constant Growth DCF model is based on the proxy companies' current annual dividend and average closing stock prices over the 30-, 90-, and 180-trading days as of March 31, 2020.

Q. Why did you use three averaging periods for stock prices?

A. In my Constant Growth DCF model, I use an average of recent trading days to calculate the price term (P_0) in the DCF model to ensure that the ROE is not skewed by anomalous events that may affect stock prices on any given trading day. The averaging period should also be reasonably representative of expected capital market conditions over the long-term. However, by necessity, analysts rely on historical prices which, as discussed above, have been volatile and are currently at unsustainably high levels. Under these circumstances, where current market conditions cannot be expected to continue throughout the rate period, it is important to recognize that current average prices in the Constant Growth DCF model are not consistent with forward-looking market expectations. Therefore, the results of my Constant Growth DCF model using historical data may underestimate

the forward-looking cost of equity. As a result, I place more weight on the median to median-high results produced by my Constant Growth DCF model.

Q. Did you make any adjustments to the dividend yield to account for periodic growth in dividends?

A. Yes. Since utility companies tend to increase their quarterly dividends at different times throughout the year, it is reasonable to assume that dividend increases will be evenly distributed over calendar quarters. Given that assumption, it is reasonable to apply one-half of the expected annual dividend growth rate for purposes of calculating the expected dividend yield component of the DCF model. This adjustment ensures that the expected first year dividend yield is, on average, representative of the coming twelve-month period, and does not overstate the aggregated dividends to be paid during that time.

Q. Why is it important to select appropriate measures of long-term growth in applying the DCF model?

A. In its Constant Growth form, the DCF model (i.e., Equation [2]) assumes a single long-term growth rate in perpetuity. In order to reduce the long-term growth rate to a single measure, one must assume that the dividend payout ratio remains constant and that earnings per share, dividends per share, and book value per share all grow at the same constant rate. Over the long run, however, dividend growth can only be sustained by earnings growth. For example, earnings growth rates tend to be least influenced by capital allocation decisions that companies may make in response to near-term changes in the business environment. Since such decisions may directly affect near-term dividend payout ratios, estimates of

earnings growth are more indicative of long-term investor expectations than are dividend or book value growth estimates.

Q. What sources of long-term growth rates did you rely on in your Constant Growth DCF model?

A. My Constant Growth DCF model incorporates the following sources of long-term growth rates: (1) consensus long-term earnings growth estimates from Zacks Investment Research; (2) consensus long-term earnings growth estimates from Thomson First Call (provided by Yahoo! Finance); and (3) long-term earnings growth estimates from Value Line.

Q. How did you calculate the expected dividend yield?

A. I adjusted the dividend yield to reflect the growth rate that was being used in that particular scenario. This ensures that the growth rate used in the dividend yield calculation and the growth rate used as the "g" term of the DCF model are internally consistent.

Q. Did you make any adjustments to the results of the Constant Growth DCF analysis?

A. Yes. I eliminated any ROE estimate that is below the yield on the 30-year Treasury Bond plus a minimum equity risk premium. The lower bound of 7.00 percent was established by reviewing the equity risk premium for the proxy group as calculated by my CAPM analysis.[43] As shown in Schedule-4 of Exhibit 13-A, the market risk

[43] Docket No. E017/GR-15-1033, In the Matter of the Application of Otter Tail Power Company for Authority to Increase Rates for Electric Service in the State of Minnesota (August 16, 2016), at 11.

premium ranged from 10.85 percent to 12.49 percent. Therefore, the implied equity risk premium for the proxy group is calculated as the market return times the proxy group average beta. As shown in Schedule-4 of Exhibit 13-A, the proxy group (including AWK) had a Value Line beta of 0.642, which would result in an equity risk premium for the proxy group ranging from 6.97 percent to 8.02 percent (beta of 0.642 x range of 10.85 percent to 12.49 percent = 6.97 percent to 8.02 percent). An ROE estimate of 7.00 percent would result in an equity risk premium ranging from 3.80 percent to 5.44 percent (7 percent minus risk-free rates which range from 1.56 percent to 3.20 percent = 3.80 percent to 5.44 percent), which would result in an equity risk premium for the proxy group that is approximately 300 basis points less than the equity risk premium for the proxy group including AWK calculated using my CAPM analysis. Therefore, while a return of 7.00 percent would not be considered reasonable for the subject company, it is necessary to establish a lower boundary in the results for the proxy group. Therefore, I have eliminated results for the proxy companies that fall below this point. This approach is generally consistent with the FERC's recent decision in Opinion No. 569.[44]

Q. Please summarize the results of your Constant Growth DCF analyses.

A. Figure 12 (see also Schedule-3 of Exhibit 13-A) presents the range of results produced by my proxy group. As shown in Figure 12, for the proxy group (including and excluding AWK), the median Constant Growth DCF results range from 9.27

[44] In Opinion No. 569, the FERC excluded results that were below the yield on Baa corporate bonds plus 20 percent of the CAPM risk premium, which resulted in a low-end range of 6.41 percent to 7.18 percent. The 7.00 percent threshold that I have applied is reasonable based on that range.

percent to 9.82 percent and the median high Constant Growth DCF results are in the range of 10.24 percent to 11.15 percent.

Figure 12: Summary of Constant Growth DCF Results

	Median Low	Median	Median High
Including AWK			
30-Day Average	9.34%	9.82%	11.15%
90-Day Average	9.12%	9.76%	11.15%
180-Day Average	8.98%	9.74%	11.02%
Excluding AWK			
30-Day Average	9.29%	9.39%	10.48%
90-Day Average	9.07%	9.28%	10.34%
180-Day Average	8.79%	9.27%	10.24%

Q. How did you calculate the range of results for the Constant Growth DCF model?

A. I calculated the low DCF result using the minimum growth rate (i.e., the lowest of the Thomson First Call, Zacks, and Value Line earnings growth rates) for each of the proxy group companies. Thus, the low result reflects the minimum DCF result for the proxy group. I used a similar approach to calculate the high results, using the highest growth rate for each proxy group company. The mean results were calculated using the average growth rates from all sources.

Q. What are your conclusions about the results of the Constant Growth DCF model?

A. As discussed previously, one primary assumption of the DCF model is a constant P/E ratio. That assumption is heavily influenced by the market price of utility stocks. To the extent that utility valuations are high and may not be sustainable, it is important to consider the results of the DCF model with caution. The median

dividend yield for the proxy group on the 30-day average DCF analysis is 2.21 percent including AWK and 2.42 percent excluding AWK, lower than the average dividend yield for natural gas and water utilities over the last 10 years. These data points demonstrate that the results of the current DCF models are significantly below more normal market conditions. Therefore, while I have given weight to the results of the Constant Growth DCF model, my recommendation also gives weight to the results of other ROE estimation models.

C. CAPM Analysis

Q. Please briefly describe the Capital Asset Pricing Model ("CAPM").

A. The CAPM is a risk premium approach that 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. Systematic risk is the risk inherent in the entire market or market segment. This form of risk cannot be diversified away using a portfolio of assets. Non-systematic risk is the risk of a specific company that can be mitigated through portfolio diversification.

The CAPM is defined by four components, each of which must theoretically be a forward-looking estimate:

$$K_e = r_f + \beta\left(r_m - r_f\right) \quad [3]$$

Where:

K_e = the required market ROE;

β = Beta coefficient of an individual security;

r_f = the risk-free ROR; and

r_m = the required return on the market as a whole.

In this specification, the term (rm – rf) represents the Market Risk Premium. According to the theory underlying the CAPM, since unsystematic risk can be diversified away, investors should only be concerned with systematic risk. Systematic risk is measured by Beta. Beta is a measure of the volatility of a security as compared to the market as a whole. Beta is defined as:

$$\beta = \frac{Covariance(r_e, r_m)}{Variance(r_m)} \quad [4]$$

The variance of the market return (i.e., Variance (rm)) is a measure of the uncertainty of the general market. The covariance between the return on a specific security and the general market (i.e., Covariance (re, rm)) reflects the extent to which the return on that security will respond to a given change in the general market return. Thus, Beta represents the risk of the security relative to the general market.

Q. What risk-free rate did you use in your CAPM analysis?

A. I relied on three sources for my estimate of the risk-free rate: (1) the current 30-day average yield on 30-year U.S. Treasury bonds (i.e., 1.56 percent);[45] (2) the projected 30-year U.S. Treasury bond yield for Q3 2020 through Q3 2021 (i.e., 1.80 percent);[46] and (3) the projected 30-year U.S. Treasury bond yield for 2021 through 2025 (i.e., 3.20 percent).[47]

Q. Would you place more weight on one of these scenarios?

A. Yes. Based on current market conditions, I place more weight on the results of the projected yields on the 30-year Treasury bonds. As discussed previously, the estimation of the cost of equity in this case should be forward-looking because it is the return that investors would receive over the future rate period. Therefore, the inputs and assumptions used in the CAPM analysis should reflect the expectations of the market at that time. While I have included the results of a CAPM analysis that relies on the current average risk-free rate, as discussed with respect to the DCF analysis, recent market conditions may not be representative of the market's expectations for future interest rates.

Q. What Beta coefficients did you use in your CAPM analysis?

A. As shown in Schedule-4 of Exhibit 13-A, I used the Beta coefficients for the proxy group companies as reported by Bloomberg and Value Line. The Beta coefficients reported by Bloomberg were calculated using ten years of weekly returns relative

45 Bloomberg Professional, as of March 31, 2020.
46 Blue Chip Financial Forecasts, Vol. 39, No. 4, April 1, 2020, at 2.
47 Blue Chip Financial Forecasts, Vol. 38, No. 12, December 1, 2019, at 14.

to the S&P 500 Index. Value Line's calculation is based on five years of weekly returns relative to the New York Stock Exchange Composite Index.

Q. How did you estimate the Market Risk Premium in the CAPM?

A. I estimated the Market Risk Premium based on the expected return on the S&P 500 Index less the 30-year Treasury bond yield. I calculated the expected return on the S&P 500 Index using S&P's published dividend yield and five-year projected growth rate for the entire S&P 500 Index. As shown in Schedule-4 of Exhibit 13-A, based on S&P's five-year growth rate for the S&P 500 of 11.60 percent and dividend yield of 2.31 percent, the estimated required market return for the S&P 500 Index is 14.05 percent. The implied market risk premium over the current 30-day average of the 30-year U.S. Treasury bond yield, and projected yields on the 30-year U.S. Treasury bond, range from 10.85 percent to 12.25 percent.

Q. Have other regulators endorsed the use of a forward-looking market risk premium?

A. Yes. The Staff in the Maine Public Utilities Commission ("Maine PUC") have supported the forward-looking market risk premium. In the Bench Analysis in Docket No. 2018-00194 for Central Maine Power Company, Docket No. 2017-00198 for Emera Maine and Docket No. 2017-00065 for Northern Utilities, the Staff accepted the forward-looking methodology for calculating the market return that was proposed by the companies.[48] In each case, the market return was the

[48] Central Maine Power Company, Investigation into Rates and Revenue Requirements of Central Maine Power Company, Docket No. 2018-00194, Bench Analysis at 52 (February 22, 2019); Emera Maine, Request for Approval of a Proposed Rate Increase, Docket No. 2017-00198, Bench Analysis at 71-72

expected return for the S&P 500, which was calculated using a Constant Growth DCF model. In Docket No. 2017-00198, Staff noted the following:

> Staff has no issue with the methodology used by Mr. Perkins in calculating market parameters based on the S&P 500 and used the model provided by Mr. Perkins with the revised risk free rate to re-calculate the market risk premiums.[49]

Furthermore, the Maine PUC in Docket No. 2017-0198 used the CAPM results calculated by Staff and Emera Maine as a check on the reasonableness of the DCF results in the case and did not dispute the use of the forward-looking market risk premium by the parties (i.e., Staff and Emera Maine).[50]

Q. Did you consider another form of the CAPM in your analysis?

A. Yes. I have also considered the results of an Empirical CAPM ("ECAPM" or alternatively referred to as the Zero-Beta CAPM)[51] in estimating the cost of equity for PAWC. The ECAPM calculates the product of the adjusted Beta coefficient and the market risk premium and applies a weight of 75.00 percent to that result. The model then applies a 25.00 percent weight to the market risk premium, without any effect from the Beta coefficient. The results of the two calculations are summed, along with the risk-free rate, to produce the ECAPM result, as noted in Equation [5] below:

(December 21, 2017); Northern Utilities, Inc. d/b/a UNITIL, Request for Approval of Rate Change Pursuant to Section 307, Docket No. 2017-00065, Bench Analysis, at 15-16 (October 6, 2017).

49 Emera Maine, Request for Approval of a Proposed Rate Increase, Docket No. 2017-00198, Bench Analysis, at 71-72 (December 21, 2017).

50 Emera Maine, Request for Approval of Proposed Rate Increase, Docket No. 2017-00198, June 28, 2018, at 41

51 *See e.g.*, Roger A. Morin, New Regulatory Finance, Public Utilities Reports, Inc., 2006, at 189.

$$k_e = r_f + 0.75\beta(r_m - r_f) + 0.25(r_m - r_f) \quad [5]$$

Where:

k_e = the required market ROE
β = Adjusted Beta coefficient of an individual security
r_f = the risk-free rate of return
r_m = the required return on the market as a whole

In essence, the Empirical form of the CAPM addresses the tendency of the "traditional" CAPM to underestimate the cost of equity for companies with low Beta coefficients such as regulated utilities. In that regard, the ECAPM is not redundant to the use of adjusted Betas; rather, it recognizes the results of academic research indicating that the risk-return relationship is different (in essence, flatter) than estimated by the CAPM, and that the CAPM underestimates the "alpha," or the constant return term.[52]

As with the CAPM, my application of the ECAPM uses the forward-looking market risk premium estimates, the three yields on 30-year Treasury securities noted earlier as the risk-free rate, and the Bloomberg and Value Line Beta coefficients.

Q. What are the results of your CAPM analyses?

A. As shown in Figure 13 (see also Schedule-4 of Exhibit 13-A), my traditional CAPM analyses produces a range of returns from 9.58 percent to 11.48 percent (including AWK) and from 9.68 percent to 11.47 percent (excluding AWK). The ECAPM analysis results range from 10.70 percent to 12.12 percent (including AWK) and from 10.77 percent to 12.11 percent (excluding AWK). The range established by

[52] *Id*., at 191.

the traditional CAPM and the ECAPM is 9.58 percent to 12.12 percent with a mean of 10.96 percent (including AWK) and 9.68 percent to 12.11 percent with a mean of 11.00 percent (excluding AWK).

Figure 13: Forward-Looking CAPM Results

	Current Risk-Free Rate (1.56%)	Q3 2020- Q3 2021 Projected Risk-Free Rate (1.80%)	2021-2025 Projected Risk-Free Rate (3.20%)
CAPM			
Including AWK			
Bloomberg Beta	9.58%	9.67%	10.17%
Value Line Beta	11.09%	11.15%	11.48%
Excluding AWK			
Bloomberg Beta	9.68%	9.76%	10.25%
Value Line Beta	11.08%	11.13%	11.47%
ECAPM			
Including AWK			
Bloomberg Beta	10.70%	10.76%	11.14%
Value Line Beta	11.83%	11.87%	12.12%
Excluding AWK			
Bloomberg Beta	10.77%	10.83%	11.20%
Value Line Beta	11.82%	11.86%	12.11%

D. Expected Earnings Analysis

Q. Have you considered an additional analysis to estimate the cost of equity for PAWC?

A. Yes. I have considered an Expected Earnings analysis based on the projected ROEs for each of the proxy group companies.

Q. What is an Expected Earnings Analysis?

A. The Expected Earnings methodology is a comparable earnings analysis that calculates the earnings that an investor expects to receive on the book value of a

stock. The expected earnings analysis is a forward-looking estimate of investors' expected returns. The use of an Expected Earnings approach based on the proxy companies provides a range of the expected returns on a group of risk comparable companies to the subject company. This range is useful in helping to determine the opportunity cost of investing in the subject company, which is relevant in determining a company's ROE.

Q. Have any other regulators considered the use of an Expected Earnings Analysis?

A. Yes. The Washington Utilities & Transportation Commission ("WUTC"), in its order in Dockets UE-170485 and UG-170486, considered the results of the Comparable Earnings analysis[53] in establishing the authorized ROE for Avista Corporation. The WUTC noted that it tends to place more weight on the results of the DCF, CAPM and Risk Premium analyses; however, given the wide range of CAPM results presented by the ROE witnesses in the case, the WUTC decided to apply weight to the results of the Comparable Earnings analysis.[54] Specifically, the WUTC stated the following:

[53] The Expected Earnings analysis is a form of the Comparable Earnings analysis that relies exclusively on forward-looking projections.

[54] *Wash. Utils. & Transp. Comm'n v. Avista Corp*., Docket Nos. UE-170485 and UG-170486, Order 07, ¶ 65 (April 26,2018). Comparable Earnings as discussed in this docket is similar to the Expected Earnings analysis developed in my Direct Testimony.

> Finally, as additional data points for our consideration of establishing Avista's ROE, we note that two witness, Mr. McKenzie for Avista and Mr. Parcell for Staff, employ the CE approach to two proxy groups of companies. The respective mid-points of each witnesses' CE analysis are 10.5 and 9.5 percent, respectively, with an average of 10.0 percent. Although we generally do not apply material weight to the CE method, having stronger reliance on the DCF, CAPM and RP methods, we are inclined to include the CE method here given the anomalous CAPM results described previously.[55]

Additionally, in its order in Docket No. ER12111052 for Jersey Central Power and Light Company, the New Jersey Board of Public Utilities ("NJ Board") noted that rate of return experts use a number of models including the DCF, CAPM, Risk Premium and Comparable Earnings to estimate the return required by investors. Specifically, the NJ Board noted:

[55] *Ibid*.

> In determining the cost of equity capital for a regulated utility, rate of return experts typically use a variety of financial models to simulate the returns assertedly required by investors. These include Discounted Cash Flow (DCF) models, Risk Premium models, Capital Asset Pricing Models (CAPM), Comparable Earnings models and variations thereof. However, it is widely acknowledged that these economic models constitute estimates, which, although probative, are not necessarily precise. The imprecision in the estimates provided by these models is more pronounced as a result of the current economic environment still recovering from the Great Recession, characterized by some as the worst economy since the Great Depression.[56]

Q. How did you develop the Expected Earnings Approach?

A. I relied primarily on the projected ROE capital for the proxy companies as reported by Value Line for the period from 2022-2024.[57] The projected ROEs are adjusted to account for the fact that the ROEs reported by Value Line are calculated on the basis of common shares outstanding at the end of the period, as opposed to average shares outstanding over the period. As shown in Schedule-5 of Exhibit 13-A, the Expected Earnings analysis results in a mean of 11.33 percent and a median of 11.72 percent including AWK and a mean of 11.29 percent and a median of 10.84 percent excluding AWK.

[56] BPU Docket No. ER12111052, OAL Docket No. PUC16310-12, Order Adopting Initial Decision with Modifications and Clarifications, March 18, 2015, at 71.

[57] Value Line projections refer to 2022-2024 for the Water Utilities in the proxy group and 2023-2025 for the Natural Gas Utilities in the proxy group. The difference in the projection period is due to the timing of Value Line's release date for the reports.

VII. BUSINESS RISKS AND MANAGEMENT PERFORMANCE

Q. Do the DCF, CAPM, ECAPM and Expected Earnings results for the proxy group, taken alone, provide an appropriate estimate of the cost of equity for PAWC?

A. No. These results provide only a range of the appropriate estimate of PAWC's cost of equity. Several additional factors must be considered when determining where the Company's cost of equity falls within the range of results. These factors, discussed below, should be considered with respect to their overall effect on PAWC's risk profile relative to the proxy group.

A. Risks Associated with Capital Expenditure Program

Q. Please summarize PAWC's capital expenditure program.

A. PAWC projects that the Company will spend approximately $1.90 billion on capital investments for the period from 2020-2024, including significant investment to replace aging infrastructure necessary to meet the needs of its customers and to comply with various regulations.

Q. How is PAWC's risk profile affected by its substantial capital expenditure program?

A. As with any utility faced with substantial capital expenditures, PAWC's risk profile is adversely affected in two significant and related ways: (1) the heightened level of investment increases the risk of under-recovery, or delayed recovery, of the invested capital; and (2) an inadequate return would put downward pressure on key credit metrics.

Q. Do credit rating agencies recognize the risks associated with elevated capital expenditures?

A. Yes. From a credit perspective, the additional pressure on cash flows associated with high levels of capital expenditures exerts corresponding pressure on credit metrics and, therefore, credit ratings. An S&P report explains:

> [T]here is little doubt that the U.S. electric industry needs to make record capital expenditures to comply with the proposed carbon pollution rules over the next several years, while maintaining safety standards and grid stability. We believe the higher capital spending and subsequent rise in debt levels could strain these companies' financial measures, resulting in an almost consistent negative discretionary cash flow throughout this higher construction period. To meet the higher capital spending requirements, companies will require ongoing and steady access to the capital markets, necessitating that the industry maintains its high credit quality. We expect that utilities will continue to effectively manage their regulatory risk by using various creative means to recover their costs and to finance their necessary higher spending.[58]

While this S&P report refers to electric utilities, the same applies to water utilities. To the extent that PAWC's rates do not permit it to recover its full cost of doing business, the Company will face increased recovery risk and thus increased pressure on its credit metrics. In an August 2016 report, S&P explains the importance of regulatory support for large capital projects:

[58] S&P, Ratings Direct, "U.S. Regulated Electric Utilities' Annual Capital Spending is Poised to Eclipse $100 Billion," July 2014.

> When applicable, a jurisdiction's willingness to support large capital projects with cash during construction is an important aspect of our analysis. This is especially true when the project represents a major addition to rate base and entails long lead times and technological risks that make it susceptible to construction delays. Broad support for all capital spending is the most credit-sustaining. Support for only specific types of capital spending, such as specific environmental projects or system integrity plans, is less so, but still favorable for creditors. Allowance of a cash return on construction work-in-progress or similar ratemaking methods historically were extraordinary measures for use in unusual circumstances, but when construction costs are rising, cash flow support could be crucial to maintain credit quality through the spending program. Even more favorable are those jurisdictions that present an opportunity for a higher return on capital projects as an incentive to investors.[59]

Q. Have credit rating agencies commented specifically on AWK's capital spending program?

A. Yes, both S&P and Moody's have observed that AWK has significant capital spending requirements. S&P states: "The combination of AWK's large capital spending, acquisitions in 2018, and the effects of tax reform have moderately weakened the company's financial measures, which we expect to remain at the lower end of the range for the rating."[60] Additionally, Moody's recently commented that:

[59] S&P Global Ratings, "Assessing U.S. Investor-Owned Utility Regulatory Environments," August 10, 2016, at 7.

[60] S&P Global Ratings, "American Water Works Company, Inc.," June 7, 2019, at 3.

> As previously expected, the company is increasing leverage due to financial policies that target up to $8.6 billion of capex, dividend growth is approaching 10% and no equity issuances are planned over the next five years. This is reducing key financial ratios, the effect of which is being exacerbated by cash flow pressures from 2017 federal tax reform.[61]

Q. Does PAWC have a capital tracking mechanism to recover some of the costs associated with its capital expenditures plan between rate cases?

A. Yes. PAWC has a Water and Wastewater Distribution System Improvement Charge ("DSIC") which allows PAWC to recover the costs associated with replacing and repairing aging water and wastewater infrastructure. However, it is important to note that the some of the costs included in PAWC's capital expenditures plan do not qualify for cost recovery through the DSIC. As a result, PAWC would still depend on rate case filings for complete capital cost recovery.

Q. Do the proxy group companies have the ability to recover capital investments through a distribution system infrastructure surcharge?

A. Yes, the proxy companies have infrastructure and capital recovery mechanisms that address significant capital expenditure requirements. As shown in Schedule-6 of Exhibit 13-A, the companies in the proxy group, excluding AWK, have infrastructure replacement recovery mechanisms in approximately 55.88 percent of their operating jurisdictions. Including AWK, the percentage of operating jurisdictions with infrastructure replacement recovery mechanisms is 60.00 percent. While PAWC does recover capital expenditures through a capital tracking

[61] Moody's Investors Service, "Announcement of Periodic Review: Moody's announces completion of a periodic review of ratings of American Water Works Company, Inc.," August 16, 2019.

mechanism, PAWC does still rely on rate case filings for a portion of the Company's capital costs.

Q. What are your conclusions regarding the effect of PAWC's capital spending program on its risk profile?

A. The Company's capital expenditure requirements as a percentage of net utility plant are significant and will continue over the next few years. Additionally, similar to a number of the operating subsidiaries of the proxy group, PAWC does have a capital tracking mechanism to recover some of the Company's projected capital expenditures. Nevertheless, a portion of PAWC's capital expenditures do not qualify for recovery through the DSIC; therefore, the Company is still dependent on rate case filings to recover some of its capital expenditures.

B. Risks Associated with Environmental and Water Quality Regulation

Q. Please provide an overview of the risks associated with water quantity, water quality and other environmental regulations applicable to PAWC's water supply facilities and operations.

A. Water supply utilities are subject to a complex array of regulations at the federal, state and river basin commission levels with respect to water quantity, water quality and other environmental aspects of their facilities and operations.

The testimony of Bruce Aiton at PAWC Statement No. 3 provides a detailed description of the environmental and regulatory risks facing water and wastewater utilities. As discussed in Mr. Aiton's testimony PAWC faces risks related to the following:

1) As the result of conditions that arose in Flint, Michigan and other jurisdictions across the country, there is increasing scrutiny by all levels of government of the presence of lead in the water customers use and consume. As a result, regulators are focused on adopting more stringent requirements for enforcing the federal "Lead and Copper Rule." PAWC's service territory includes the type of copper and galvanized pipes with solder joints that raise the risk of lead contamination.

2) Significant proposed revisions to the Lead and Copper Rule are pending before the Environmental Protection Agency's ("EPA"). These proposals include a mandate that customers and utilities share in the removal of lead service line replacement programs.

3) The Company has adopted a Commission-approved program that addresses the concerns outlined by the EPA about the presence of lead in customer-owned lines. Under this program, the Company is replacing customer-owned lead service lines across the service territory at no cost to the customer and without PAWC taking ownership of the new lines. In addition, the Company has implemented education initiatives for customers about the risks of lead in drinking water.

4) To address source water protection, the Pennsylvania Department of Environmental Protection ("PADEP") has proposed more intensive period "point of entry" monitoring for all public water systems sources, including those sources that are utilized only intermittently as backups in the event of

emergencies. If implemented as proposed, the point of entry monitoring requirements would significantly increase PAWC's monitoring requirements.

5) The EPA has continued to make its regulations concerning disinfection byproducts more stringent. The Stage 2 Disinfectants and Disinfection Byproducts Rule adopted in 2006, coupled with increasingly stringent disinfection regulations, requires a very careful balancing of treatment processes and source water monitoring to meet the twin goals of killing microbes while avoiding unacceptable concentrations of disinfection byproducts. These evolving standards require the Company to continually evaluate its treatment process which increases costs and demand for new investment.

Q. Provide an overview of the risks associated with environmental regulation with respect to PAWC's wastewater system operations.

A. As is the case with regard to drinking water system operations, the operation of wastewater collection and treatment systems face a range of environmental regulatory risks. These risks are discussed in detail in the testimony of Bruce Aiton at PAWC Statement No. 3. The following is a summary of these risk factors.

1) The Clean Water Act requires wastewater systems to obtain and maintain compliance with National Pollutant Discharge Elimination System ("NPDES") permits, which in Pennsylvania are issued by PADEP. Those NPDES permits include the establishment of stringent effluent limits which are set based upon

the stricter of technology-based effluent limits and water quality-based effluent limits.

Technology based limits are set by EPA at levels that reflect some measure of best practice that can, become more stringent as technology evolves. As discussed by Mr. Aiton, the NPDES permit issued in late 2016 for PAWC's Scranton system sets more stringent limits, some of which go into effect immediately, and some phased in over time.

More stringent effluent limits may be imposed when technology evolves or stream conditions change, engendering requirements for significant capital improvements and/or increased operating costs for enhanced treatment performance.

2) Certain Pennsylvania streams in PAWC's system are parts of watersheds which are classified as "impaired" (meaning below state standards). Such impaired waters are subject to the development and imposition of Total Maximum Daily Loads ("TMDLs") for parameters that contribute to the instream conditions. As discussed by Mr. Aiton, all wastewater systems in the Susquehanna River Basin, a watershed relied on by PAWC, have been accorded an annual "cap load"; therefore, certain sediments exceeding these limits can lead to penalties and other enforcement actions.

3) EPA's Combined Sewer Overflow (CSO) Control Policy[62] ("CSO Policy"), seeks to reduce, but not eliminate, CSOs. PAWC's recently acquired Scranton system has a combined sewer outflow that exceed the system conveyance and/or treatment capacity, after storms with excess untreated wastewaters discharged to receiving streams via combined sewer overflow ("CSO") outfalls. In many cases, separation of CSS into separate sanitary and storm systems is logistically and economically infeasible.

Under the CSO Policy and NPDES permits, operators of CSS systems must develop and implement a Long-Term Control Plan ("LTCP"), consisting of a collection system and treatment plant improvement projects designed to reduce CSOs. These LTCP requirements often involve very substantial multi-year CapEx programs.

Q. What is your conclusion with respect to the effect of the risk associated with environmental regulations and water quality regulations on PAWC's cost of equity?

A. PAWC has significant risk and uncertainty associated with environmental and water quality regulations, and the recovery of costs to comply with those regulations. It is clear that the financial community recognizes the additional risks to credit quality associated with the capital investment required to meet environmental and water quality regulations. As discussed in Section V of my

[62] 59 Fed. Reg. 18687 (April 19, 1994), available at: https://www.epa.gov/sites/production/files/2015-10/documents/owm0111.pdf

testimony, in order to establish a proxy group of sufficient size, the group is composed of both water utilities and natural gas utilities. When considering this risk factor, and the issues faced by the natural gas utilities in the proxy group, these environmental risk factors, in addition to the magnitude of the capital program that the Company has planned to ensure compliance, support an ROE above the proxy group median.

C. Management Performance and Recognition

Q. Please provide an overview of PAWC's programs and initiatives related to management performance.

A. Section 523 of the Pennsylvania Code for Public Utilities states that the Commission consider "the efficiency, effectiveness and adequacy of service of each utility when determining just and reasonable rates under this title". Additionally, the Commission's Policy Statement on Small Nonviable Water and Wastewater Systems at 69 Pa. Code § 69.711 states that the Commission will consider acquisition incentives including "rate of return premiums", "acquisition adjustments", "deferral of acquisition improvement costs" and plant improvement surcharge" to encourage the acquisition of troubled water and wastewater systems by viable utilities.

The testimony of Rod Nevirauskas at PAWC Statement No. 1 provides a detailed description of the programs and initiatives the Company has undertaken to demonstrate the excellent management performance of PAWC and support the Commission's implementation of both Section 523 of the Pennsylvania Code and

the Commission's Policy Statement. As discussed in Mr. Nevirauskas's testimony PAWC has demonstrated exemplary management performance as a result of the following initiatives/programs:

1) The Company has been able to mitigate the increase in the operating and maintenance expense of its water operations without a decline in service quality.

2) The Company has been working to mitigate customer rate impacts by trying to find sources of non-rate revenue to be recorded "above the line" for ratemaking purposes. The two most significant examples are: (1) rentals of space on water tanks for antennae for cellular telephones and similar applications; and (2) permitting carefully-controlled and environmentally-sensitive timbering on Company property.

3) The Company continues to meet all federal and state drinking water regulations. Additionally, the Company is the leading participant in the EPA's Partnership for Safe Water Treatment Program ("Partnership"), which means that it treats water to a standard that surpasses the requirements imposed by EPA and DEP.

4) The Company's industry-leading programs to assist low-income and payment-troubled customers. The assistance is provided through PAWC's H2O ("Help to Others") program. This program provides support to water and wastewater customers who qualify through discounts in rates, grants

and conservation education through the Dollar Energy Fund. PAWC's H2O program is also different from similar programs in that PAWC contributed $400,000 of shareholder's annual return to the program to assist customers in need.

5) PAWC has an extensive public education program that includes an initiative to educate the youth. For example, PAWC conducts water camps for elementary school children in the Commonwealth of Pennsylvania during the summer, teaches classes on watershed protection, water treatment, the water cycle and water conservation in the classroom during the school year, conducts plant tours, judges "envirothon" competitions and participates in Earth Day activities. Additionally, PAWC conducts water audits, provides water conservation kits and offers in-home repairs to water-using facilities to help eligible low-income customers reduce their water usage.

Finally, the testimonies of Mr. William Clarkson, Mr. Bruce Aiton and Mr. Bernard Grundusky discuss additional Company initiatives which further support the excellent management performance record of PAWC.

Q. How have you considered the management performance of PAWC in your recommendation?

A. As discussed above, a reasonable range of ROE estimates for PAWC is from 10.00 percent to 10.80 percent. I have decided to recommend an ROE of 10.80 percent for PAWC, which is at the high end of the reasonable range to reflect the

Company's excellent management performance. However, as discussed in Mr. Nevirauskas's testimony, if the Commission were to authorize an ROE for PAWC that is less than my recommended ROE, the Commission should add to the authorized ROE a management performance adjustment of no less than 25 basis points.

VIII. CAPITAL STRUCTURE AND COST OF DEBT

Q. Please explain how the water services capital structure was calculated for PAWC.

A. Because there is specific debt that has been identified for the wastewater services, the capital structures for water and wastewater services were calculated separately. The capital structure for the total company was calculated first, including all debt issuances and all sources of capital. As shown in Schedule-10 of Exhibit 13-A, the total company projected capital structure includes 44.79 percent long-term debt, 0.06 percent preferred stock and 55.15 percent common equity for the first year of the Rate Plan (ending December 31, 2021) and 44.84 percent long-term debt, 0.01 percent preferred stock and 55.15 percent common equity for the second year of the Rate Plan (ending December 31, 2022). The total company capital structure includes four issuances that can be specifically assigned to the wastewater services: Pennvest Clarion; Pennvest Pocono; Pennvest Scranton; and $47 million of a PEDFA tax-exempt debt issuance for Coatsville. These issuances are shown on Schedule-11 of Exhibit 13-A. The capital structure for water service was calculated by removing the wastewater specific debt instruments from the total long-term debt of the company and recalculating the

ratios of the remaining capital stock. The ratemaking capital structure for the water service after removing the wastewater specific debt issuances from the total company capital structure was 43.88 percent long-term debt, 0.06 percent preferred stock and 56.06 percent common equity for the first year of the Rate Plan (ending December 31, 2021) and 44.02 percent long-term debt, 0.01 percent preferred stock and 55.97 percent common equity for the second year of the Rate Plan (ending December 31, 2022).

Q. How was the wastewater services capital structure calculated?

A. The wastewater specific capital structure was calculated by applying the total company debt ratio to the wastewater rate base, excluding the specific wastewater debt issuances. Preferred stock is also calculated by applying the total company percentage of preferred stock to the rate base less the wastewater specific debt issuances. The equity component of the capital structure is the rate base less long-term debt, wastewater specific debt issuances and preferred stock. As shown in Figure 14 and Schedule-10 of Exhibit 13-A, the wastewater specific capital structure includes 49.58 percent long-term debt, 0.05 percent preferred stock and 50.37 percent common equity for the first year of the Rate Plan (ending December 31, 2021) and 49.26 percent long-term debt, 0.01 percent preferred stock and 50.73 percent common equity for the second year of the Rate Plan (ending December 31, 2022).

Figure 14: 2021 and 2020 Projected Rate-Making Capital Structures

	Rate Year 1 (2021)	Rate Year 2 (2022)
Total Company[63]		
Common Equity	55.15%	55.15%
Preferred Stock	0.06%	0.01%
Long-Term Debt	44.79%	44.84%
Water Services[64]		
Common Equity	56.06%	55.97%
Preferred Stock	0.06%	0.01%
Long-Term Debt	43.88%	44.02%
Wastewater Services[65]		
Common Equity	50.37%	50.73%
Preferred Stock	0.05%	0.01%
Long-Term Debt	39.44%	39.90%
WW Specific Debt	10.14%	9.36%

Q. Did you conduct any analysis to determine if the requested equity ratio was reasonable?

A. Yes, I did. I reviewed the Company's proposed capital structures for the first and second years of the rate plan and the capital structures of the utility operating subsidiaries of the proxy companies. Because the ROE is set based on the return that is derived from the risk-comparable proxy group, it is reasonable to look to the proxy group average capital structure to benchmark the equity ratio for the Company.

63 *See* Exhibit 13-A, Schedule 10.
64 *Ibid.*, at Schedule 10.
65 *Ibid.*, at Schedule 10.

Q. Please discuss your analysis of the capital structures of the proxy group companies.

A. I calculated the mean proportions of common equity, long-term debt and preferred equity for the most recent year for each of the companies in the proxy group at the operating subsidiary level.[66] My analysis of the capital structures of the proxy group companies is provided in Schedule-7 of Exhibit 13-A. As shown in Schedule-7 of Exhibit 13-A, the mean common equity ratio for the proxy group at the operating subsidiary level (excluding AWK) was 55.51 percent, within a range from 40.53 percent to 66.82 percent. PAWC's proposed water services equity ratios for 2021 and 2022 are slightly greater than the mean equity ratio and well within the range of equity ratios established by the proxy group. The wastewater services equity ratios for 2021 and 2022 are well below the mean equity ratio for the proxy companies.

Q. Are there other factors to be considered in setting the Company's capital structure?

A. Yes. The credit rating agencies' response to the TCJA must also be considered when determining the equity ratio. As discussed previously in my testimony, all three rating agencies have noted that the TCJA has negative implications for utility cash flows. S&P and FitchRatings have specifically identified increasing the equity ratio as one approach to ensure that utilities have sufficient cash flows following the federal income tax rate reductions and the loss of bonus depreciation.

[66] Long-term debt includes the current portion of long-term debt, assuming that the current portion would be refinanced with debt at maturity.

Furthermore, Moody's unprecedented downgrade of the rating outlook for the entire utilities sector in June 2018 stresses the importance of maintaining adequate cash flow metrics for the industry, as a whole, and PAWC, particularly, in the context of this proceeding.

Q. What is your conclusion with regard to PAWC's proposed capital structures?

A. Considering the actual capital structures of the proxy group operating companies, I believe that PAWC's proposed common equity ratios for water distribution service of 56.06 percent as of December 31, 2021 and 55.97 percent as of December 31, 2022 are reasonable. The proposed equity ratios are well withing the range of equity ratios established by the capital structures of the utility operating subsidiaries of the proxy companies. In addition, based on the cash flow concerns raised by credit rating agencies as a result of the TCJA, it is reasonable to rely on a higher equity ratio than the Company may have relied on in prior. The wastewater services capital structure as of December 31, 2021 and as of December 31, 2022 has significantly less equity than the average for the proxy companies.

Q. What is PAWC's proposed cost of long-term debt?

A. As shown in Schedule-8 of Exhibit 13-A, PAWC is proposing a long-term debt cost for the water service of 4.47 percent for the first year under the rate plan (ending December 31, 2021) and 4.35 percent for the second year of its rate plan (ending December 31, 2022). The wastewater services debt is projected in two components, the wastewater specific issuances, shown on Schedule-11 of Exhibit 13-A, have a projected debt cost of 2.55 percent for the first year under the rate

plan (ending December 31, 2021) and 2.60 percent for the second year of its rate plan (ending December 31, 2022). The remainder of the wastewater debt is projected to be financed at the total company rate of 4.47 for the first year under the rate plan (ending December 31, 2021) and 4.35 percent for the second year of its rate plan (ending December 31, 2022).

Q. Do you believe PAWC's proposed cost of long-term debt is reasonable?

A. Yes, I do. I have reviewed the underlying calculations supporting the cost of long-term debt for PAWC, and I find them to be methodologically correct. The embedded cost of long-term debt is based on the Company's actual debt issuances for 2019, and includes one new debt issuance in 2020, 2021 and 2022. The interest rates on the three proposed debt issuances was based on the projected yield on 30-year Treasury bonds plus the projected spread between the yield on Treasury bonds and the expected yield at issuance, verified in the market by PAWC's Treasury department. I conclude that PAWC's proposed long-term debt costs for the first year under the rate plan (ending December 31, 2021) and for the second year of its rate plan (ending December 31, 2022) are reasonable and should be approved by the Commission.

IX. MULTI-YEAR RATE PLAN

Q. Are you aware that the Company is filing a multi-year rate plan?

A. Yes, the Company is proposing a two-year rate plan through 2022.

Q. Does a multi-year rate plan create additional risk for the Company?

A. Yes. As noted earlier in my testimony, recent market conditions have demonstrated volatility and uncertainty related to extreme short-term conditions. These conditions have affected the assumptions used in the ROE estimation models, understating the results of the DCF model and the CAPM. Recent reductions in the yields on U.S. Treasury bonds could reverse once the short-term shock of COVID-19 and the volatility that has resulted from this situation has stabilized. In addition, as fear in the market subsidies, it is likely that the dividend yields for utility stocks will increase and be more in line with historical levels. It is reasonable to expect that the current market conditions will not persist for the entirety of the multi-year rate period of 2021-2022 during which the Company's rate plan will be in effect. Therefore, it is important to consider how these conditions have affected the results of the ROE estimation models when setting an appropriate ROE for the Company over the multi-year rate period that is proposed.

Q. Have you conducted any analysis as to the expected return on equity over the period that the Company is proposing for its multi-year rate plan?

A. Yes. As discussed in Section VI of my testimony, the CAPM analysis shown in Schedule-4 of Exhibit 13-A estimates the projected yields on 30-year Treasury bonds over the period from 2021-2025 as the risk-free rate and results in an estimated cost of equity ranging from 10.17 percent to 11.48 percent including AWK and 10.25 percent to 11.47 percent excluding AWK.

Q. What are your conclusions regarding the Company's proposed multi-year rate plan and its effect on the ROE for PAWC?

A. Recent market uncertainty regarding COVID-19 has resulted in investors rotating into lower risk assets such as Treasury bonds as a result interest rates have been driven to historically low levels. However, current market conditions are more reflective of a short-term dislocation in the market that is not expected to continue over the long-term which is why analysts' are forecasting interest rates to increase over the near-term or the period of PAWC's proposed multi-year rate plan. Therefore, if the Commission adopts PAWC's proposed multi-year rate plan, the Commission should adopt an ROE which is based on the use of forward looking data to ensure the Company can attract capital over the multi-year period. As shown in Figure 1, the range of results from the forward-looking ROE estimation models includes results from 9.67 percent to 12.12 percent. Within that range, an ROE of 10.80 percent reflects an appropriate return for PAWC taking into consideration the results of the models, the uncertainty in the market, and the risk factors that are specific to the Company.

X. CONCLUSIONS AND RECOMMENDATION

Q. What is your conclusion regarding a fair ROE for PAWC?

A. Based on the various quantitative analyses discussed in my Direct Testimony and the qualitative analyses presented in my Direct Testimony, a reasonable range of ROE results for PAWC is from 10.00 percent to 10.80 percent. I am recommending that the Commission set the Company's rate of return on common equity at 10.80 percent. A return at the high end of the range of results would recognize the

Company's superior performance and service quality, as discussed in the testimony of Mr. Rod Nevirauskas at PAWC Statement No. 1. In addition, the recommended ROE takes into consideration the anomalous conditions in capital markets that are causing the DCF model to understate the cost of equity, including the effect of the current low interest rate environment on utility stock valuations and dividend yields. Finally, the recommendation takes into consideration the relative business and financial risk of PAWC as compared to the proxy group. As a result, this ROE would enable the company to maintain its financial integrity and therefore its ability to attract capital at reasonable terms under a variety of economic and financial market conditions, while continuing to provide safe, reliable and affordable water and wastewater service to customers in Pennsylvania.

Q. What is your conclusion with respect to PAWC's proposed capital structures for water distribution service and wastewater service?

A. My conclusion is that PAWC's proposed capital structures for the rate plan, summarized in Figure 15 for both the water distribution service and wastewater service, are reasonable compared to the mean and range established by the capital structures for the proxy group companies.

Figure 15: 2021 and 2020 Projected Rate-Making Capital Structures

	Rate Year 1 (2021)	Rate Year 2 (2022)
Total Company[67]		
Common Equity	55.15%	55.15%
Preferred Stock	0.06%	0.01%
Long-Term Debt	44.79%	44.84%
Water Services[68]		
Common Equity	56.06%	55.97%
Preferred Stock	0.06%	0.01%
Long-Term Debt	43.88%	44.02%
Wastewater Services[69]		
Common Equity	50.37%	50.73%
Preferred Stock	0.05%	0.01%
Long-Term Debt	39.44%	39.90%
WW Specific Debt	10.14%	9.36%

Q. Does this conclude your Direct Testimony?

A. Yes.

67 *See* Exhibit 13-A, Schedule 10

68 *Ibid.*, at Schedule 10.

69 *Ibid.*, at Schedule 10.

ANN E. BULKLEY
Senior Vice President

Ms. Bulkley has more than two decades of management and economic consulting experience in the energy industry. Ms. Bulkley has extensive state and federal regulatory experience on both electric and natural gas issues including rate of return, cost of equity and capital structure issues. Ms. Bulkley has provided expert testimony on the cost of capital in more than 30 regulatory proceedings before regulatory commissions in Arizona, Arkansas, Colorado, Connecticut, Kansas, Massachusetts, Michigan, Minnesota, Missouri, New Jersey, New Mexico, New York, North Dakota, Oklahoma, Pennsylvania, Texas, South Dakota, West Virginia, and the Federal Energy Regulatory Commission. In addition, Ms. Bulkley has prepared and provided supporting analysis for at least forty Federal and State regulatory proceedings. In addition, Ms. Bulkley has worked on acquisition teams with investors seeking to acquire utility assets, providing valuation services including an understanding of regulation, market expected returns, and the assessment of utility risk factors. Ms. Bulkley has assisted clients with valuations of public utility and industrial properties for ratemaking, purchase and sale considerations, ad valorem tax assessments, and accounting and financial purposes. In addition, Ms. Bulkley has experience in the areas of contract and business unit valuation, strategic alliances, market restructuring and regulatory and litigation support. Prior to joining Concentric, Ms. Bulkley held senior expertise-based consulting positions at several firms, including Reed Consulting Group and Navigant Consulting, Inc. where she specialized in valuation. Ms. Bulkley holds an M.A. in economics from Boston University and a B.A. in economics and finance from Simmons College. Ms. Bulkley is a Certified General Appraiser licensed in the Commonwealth of Massachusetts and the State of New Hampshire.

REPRESENTATIVE PROJECT EXPERIENCE

Regulatory Analysis and Ratemaking

Ms. Bulkley has provided a range of advisory services relating to regulatory policy analysis and many aspects of utility ratemaking. Specific services have included: cost of capital and return on equity testimony, cost of service and rate design analysis and testimony, development of ratemaking strategies; development of merchant function exit strategies; analysis and program development to address residual energy supply and/or provider of last resort obligations; stranded costs assessment and recovery; performance-based ratemaking analysis and design; and many aspects of traditional utility ratemaking (e.g., rate design, rate base valuation).

Cost of Capital

Ms. Bulkley has provided expert testimony on the cost of capital in more than 30 regulatory proceedings before regulatory commissions in Arizona, Arkansas, Colorado, Connecticut, Kansas, Massachusetts, Michigan, Minnesota, Missouri, New Jersey, New Mexico, New York, North Dakota, Oklahoma, Pennsylvania, Texas, South Dakota, West Virginia, and the Federal Energy Regulatory Commission. In addition, Ms. Bulkley has prepared and provided supporting analysis for at least forty Federal and State regulatory proceedings in which she did not testify.

Valuation

Ms. Bulkley has provided valuation services to utility clients, unregulated generators and private equity clients for a variety of purposes including ratemaking, fair value, ad valorem tax, litigation and damages, and acquisition. Ms. Bulkley's appraisal practices are consistent with the national standards established by the Uniform Standards of Professional Appraisal Practice.

Representative projects/clients have included:

- Northern Indiana Fuel and Light: Provided expert testimony regarding the fair value of the company's natural gas distribution system assets. Valuation relied on cost approach.
- Kokomo Gas: Provided expert testimony regarding the fair value of the company's natural gas distribution system assets. Valuation relied on cost approach.
- Prepared fair value rate base analyses for Northern Indiana Public Service Company for several electric rate proceedings. Valuation approaches used in this project included income, cost and comparable sales approaches.
- Confidential Utility Client: Prepared valuation of fossil and nuclear generation assets for financing purposes for regulated utility client.
- Prepared a valuation of a portfolio of generation assets for a large energy utility to be used for strategic planning purposes. Valuation approach included an income approach, a real options analysis and a risk analysis.
- Assisted clients in the restructuring of NUG contracts through the valuation of the underlying assets. Performed analysis to determine the option value of a plant in a competitively priced electricity market following the settlement of the NUG contract.
- Prepared market valuations of several purchase power contracts for large electric utilities in the sale of purchase power contracts. Assignment included an assessment of the regional power market, analysis of the underlying purchase power contracts, a traditional discounted cash flow valuation approach, as well as a risk analysis. Analyzed bids from potential acquirers using income and risk analysis approached. Prepared an assessment of the credit issues and value at risk for the selling utility.
- Prepared appraisal of a portfolio of generating facilities for a large electric utility to be used for financing purposes.
- Prepared an appraisal of a fleet of fossil generating assets for a large electric utility to establish the value of assets transferred from utility property.
- Conducted due diligence on an electric transmission and distribution system as part of a buy-side due diligence team.
- Provided analytical support for and prepared appraisal reports of generation assets to be used in ad valorem tax disputes.
- Provided analytical support and prepared testimony regarding the valuation of electric distribution system assets in five communities in a condemnation proceeding.
- Valued purchase power agreements in the transfer of assets to a deregulated electric market.

Ratemaking

Ms. Bulkley has assisted several clients with analysis to support investor-owned and municipal utility clients in the preparation of rate cases. Sample engagements include:

- Assisted several investor-owned and municipal clients on cost allocation and rate design issues including the development of expert testimony supporting recommended rate alternatives.

Worked with Canadian regulatory staff to establish filing requirements for a rate review of a newly regulated electric utility. Analyzed and evaluated rate application. Attended hearings and conducted investigation of rate application for regulatory staff. Prepared, supported and defended recommendations for revenue requirements and rates for the company. Developed rates for gas utility for transportation program and ancillary services.

Strategic and Financial Advisory Services

Ms. Bulkley has assisted several clients across North America with analytically based strategic planning, due diligence and financial advisory services.

Representative projects include:

- Preparation of feasibility studies for bond issuances for municipal and district steam clients.
- Assisted in the development of a generation strategy for an electric utility. Analyzed various NERC regions to identify potential market entry points. Evaluated potential competitors and alliance partners. Assisted in the development of gas and electric price forecasts. Developed a framework for the implementation of a risk management program.
- Assisted clients in identifying potential joint venture opportunities and alliance partners. Contacted interviewed and evaluated potential alliance candidates based on company-established criteria for several LDCs and marketing companies. Worked with several LDCs and unregulated marketing companies to establish alliances to enter into the retail energy market. Prepared testimony in support of several merger cases and participated in the regulatory process to obtain approval for these mergers.
- Assisted clients in several buy-side due diligence efforts, providing regulatory insight and developing valuation recommendations for acquisitions of both electric and gas properties.

PROFESSIONAL HISTORY

Concentric Energy Advisors, Inc. (2002 – Present)
Senior Vice President
Vice President
Assistant Vice President
Project Manager

Navigant Consulting, Inc. (1995 – 2002)
Project Manager

Cahners Publishing Company (1995)
Economist

EDUCATION

Boston University
M.A., Economics, 1995

Simmons College
B.A., Economics and Finance, 1991

CERTIFICATIONS

Certified General Appraiser licensed in the Commonwealth of Massachusetts and the State of New Hampshire.

SPONSOR	DATE	CASE/APPLICANT	DOCKET /CASE NO.	SUBJECT
Arizona Corporation Commission				
Arizona Public Service Company	10/19	Arizona Public Service Company	Docket No. E-01345A-19-0236	Return on Equity
Tucson Electric Power Company	04/19	Tucson Electric Power Company	Docket No. E-01933A-19-0028	Return on Equity
Tucson Electric Power Company	11/15	Tucson Electric Power Company	Docket No. E-01933A-15-0322	Return on Equity
UNS Electric	05/15	UNS Electric	Docket No. E-04204A-15-0142	Return on Equity
UNS Electric	12/12	UNS Electric	Docket No. E-04204A-12-0504	Return on Equity
Arkansas Public Service Commission				
Arkansas Oklahoma Gas Corporation	10/13	Arkansas Oklahoma Gas Corporation	Docket No. 13-078-U	Return on Equity
Colorado Public Utilities Commission				
Public Service Company of Colorado	02/20	Public Service Company of Colorado	20AL-0049G	Return on Equity
Public Service Company of Colorado	05/19	Public Service Company of Colorado	19AL-0268E	Return on Equity
Public Service Company of Colorado	01/19	Public Service Company of Colorado	19AL-0063ST	Return on Equity
Atmos Energy Corporation	05/15	Atmos Energy Corporation	Docket No. 15AL-0299G	Return on Equity
Atmos Energy Corporation	04/14	Atmos Energy Corporation	Docket No. 14AL-0300G	Return on Equity
Atmos Energy Corporation	05/13	Atmos Energy Corporation	Docket No. 13AL-0496G	Return on Equity
Connecticut Public Utilities Regulatory Authority				
Connecticut Natural Gas Corporation	06/18	Connecticut Natural Gas Corporation	Docket No. 18-05-16	Return on Equity
Yankee Gas Services Co. d/b/a Eversource Energy	06/18	Yankee Gas Services Co. d/b/a Eversource Energy	Docket No. 18-05-10	Return on Equity
The Southern Connecticut Gas Company	06/17	The Southern Connecticut Gas Company	Docket No. 17-05-42	Return on Equity
The United Illuminating Company	07/16	The United Illuminating Company	Docket No. 16-06-04	Return on Equity
Federal Energy Regulatory Commission				
Panhandle Eastern Pipe Line Company, LP	10/19	Panhandle Eastern Pipe Line Company, LP	Docket Nos. RP19-78-000 RP19-78-001	Return on Equity
Panhandle Eastern Pipe Line Company, LP	08/19	Panhandle Eastern Pipe Line Company, LP	Docket Nos. RP19-1523	Return on Equity

SPONSOR	DATE	CASE/APPLICANT	DOCKET /CASE NO.	SUBJECT
Sea Robin Pipeline Company LLC	11/18	Sea Robin Pipeline Company LLC	Docket# RP19-352-000	Return on Equity
Tallgrass Interstate Gas Transmission	10/15	Tallgrass Interstate Gas Transmission	RP16-137	Return on Equity
Indiana Utility Regulatory Commission				
Indiana and Michigan American Water Company	09/18	Indiana and Michigan American Water Company	IURC Cause No. 45142	Return on Equity
Northern Indiana Public Service Company	09/17	Northern Indiana Public Service Company	Cause No. 44988	Fair Value
Indianapolis Power and Light Company	12/16	Indianapolis Power and Light Company	Cause No.44893	Fair Value
Northern Indiana Public Service Company	10/15	Northern Indiana Public Service Company	Cause No. 44688	Fair Value
Indianapolis Power and Light Company	09/15	Indianapolis Power and Light Company	Cause No. 44576 Cause No. 44602	Fair Value
Kokomo Gas and Fuel Company	09/10	Kokomo Gas and Fuel Company	Cause No. 43942	Fair Value
Northern Indiana Fuel and Light Company, Inc.	09/10	Northern Indiana Fuel and Light Company, Inc.	Cause No. 43943	Fair Value
Kansas Corporation Commission				
Atmos Energy Corporation	08/15	Atmos Energy Corporation	Docket No. 16-ATMG-079-RTS	Return on Equity
Kentucky Public Service Commission				
Kentucky American Water Company	11/18	Kentucky American Water Company	Docket No. 2018-00358	Return on Equity
Maine Public Utilities Commission				
Central Maine Power	10/18	Central Maine Power	Docket No. 2018-00194	Return on Equity
Maryland Public Service Commission				
Maryland American Water Company	06/18	Maryland American Water Company	Case No. 9487	Return on Equity
Massachusetts Appellate Tax Board				
Hopkinton LNG Corporation	03/20	Hopkinton LNG Corporation	Docket No.	Valuation of LNG Facility
FirstLight Hydro Generating Company	06/17	FirstLight Hydro Generating Company	Docket No. F-325471 Docket No. F-325472 Docket No. F-325473 Docket No. F-325474	Valuation of Electric Generation Assets

SPONSOR	DATE	CASE/APPLICANT	DOCKET /CASE NO.	SUBJECT
Massachusetts Department of Public Utilities				
Berkshire Gas Company	05/18	Berkshire Gas Company	DPU 18-40	Rate Case
Unitil Corporation	01/04	Fitchburg Gas and Electric	DTE 03-52	Integrated Resource Plan; Gas Demand Forecast
Michigan Public Service Commission				
Wisconsin Electric Power Company	12/11	Wisconsin Electric Power Company	Case No. U-16830	Return on Equity
Michigan Tax Tribunal				
New Covert Generating Co., LLC.	03/18	The Township of New Covert Michigan	MTT Docket No. 000248TT and 16-001888-TT	Valuation of Electric Generation Assets
Covert Township	07/14	New Covert Generating Co., LLC.	Docket No. 399578	Valuation of Electric Generation Assets
Minnesota Public Utilities Commission				
Allete, Inc. d/b/a Minnesota Power	11/19	Allete, Inc. d/b/a Minnesota Power	E015/GR-19-442	Return on Equity
CenterPoint Energy Resources Corporation d/b/a CenterPoint Energy Minnesota Gas	10/19	CenterPoint Energy Resources Corporation d/b/a CenterPoint Energy Minnesota Gas	G-008/GR-19-524	Return on Equity
Great Plains Natural Gas Co.	09/19	Great Plains Natural Gas Co.	Docket No. G004/GR-19-511	Return on Equity
Minnesota Energy Resources Corporation	10/17	Minnesota Energy Resources Corporation	Docket No. G011/GR-17-563	Return on Equity
Missouri Public Service Commission				
Missouri American Water Company	06/17	Missouri American Water Company	Case No. WR-17-0285 Case No. SR-17-0286	Return on Equity
Montana Public Service Commission				
Montana-Dakota Utilities Co.	09/18	Montana-Dakota Utilities Co.	D2018.9.60	Return on Equity
New Hampshire - Board of Tax and Land Appeals				
Public Service Company of New Hampshire d/b/a Eversource Energy	11/19 12/19	Public Service Company of New Hampshire d/b/a Eversource Energy	Master Docket No. 28873-14-15-16-17PT	Valuation of Utility Property and Generating Assets
New Hampshire Public Utilities Commission				
Public Service Company of New Hampshire	05/19	Public Service Company of New Hampshire	DE-19-057	Return on Equity

SPONSOR	DATE	CASE/APPLICANT	DOCKET /CASE NO.	SUBJECT
New Hampshire-Merrimack County Superior Court				
Northern New England Telephone Operations, LLC d/b/a FairPoint Communications, NNE	04/18	Northern New England Telephone Operations, LLC d/b/a FairPoint Communications, NNE	220-2012-CV-1100	Valuation of Utility Property
New Hampshire-Rockingham Superior Court				
Eversource Energy	05/18	Public Service Commission of New Hampshire	218-2016-CV-00899 218-2017-CV-00917	Valuation of Utility Property
New Jersey Board of Public Utilities				
New Jersey American Water Company, Inc.	12/19	New Jersey American Water Company, Inc.	WR1912XXXX	Return on Equity
Public Service Electric and Gas Company	04/19	Public Service Electric and Gas Company	EO18060629 GO18060630	Return on Equity
Public Service Electric and Gas Company	02/18	Public Service Electric and Gas Company	GR17070776	Return on Equity
Public Service Electric and Gas Company	01/18	Public Service Electric and Gas Company	ER18010029 GR18010030	Return on Equity
New Mexico Public Regulation Commission				
Southwestern Public Service Company	07/19	Southwestern Public Service Company	19-00170-UT	Return on Equity
Southwestern Public Service Company	10/17	Southwestern Public Service Company	Case No. 17-00255-UT	Return on Equity
Southwestern Public Service Company	12/16	Southwestern Public Service Company	Case No. 16-00269-UT	Return on Equity
Southwestern Public Service Company	10/15	Southwestern Public Service Company	Case No. 15-00296-UT	Return on Equity
Southwestern Public Service Company	06/15	Southwestern Public Service Company	Case No. 15-00139-UT	Return on Equity
New York State Department of Public Service				
Corning Natural Gas Corporation	02/20	Corning Natural Gas Corporation	Case No. 20-G-0101	Return on Equity
New York State Electric and Gas Company Rochester Gas and Electric	05/19	New York State Electric and Gas Company Rochester Gas and Electric	19-E-0378 19-G-0379 19-E-0380 19-G-0381	Return on Equity
Brooklyn Union Gas Company d/b/a National Grid NY KeySpan Gas East Corporation d/b/a National Grid	04/19	Brooklyn Union Gas Company d/b/a National Grid NY KeySpan Gas East Corporation d/b/a National Grid	19-G-0309 19-G-0310	Return on Equity

SPONSOR	DATE	CASE/APPLICANT	DOCKET /CASE NO.	SUBJECT
Central Hudson Gas and Electric Corporation	07/17	Central Hudson Gas and Electric Corporation	Gas 17-G-0460 Electric 17-E-0459	Return on Equity
Niagara Mohawk Power Corporation	04/17	National Grid USA	Case No. 17-E-0238 17-G-0239	Return on Equity
Corning Natural Gas Corporation	06/16	Corning Natural Gas Corporation	Case No. 16-G-0369	Return on Equity
National Fuel Gas Company	04/16	National Fuel Gas Company	Case No. 16-G-0257	Return on Equity
KeySpan Energy Delivery	01/16	KeySpan Energy Delivery	Case No. 15-G-0058 Case No. 15-G-0059	Return on Equity
New York State Electric and Gas Company Rochester Gas and Electric	05/15	New York State Electric and Gas Company Rochester Gas and Electric	Case No. 15-G-0284 Case No. 15-E-0285 Case No. 15-G-0286	Return on Equity
North Dakota Public Service Commission				
Northern States Power Company	12/12	Northern States Power Company	C-PU-12-813	Return on Equity
Northern States Power Company	12/10	Northern States Power Company	C-PU-10-657	Return on Equity
Oklahoma Corporation Commission				
Arkansas Oklahoma Gas Corporation	01/13	Arkansas Oklahoma Gas Corporation	Cause No. PUD 201200236	Return on Equity
Oregon Public Service Commission				
PacifiCorp d/b/a Pacific Power & Light	02/20	PacifiCorp d/b/a Pacific Power & Light	Docket No. UE-374	Return on Equity
Pennsylvania Public Utility Commission				
American Water Works Company Inc.	04/17	Pennsylvania-American Water Company	Docket No. R-2017-2595853	Return on Equity
South Dakota Public Utilities Commission				
Northern States Power Company	06/14	Northern States Power Company	Docket No. EL14-058	Return on Equity
Texas Public Utility Commission				
Southwestern Public Service Commission	08/19	Southwestern Public Service Commission	Docket No. D-49831	Return on Equity
Southwestern Public Service Company	01/14	Southwestern Public Service Company	Docket No. 42004	Return on Equity
Virginia State Corporation Commission				
Virginia American Water Company, Inc.	11/18	Virginia American Water Company, Inc.	Docket No. PUR-2018-00175	Return on Equity
Washington Utilities Transportation Commission				

SPONSOR	DATE	CASE/APPLICANT	DOCKET /CASE NO.	SUBJECT
PacifiCorp d/b/a Pacific Power & Light	12/19	PacifiCorp d/b/a Pacific Power & Light	Docket No. UE-191024	Return on Equity
Cascade Natural Gas Corporation	04/19	Cascade Natural Gas Corporation	Docket No. UG-190210	Return on Equity
West Virginia Public Service Commission				
West Virginia American Water Company	04/18	West Virginia American Water Company	Case No. 18-0573-W-42T Case No. 18-0576-S-42T	Return on Equity
Wisconsin Public Service Commission				
Wisconsin Electric Power Company and Wisconsin Gas LLC	03/19	Wisconsin Electric Power Company and Wisconsin Gas LLC	Docket No. 05-UR-109	Return on Equity
Wisconsin Public Service Corp.	03/19	Wisconsin Public Service Corp.	6690-UR-126	Return on Equity
Wyoming Public Service Commission				
PacifiCorp d/b/a Rocky Mountain Power	03/20	PacifiCorp d/b/a Rocky Mountain Power	Docket No. 20000-578-ER-20	Return on Equity
Montana-Dakota Utilities Co.	05/19	Montana-Dakota Utilities Co.	30013-351-GR-19	Return on Equity

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

PENNSYLVANIA PUBLIC UTILITY COMMISSION	:	
	:	**DOCKET NOS. R-2020-3019369 (WATER)**
v.	:	**R-2020-3019371 (WASTEWATER)**
PENNSYLVANIA-AMERICAN WATER COMPANY	:	

VERIFICATION

I, **Ann E. Bulkley**, hereby state that the facts set forth in the pre-marked Statement No. 13 and accompanying exhibits, if any, are true and correct to the best of my knowledge, information and belief. I understand that this verification is made subject to the provisions and penalties of 18 Pa. C.S. § 4904 (relating to unsworn falsifications to authorities).

Date: April 29, 2020

Ann E. Bulkley

SUMMARY OF ROE ANALYSES RESULTS

Constant Growth DCF			
	Median Low	Median	Median High
Including AWK			
30-Day Average	9.34%	9.82%	11.15%
90-Day Average	9.12%	9.76%	11.15%
180-Day Average	8.98%	9.74%	11.02%
Excluding AWK			
30-Day Average	9.29%	9.39%	10.48%
90-Day Average	9.07%	9.28%	10.34%
180-Day Average	8.79%	9.27%	10.24%
CAPM			
	Current 30-day Average Treasury Bond Yield	Near-Term Blue Chip Forecast Yield	Long-Term Blue Chip Forecast Yield
Including AWK			
Value Line Beta	9.58%	9.67%	10.17%
Bloomberg Beta	11.09%	11.15%	11.48%
Excluding AWK			
Value Line Beta	9.68%	9.76%	10.25%
Bloomberg Beta	11.08%	11.13%	11.47%
ECAPM			
Including AWK			
Value Line Beta	10.70%	10.76%	11.14%
Bloomberg Beta	11.83%	11.87%	12.12%
Excluding AWK			
Value Line Beta	10.77%	10.83%	11.20%
Bloomberg Beta	11.82%	11.86%	12.11%
Expected Earnings			
	Mean		Median
Including AWK	11.33%		11.72%
Excluding AWK	11.29%		10.84%

Notes:

[1] The analytical results included in the table reflect the results of the Constant Growth DCF analysis excluding the results for individual companies that did not meet the minimum threshold of 7 percent.

PROXY GROUP SCREENING DATA AND RESULTS - FINAL PROXY GROUP

Company	Ticker	[1] Dividends	[2] S&P Credit Rating Between BBB- and AAA	[3] Covered by More Than 1 Analyst	[4] Positive Growth Rates from at least two sources (Value Line, Yahoo! First Call, and Zacks)	[5] % Regulated Operating Income > 70%	[6] Announced Merger
American States Water Co	AWR	Yes	A+	Yes	Yes	82%	No
American Water	AWK	Yes	A	Yes	Yes	100%	No
Atmos Energy Corporation	ATO	Yes	A	Yes	Yes	100%	No
California Water Service Group	CWT	Yes	A+	Yes	Yes	96%	No
Middlesex Water Company	MSEX	Yes	A	Yes	Yes	93%	No
New Jersey Resources Corporation	NJR	Yes	AA-	Yes	Yes	71%	No
Northwest Natural Gas Company	NWN	Yes	A+	Yes	Yes	100%	No
ONE Gas Inc.	OGS	Yes	A	Yes	Yes	100%	No
San Jose Water	SJW	Yes	A-	Yes	Yes	98%	No
South Jersey Industries, Inc.	SJI	Yes	BBB	Yes	Yes	88%	No
Southwest Gas Corporation	SWX	Yes	BBB+	Yes	Yes	82%	No
Spire, Inc.	SR	Yes	A-	Yes	Yes	97%	No
York Water Company	YORW	Yes	A-	Yes	Yes	100%	No

Notes:
[1] Source: Bloomberg Professional
[2] Source: Bloomberg Professional
[3] Source: Yahoo! Finance, Value Line Investment Survey, and Zacks
[4] Source: Yahoo! Finance, Value Line Investment Survey, and Zacks
[5] Source: Form 10-K's for 2018, 2017, and 2016
[6] Source: SNL Financial News Releases

30-DAY CONSTANT GROWTH DCF -- PAWC PROXY GROUP

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	All Proxy Group [9]	[10]	[11]	With Exclusions [12]	[13]	[14]
Company	Ticker	Annualized Dividend	Stock Price	Dividend Yield	Expected Dividend Yield	Value Line Earnings Growth	Yahoo! Finance Earnings Growth	Zacks Earnings Growth	Average Growth Rate	Low ROE	Mean ROE	High ROE	Low ROE	Mean ROE	High ROE
American States Water Co	AWR	$1.22	$82.94	1.47%	1.52%	8.00%	6.00%	NA%	7.00%	7.52%	8.52%	9.53%	7.52%	8.52%	9.53%
American Water	AWK	$2.00	$126.76	1.58%	1.65%	9.50%	8.20%	8.10%	8.60%	9.74%	10.25%	11.15%	9.74%	10.25%	11.15%
Atmos Energy Corporation	ATO	$2.30	$103.86	2.21%	2.29%	7.00%	7.10%	7.20%	7.10%	9.29%	9.39%	9.49%	9.29%	9.39%	9.49%
California Water Service Group	CWT	$0.85	$51.05	1.67%	1.74%	8.00%	9.80%	NA%	8.90%	9.73%	10.64%	11.55%	9.73%	10.64%	11.55%
Middlesex Water Company	MSEX	$1.03	$60.92	1.68%	1.73%	7.50%	2.70%	NA%	5.10%	4.41%	6.83%	9.25%			9.25%
New Jersey Resources Corporation	NJR	$1.25	$34.74	3.60%	3.67%	2.50%	6.00%	NA%	4.25%	6.14%	7.92%	9.71%		7.92%	9.71%
Northwest Natural Gas Company	NWN	$1.91	$65.44	2.92%	3.11%	22.50%	3.75%	NA%	13.13%	6.72%	16.24%	25.75%		16.24%	25.75%
ONE Gas Inc.	OGS	$2.16	$82.27	2.63%	2.70%	7.00%	5.00%	5.50%	5.83%	7.69%	8.54%	9.72%	7.69%	8.54%	9.72%
San Jose Water	SJW	$1.28	$62.15	2.06%	2.15%	7.00%	14.00%	4.00%	8.33%	6.10%	10.48%	16.20%		10.48%	16.20%
South Jersey Industries, Inc.	SJI	$1.18	$27.11	4.35%	4.57%	9.50%	10.20%	10.20%	9.97%	14.06%	14.54%	14.77%	14.06%	14.54%	14.77%
Southwest Gas Corporation	SWX	$2.18	$66.20	3.29%	3.42%	8.00%	8.20%	6.00%	7.40%	9.39%	10.82%	11.63%	9.39%	10.82%	11.63%
Spire, Inc.	SR	$2.49	$75.74	3.29%	3.37%	5.50%	4.65%	4.80%	4.98%	8.01%	8.35%	8.88%	8.01%	8.35%	8.88%
York Water Company	YORW	$0.72	$43.29	1.67%	1.73%	9.50%	4.90%	NA%	7.20%	6.61%	8.93%	11.24%		8.93%	11.24%
Median				2.21%	2.29%	8.00%	6.00%	6.00%	7.20%	7.69%	9.39%	11.15%	9.34%	9.82%	11.15%
Median excluding AWK				2.42%	2.50%	7.75%	6.00%	5.75%	7.15%	7.60%	9.16%	10.48%	9.29%	9.39%	10.48%

Notes:
[1] Source: Bloomberg Professional
[2] Source: Bloomberg Professional, equals 30-day average as of March 31, 2020
[3] Equals [1] / [2]
[4] Equals [3] x (1 + 0.50 x [8])
[5] Source: Value Line
[6] Source: Yahoo! Finance
[7] Source: Zacks
[8] Equals Average ([5], [6], [7])
[9] Equals [3] x (1 + 0.50 x Minimum ([5], [6], [7]) + Minimum ([5], [6], [7])
[10] Equals [4] + [8]
[11] Equals [3] x (1 + 0.50 x Maximum ([5], [6], [7]) + Maximum ([5], [6], [7])
[12] Equals [9] if greater than 7.00%
[13] Equals [10] if greater than 7.00%
[14] Equals [11] if greater than 7.00%

90-DAY CONSTANT GROWTH DCF -- PAWC PROXY GROUP

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	All Proxy Group [9]	[10]	[11]	With Exclusions [12]	[13]	[14]
Company	Ticker	Annualized Dividend	Stock Price	Dividend Yield	Expected Dividend Yield	Value Line Earnings Growth	Yahoo! Finance Earnings Growth	Zacks Earnings Growth	Average Growth Rate	Low ROE	Mean ROE	High ROE	Low ROE	Mean ROE	High ROE
American States Water Co	AWR	$1.22	$85.86	1.42%	1.47%	8.00%	6.00%	NA%	7.00%	7.46%	8.47%	9.48%	7.46%	8.47%	9.48%
American Water	AWK	$2.00	$126.62	1.58%	1.65%	9.50%	8.20%	8.10%	8.60%	9.74%	10.25%	11.15%	9.74%	10.25%	11.15%
Atmos Energy Corporation	ATO	$2.30	$109.44	2.10%	2.18%	7.00%	7.10%	7.20%	7.10%	9.18%	9.28%	9.38%	9.18%	9.28%	9.38%
California Water Service Group	CWT	$0.85	$51.61	1.65%	1.72%	8.00%	9.80%	NA%	8.90%	9.71%	10.62%	11.53%	9.71%	10.62%	11.53%
Middlesex Water Company	MSEX	$1.03	$63.16	1.62%	1.66%	7.50%	2.70%	NA%	5.10%	4.34%	6.76%	9.18%			9.18%
New Jersey Resources Corporation	NJR	$1.25	$40.41	3.09%	3.16%	2.50%	6.00%	NA%	4.25%	5.63%	7.41%	9.19%		7.41%	9.19%
Northwest Natural Gas Company	NWN	$1.91	$69.92	2.73%	2.91%	22.50%	3.75%	NA%	13.13%	6.53%	16.04%	25.54%		16.04%	25.54%
ONE Gas Inc.	OGS	$2.16	$89.12	2.42%	2.49%	7.00%	5.00%	5.50%	5.83%	7.48%	8.33%	9.51%	7.48%	8.33%	9.51%
San Jose Water	SJW	$1.28	$68.34	1.87%	1.95%	7.00%	14.00%	4.00%	8.33%	5.91%	10.28%	16.00%		10.28%	16.00%
South Jersey Industries, Inc.	SJI	$1.18	$30.12	3.92%	4.11%	9.50%	10.20%	10.20%	9.97%	13.60%	14.08%	14.32%	13.60%	14.08%	14.32%
Southwest Gas Corporation	SWX	$2.18	$73.06	2.98%	3.09%	8.00%	8.20%	6.00%	7.40%	9.07%	10.49%	11.31%	9.07%	10.49%	11.31%
Spire, Inc.	SR	$2.49	$80.10	3.11%	3.19%	5.50%	4.65%	4.80%	4.98%	7.83%	8.17%	8.69%	7.83%	8.17%	8.69%
York Water Company	YORW	$0.72	$45.26	1.59%	1.65%	9.50%	4.90%	NA%	7.20%	6.53%	8.85%	11.17%		8.85%	11.17%
Median				2.10%	2.18%	8.00%	6.00%	6.00%	7.20%	7.48%	9.28%	11.15%	9.12%	9.76%	11.15%
Median excluding AWK				2.26%	2.34%	7.75%	6.00%	5.75%	7.15%	7.47%	9.06%	10.34%	9.07%	9.28%	10.34%

Notes:
[1] Source: Bloomberg Professional
[2] Source: Bloomberg Professional, equals 90-day average as of March 31, 2020
[3] Equals [1] / [2]
[4] Equals [3] x (1 + 0.50 x [8])
[5] Source: Value Line
[6] Source: Yahoo! Finance
[7] Source: Zacks
[8] Equals Average ([5], [6], [7])
[9] Equals [3] x (1 + 0.50 x Minimum ([5], [6], [7]) + Minimum ([5], [6], [7])
[10] Equals [4] + [8]
[11] Equals [3] x (1 + 0.50 x Maximum ([5], [6], [7]) + Maximum ([5], [6], [7])
[12] Equals [9] if greater than 7.00%
[13] Equals [10] if greater than 7.00%
[14] Equals [11] if greater than 7.00%

180-DAY CONSTANT GROWTH DCF -- PAWC PROXY GROUP

										All Proxy Group			With Exclusions		
		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]
Company	Ticker	Annualized Dividend	Stock Price	Dividend Yield	Expected Dividend Yield	Value Line Earnings Growth	Yahoo! Finance Earnings Growth	Zacks Earnings Growth	Average Growth Rate	Low ROE	Mean ROE	High ROE	Low ROE	Mean ROE	High ROE
American States Water Co	AWR	$1.22	$86.70	1.41%	1.46%	8.00%	6.00%	NA%	7.00%	7.45%	8.46%	9.46%	7.45%	8.46%	9.46%
American Water	AWK	$2.00	$123.90	1.61%	1.68%	9.50%	8.20%	8.10%	8.60%	9.78%	10.28%	11.19%	9.78%	10.28%	11.19%
Atmos Energy Corporation	ATO	$2.30	$109.81	2.09%	2.17%	7.00%	7.10%	7.20%	7.10%	9.17%	9.27%	9.37%	9.17%	9.27%	9.37%
California Water Service Group	CWT	$0.85	$52.65	1.61%	1.69%	8.00%	9.80%	NA%	8.90%	9.68%	10.59%	11.49%	9.68%	10.59%	11.49%
Middlesex Water Company	MSEX	$1.03	$62.60	1.64%	1.68%	7.50%	2.70%	NA%	5.10%	4.36%	6.78%	9.20%			9.20%
New Jersey Resources Corporation	NJR	$1.25	$42.71	2.93%	2.99%	2.50%	6.00%	NA%	4.25%	5.46%	7.24%	9.01%		7.24%	9.01%
Northwest Natural Gas Company	NWN	$1.91	$69.95	2.73%	2.91%	22.50%	3.75%	NA%	13.13%	6.53%	16.03%	25.54%		16.03%	25.54%
ONE Gas Inc.	OGS	$2.16	$90.37	2.39%	2.46%	7.00%	5.00%	5.50%	5.83%	7.45%	8.29%	9.47%	7.45%	8.29%	9.47%
San Jose Water	SJW	$1.28	$68.16	1.88%	1.96%	7.00%	14.00%	4.00%	8.33%	5.92%	10.29%	16.01%		10.29%	16.01%
South Jersey Industries, Inc.	SJI	$1.18	$31.11	3.79%	3.98%	9.50%	10.20%	10.20%	9.97%	13.47%	13.95%	14.19%	13.47%	13.95%	14.19%
Southwest Gas Corporation	SWX	$2.18	$80.59	2.70%	2.80%	8.00%	8.20%	6.00%	7.40%	8.79%	10.20%	11.02%	8.79%	10.20%	11.02%
Spire, Inc.	SR	$2.49	$81.97	3.04%	3.11%	5.50%	4.65%	4.80%	4.98%	7.76%	8.10%	8.62%	7.76%	8.10%	8.62%
York Water Company	YORW	$0.72	$42.64	1.69%	1.75%	9.50%	4.90%	NA%	7.20%	6.63%	8.95%	11.27%		8.95%	11.27%
Median				2.09%	2.17%	8.00%	6.00%	6.00%	7.20%	7.45%	9.27%	11.02%	8.98%	9.74%	11.02%
Median excluding AWK				2.24%	2.31%	7.75%	6.00%	5.75%	7.15%	7.45%	9.11%	10.24%	8.79%	9.27%	10.24%

Notes:
[1] Source: Bloomberg Professional
[2] Source: Bloomberg Professional, equals 180-day average as of March 31, 2020
[3] Equals [1] / [2]
[4] Equals [3] x (1 + 0.50 x [8])
[5] Source: Value Line
[6] Source: Yahoo! Finance
[7] Source: Zacks
[8] Equals Average ([5], [6], [7])
[9] Equals [3] x (1 + 0.50 x Minimum ([5], [6], [7]) + Minimum ([5], [6], [7])
[10] Equals [4] + [8]
[11] Equals [3] x (1 + 0.50 x Maximum ([5], [6], [7]) + Maximum ([5], [6], [7])
[12] Equals [9] if greater than 7.00%
[13] Equals [10] if greater than 7.00%
[14] Equals [11] if greater than 7.00%

CAPITAL ASSET PRICING MODEL -- CURRENT RISK-FREE RATE & VL BETA

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

Company	Ticker	[1] Current 30-day average of 30-year U.S. Treasury bond yield	[2] Beta (β)	[3] Market Return (Rm)	[4] Market Risk Premium (Rm − Rf)	[5] ROE (K)	[6] ECAPM ROE
American States Water Co	AWR	1.56%	0.65	14.05%	12.49%	9.68%	10.77%
American Water	AWK	1.56%	0.55	14.05%	12.49%	8.43%	9.83%
Atmos Energy Corporation	ATO	1.56%	0.55	14.05%	12.49%	8.43%	9.83%
California Water Service Group	CWT	1.56%	0.70	14.05%	12.49%	10.30%	11.24%
Middlesex Water Company	MSEX	1.56%	0.75	14.05%	12.49%	10.92%	11.70%
New Jersey Resources Corporation	NJR	1.56%	0.65	14.05%	12.49%	9.68%	10.77%
Northwest Natural Gas Company	NWN	1.56%	0.55	14.05%	12.49%	8.43%	9.83%
ONE Gas Inc.	OGS	1.56%	0.60	14.05%	12.49%	9.05%	10.30%
San Jose Water	SJW	1.56%	0.60	14.05%	12.49%	9.05%	10.30%
South Jersey Industries, Inc.	SJI	1.56%	0.80	14.05%	12.49%	11.55%	12.17%
Southwest Gas Corporation	SWX	1.56%	0.65	14.05%	12.49%	9.68%	10.77%
Spire, Inc.	SR	1.56%	0.60	14.05%	12.49%	9.05%	10.30%
York Water Company	YORW	1.56%	0.70	14.05%	12.49%	10.30%	11.24%
Mean						9.58%	10.70%
Mean Excluding AWK						9.68%	10.77%

Notes:
[1] Source: Bloomberg Professional
[2] Source: Source: Value Line Reports, January 10, 2020; February 28, 2020
[3] Source: Schedule 4, page 3
[4] Equals [3] - [1]
[5] Equals [1] + [2] x [4]
[6] Equals [1] + 0.25 x ([4]) + 0.75 x ([2] x [4])

CAPITAL ASSET PRICING MODEL -- NEAR-TERM PROJECTED RISK-FREE RATE & VL BETA

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

Company	Ticker	[1] Near-term projected 30-year U.S. Treasury bond yield (Q3 2020 - Q3 2021)	[2] Beta (β)	[3] Market Return (Rm)	[4] Market Risk Premium (Rm − Rf)	[5] ROE (K)	[6] ECAPM ROE
American States Water Co	AWR	1.80%	0.65	14.05%	12.25%	9.76%	10.83%
American Water	AWK	1.80%	0.55	14.05%	12.25%	8.54%	9.91%
Atmos Energy Corporation	ATO	1.80%	0.55	14.05%	12.25%	8.54%	9.91%
California Water Service Group	CWT	1.80%	0.70	14.05%	12.25%	10.37%	11.29%
Middlesex Water Company	MSEX	1.80%	0.75	14.05%	12.25%	10.98%	11.75%
New Jersey Resources Corporation	NJR	1.80%	0.65	14.05%	12.25%	9.76%	10.83%
Northwest Natural Gas Company	NWN	1.80%	0.55	14.05%	12.25%	8.54%	9.91%
ONE Gas Inc.	OGS	1.80%	0.60	14.05%	12.25%	9.15%	10.37%
San Jose Water	SJW	1.80%	0.60	14.05%	12.25%	9.15%	10.37%
South Jersey Industries, Inc.	SJI	1.80%	0.80	14.05%	12.25%	11.60%	12.21%
Southwest Gas Corporation	SWX	1.80%	0.65	14.05%	12.25%	9.76%	10.83%
Spire, Inc.	SR	1.80%	0.60	14.05%	12.25%	9.15%	10.37%
York Water Company	YORW	1.80%	0.70	14.05%	12.25%	10.37%	11.29%
Mean						9.67%	10.76%
Mean Excluding AWK						9.76%	10.83%

Notes:
[1] Source: Blue Chip Financial Forecasts, Vol. 39, No. 4, April 1, 2020, at 2
[2] Source: Source: Value Line Reports, January 10, 2020; February 28, 2020
[3] Source: Schedule 4, page 3
[4] Equals [3] - [1]
[5] Equals [1] + [2] x [4]
[6] Equals [1] + 0.25 x ([4]) + 0.75 x ([2] x [4])

CAPITAL ASSET PRICING MODEL -- LONG-TERM PROJECTED RISK-FREE RATE & VL BETA

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

		[1]	[2]	[3]	[4]	[5]	[6]
Company	Ticker	Projected 30-year U.S. Treasury bond yield (2021 - 2025)	Beta (β)	Market Return (Rm)	Market Risk Premium (Rm − Rf)	ROE (K)	ECAPM ROE
American States Water Co	AWR	3.20%	0.65	14.05%	10.85%	10.25%	11.20%
American Water	AWK	3.20%	0.55	14.05%	10.85%	9.17%	10.39%
Atmos Energy Corporation	ATO	3.20%	0.55	14.05%	10.85%	9.17%	10.39%
California Water Service Group	CWT	3.20%	0.70	14.05%	10.85%	10.79%	11.61%
Middlesex Water Company	MSEX	3.20%	0.75	14.05%	10.85%	11.33%	12.01%
New Jersey Resources Corporation	NJR	3.20%	0.65	14.05%	10.85%	10.25%	11.20%
Northwest Natural Gas Company	NWN	3.20%	0.55	14.05%	10.85%	9.17%	10.39%
ONE Gas Inc.	OGS	3.20%	0.60	14.05%	10.85%	9.71%	10.79%
San Jose Water	SJW	3.20%	0.60	14.05%	10.85%	9.71%	10.79%
South Jersey Industries, Inc.	SJI	3.20%	0.80	14.05%	10.85%	11.88%	12.42%
Southwest Gas Corporation	SWX	3.20%	0.65	14.05%	10.85%	10.25%	11.20%
Spire, Inc.	SR	3.20%	0.60	14.05%	10.85%	9.71%	10.79%
York Water Company	YORW	3.20%	0.70	14.05%	10.85%	10.79%	11.61%
Mean						10.17%	11.14%
Mean Excluding AWK						10.25%	11.20%

Notes:
[1] Source: Blue Chip Financial Forecasts, Vol. 38, No. 12, December 1, 2019, at 14
[2] Source: Source: Value Line Reports, January 10, 2020; February 28, 2020
[3] Source: Schedule 4, page 3
[4] Equals [3] - [1]
[5] Equals [1] + [2] x [4]
[6] Equals [1] + 0.25 x ([4]) + 0.75 x ([2] x [4])

CAPITAL ASSET PRICING MODEL -- CURRENT RISK-FREE RATE & BLOOMBERG BETA

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

		[1]	[2]	[3]	[4]	[5]	[6]
Company	Ticker	Current 30-day average of 30-year U.S. Treasury bond yield	Beta (β)	Market Return (Rm)	Market Risk Premium (Rm − Rf)	ROE (K)	ECAPM ROE
American States Water Co	AWR	1.56%	0.62	14.05%	12.49%	9.33%	10.51%
American Water	AWK	1.56%	0.78	14.05%	12.49%	11.26%	11.96%
Atmos Energy Corporation	ATO	1.56%	0.76	14.05%	12.49%	11.07%	11.81%
California Water Service Group	CWT	1.56%	0.62	14.05%	12.49%	9.34%	10.51%
Middlesex Water Company	MSEX	1.56%	0.77	14.05%	12.49%	11.11%	11.85%
New Jersey Resources Corporation	NJR	1.56%	0.78	14.05%	12.49%	11.28%	11.97%
Northwest Natural Gas Company	NWN	1.56%	0.71	14.05%	12.49%	10.42%	11.33%
ONE Gas Inc.	OGS	1.56%	0.80	14.05%	12.49%	11.61%	12.22%
San Jose Water	SJW	1.56%	0.84	14.05%	12.49%	12.04%	12.54%
South Jersey Industries, Inc.	SJI	1.56%	0.82	14.05%	12.49%	11.75%	12.33%
Southwest Gas Corporation	SWX	1.56%	0.87	14.05%	12.49%	12.37%	12.79%
Spire, Inc.	SR	1.56%	0.73	14.05%	12.49%	10.63%	11.49%
York Water Company	YORW	1.56%	0.83	14.05%	12.49%	11.97%	12.49%
Mean						11.09%	11.83%
Mean Excluding AWK						11.08%	11.82%

Notes:
[1] Source: Bloomberg Professional
[2] Source: Bloomberg Professional
[3] Source: Schedule 4, page 3
[4] Equals [3] - [1]
[5] Equals [1] + [2] x [4]
[6] Equals [1] + 0.25 x ([4]) + 0.75 x ([2] x [4])

CAPITAL ASSET PRICING MODEL -- NEAR-TERM PROJECTED RISK-FREE RATE & BLOOMBERG BETA

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

Company	Ticker	[1] Near-term projected 30-year U.S. Treasury bond yield (Q3 2020 - Q3 2021)	[2] Beta (β)	[3] Market Return (Rm)	[4] Market Risk Premium (Rm − Rf)	[5] ROE (K)	[6] ECAPM ROE
American States Water Co	AWR	1.80%	0.62	14.05%	12.25%	9.42%	10.58%
American Water	AWK	1.80%	0.78	14.05%	12.25%	11.32%	12.00%
Atmos Energy Corporation	ATO	1.80%	0.76	14.05%	12.25%	11.12%	11.85%
California Water Service Group	CWT	1.80%	0.62	14.05%	12.25%	9.43%	10.58%
Middlesex Water Company	MSEX	1.80%	0.77	14.05%	12.25%	11.17%	11.89%
New Jersey Resources Corporation	NJR	1.80%	0.78	14.05%	12.25%	11.33%	12.01%
Northwest Natural Gas Company	NWN	1.80%	0.71	14.05%	12.25%	10.49%	11.38%
ONE Gas Inc.	OGS	1.80%	0.80	14.05%	12.25%	11.66%	12.25%
San Jose Water	SJW	1.80%	0.84	14.05%	12.25%	12.08%	12.57%
South Jersey Industries, Inc.	SJI	1.80%	0.82	14.05%	12.25%	11.80%	12.36%
Southwest Gas Corporation	SWX	1.80%	0.87	14.05%	12.25%	12.40%	12.81%
Spire, Inc.	SR	1.80%	0.73	14.05%	12.25%	10.70%	11.53%
York Water Company	YORW	1.80%	0.83	14.05%	12.25%	12.01%	12.52%
Mean						11.15%	11.87%
Mean Excluding AWK						11.13%	11.86%

Notes:
[1] Source: Blue Chip Financial Forecasts, Vol. 39, No. 4, April 1, 2020, at 2
[2] Source: Bloomberg Professional
[3] Source: Schedule 4, page 3
[4] Equals [3] - [1]
[5] Equals [1] + [2] x [4]
[6] Equals [1] + 0.25 x ([4]) + 0.75 x ([2] x [4])

CAPITAL ASSET PRICING MODEL -- LONG-TERM PROJECTED RISK-FREE RATE & BLOOMBERG BETA

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

Company	Ticker	[1] Projected 30-year U.S. Treasury bond yield (2021 - 2025)	[2] Beta (β)	[3] Market Return (Rm)	[4] Market Risk Premium (Rm − Rf)	[5] ROE (K)	[6] ECAPM ROE
American States Water Co	AWR	3.20%	0.62	14.05%	10.85%	9.95%	10.97%
American Water	AWK	3.20%	0.78	14.05%	10.85%	11.63%	12.23%
Atmos Energy Corporation	ATO	3.20%	0.76	14.05%	10.85%	11.46%	12.10%
California Water Service Group	CWT	3.20%	0.62	14.05%	10.85%	9.96%	10.98%
Middlesex Water Company	MSEX	3.20%	0.77	14.05%	10.85%	11.50%	12.13%
New Jersey Resources Corporation	NJR	3.20%	0.78	14.05%	10.85%	11.64%	12.24%
Northwest Natural Gas Company	NWN	3.20%	0.71	14.05%	10.85%	10.90%	11.68%
ONE Gas Inc.	OGS	3.20%	0.80	14.05%	10.85%	11.93%	12.46%
San Jose Water	SJW	3.20%	0.84	14.05%	10.85%	12.30%	12.74%
South Jersey Industries, Inc.	SJI	3.20%	0.82	14.05%	10.85%	12.05%	12.55%
Southwest Gas Corporation	SWX	3.20%	0.87	14.05%	10.85%	12.59%	12.95%
Spire, Inc.	SR	3.20%	0.73	14.05%	10.85%	11.08%	11.82%
York Water Company	YORW	3.20%	0.83	14.05%	10.85%	12.24%	12.69%
Mean						11.48%	12.12%
Mean Excluding AWK						11.47%	12.11%

Notes:
[1] Source: Blue Chip Financial Forecasts, Vol. 38, No. 12, December 1, 2019, at 14
[2] Source: Bloomberg Professional
[3] Source: Schedule 4, page 3
[4] Equals [3] - [1]
[5] Equals [1] + [2] x [4]
[6] Equals [1] + 0.25 x ([4]) + 0.75 x ([2] x [4])

MARKET RISK PREMIUM DERIVED FROM S&P EARNINGS AND ESTIMATE REPORT

[7] S&P's estimate of the S&P 500 Dividend Yield	2.31%
[8] S&P's estimate of the S&P 500 Growth Rate	11.60%
[9] S&P 500 Estimated Required Market Return	14.05%

Notes:
[7] Source: S&P Dow Jones Indices, S&P 500 Earnings and Estimate Report, March 31, 2020
[8] Source: S&P Dow Jones Indices, S&P 500 Earnings and Estimate Report, March 31, 2020
[9] Equals ([7] x (1 + (0.5 x [8]))) + [8]

EXPECTED EARNINGS ANALYSIS

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
		Value Line ROE Years 4-6	Value Line Total Capital MRY	Value Line Common Equity Ratio MRY	Total Equity MRY	Value Line Total Capital Years 4-6	Value Line Common Equity Ratio Years 4-6	Total Equity Years 4-6	Compound Annual Growth Rate	Adjustment Factor	Adjusted Return on Common Equity
American States Water Co	AWR	14.00%	938.40	59.50%	558.35	1,350.00	54.00%	729.00	5.48%	1.027	14.37%
American Water	AWK	11.50%	13,433.00	43.60%	5,856.79	18,800.00	41.00%	7,708.00	5.65%	1.027	11.82%
Atmos Energy Corporation	ATO	9.00%	9,279.70	62.00%	5,753.41	16,000.00	60.00%	9,600.00	10.78%	1.051	9.46%
California Water Service Group	CWT	12.50%	1,440.20	50.70%	730.18	1,400.00	60.50%	847.00	3.01%	1.015	12.69%
Middlesex Water Company	MSEX	14.50%	404.10	61.60%	248.93	510.00	60.50%	308.55	4.39%	1.021	14.81%
New Jersey Resources Corporation	NJR	9.00%	3,088.90	50.20%	1,550.63	4,615.00	56.50%	2,607.48	10.95%	1.052	9.47%
Northwest Natural Gas Company	NWN	11.50%	1,520.00	52.00%	790.40	1,825.00	52.50%	958.13	3.92%	1.019	11.72%
ONE Gas Inc.	OGS	9.50%	3,415.00	62.00%	2,117.30	4,400.00	62.00%	2,728.00	5.20%	1.025	9.74%
San Jose Water	SJW	9.50%	1,320.70	67.30%	888.83	1,700.00	67.50%	1,147.50	5.24%	1.026	9.74%
South Jersey Industries, Inc.	SJI	11.50%	3,550.00	42.50%	1,508.75	4,925.00	44.00%	2,167.00	7.51%	1.036	11.92%
Southwest Gas Corporation	SWX	9.50%	5,000.00	50.00%	2,500.00	7,150.00	56.50%	4,039.75	10.07%	1.048	9.96%
Spire, Inc.	SR	7.00%	4,625.60	55.00%	2,544.08	7,200.00	55.00%	3,960.00	9.25%	1.044	7.31%
York Water Company	YORW	14.00%	219.50	57.50%	126.21	235.00	66.00%	155.10	4.21%	1.021	14.29%
Mean											11.33%
Mean Excluding AWK											11.29%
Median											11.72%
Median Excluding AWK											10.84%

Notes:
[1] Source: Value Line Reports, January 10, 2020; February 28, 2020, Due to the timing of the release of the Value Line Reports, Years 4-6 is 2022-2024 for the Water Utilities and 2023-2025 for the Natural Gas Utilities.
[2] Source: Value Line Reports, January 10, 2020; February 28, 2020, Due to the timing of the release of the Value Line Reports, the MRY is 2018 for the Water Utilities and 2019 for the Natural Gas Utilities.
[3] Source: Value Line Reports, January 10, 2020; February 28, 2020, Due to the timing of the release of the Value Line Reports, the MRY is 2018 for the Water Utilities and 2019 for the Natural Gas Utilities.
[4] Equals [2] x [3]
[5] Source: Value Line Reports, January 10, 2020; February 28, 2020, Due to the timing of the release of the Value Line Reports, Years 4-6 is 2022-2024 for the Water Utilities and 2023-2025 for the Natural Gas Utilities.
[6] Source: Value Line Reports, January 10, 2020; February 28, 2020, Due to the timing of the release of the Value Line Reports, Years 4-6 is 2022-2024 for the Water Utilities and 2023-2025 for the Natural Gas Utilities.
[7] Equals [5] x [6]
[8] Equals ([7] / [4]) ^ (1/5) - 1
[9] Equals 2 x (1 + [8]) / (2 + [8])
[10] Equals [1] x [9]

COMPARISON OF PAWC AND PROXY GROUP COMPANIES
CAPITAL COST RECOVERY MECHANISMS

Company	Ticker	State	Infrastructure Replacement Surcharge	Citations
American States Water Co	AWR			2019 10-K, page 46
		California	No	
American Water	AWK			2019 10-K, page 7
		California	No	
		Georgia	No	
		Hawaii	No	
		Illinois	Yes	
		Indiana	Yes	
		Iowa	Yes	
		Kentucky	Yes	
		Maryland	No	
		Michigan	No	
		Missouri	Yes	
		New Jersey	Yes	
		New York	Yes	
		Pennsylvania	Yes	
		Tennessee	Yes	
		Virginia	Yes	
		West Virginia	Yes	
Atmos Energy Corporation	ATO			2019 10-K, pages 7-8; S&P Global Market Intelligence, Regulatory Focus: Adjustment Clauses, dated November 12, 2019
		Colorado	Yes	
		Kansas	Yes	
		Kentucky	Yes	
		Louisiana	Yes	
		Mississippi	Yes	
		Tennessee	No	
		Texas	Yes	
		Virginia	Yes	
California Water Service Group	CWT			2019 10-K, page 8-13,
		California	No	
		Hawaii	No	
		New Mexico	No	
		Washington	No	
Middlesex Water Company	MSEX			
		New Jersey	Yes	2019 10-K, page 6-7; Middlesex Water Company Tariff; Twin Lake Utilities Tariff
		Delaware	Yes	
		Pennsylvania	No	
New Jersey Resources Corporation	NJR			S&P Global Market Intelligence, Regulatory Focus: Adjustment Clauses, dated November 12, 2019
		New Jersey	Yes	
Northwest Natural Gas Company	NWN			S&P Global Market Intelligence, Regulatory Focus: Adjustment Clauses, dated November 12, 2019.
		Oregon	No	
		Washington	No	
ONE Gas, Inc.	OGS			S&P Global Market Intelligence, Regulatory Focus: Adjustment Clauses, dated November 12, 2019.
		Kansas	Yes	
		Oklahoma	No	
		Texas	Yes	
SJW Corporation	SJW			
		California	No	SJW 2019 10-K, page 5-8
		Connecticut	Yes	
		Maine	Yes	
		Texas	No	
South Jersey Industries, Inc.	SJI			S&P Global Market Intelligence, Regulatory Focus: Adjustment Clauses, dated November 12, 2019.
		New Jersey	Yes	
Southwest Gas Corporation	SWX			S&P Global Market Intelligence, Regulatory Focus: Adjustment Clauses, dated November 12, 2019.
		Arizona	Yes	
		California	No	
		Nevada	Yes	
Spire, Inc.	SR			
		Alabama	No	2019 10-K pages 124-128; S&P Global Market Intelligence, Regulatory Focus: Adjustment Clauses, dated November 12, 2019.
		Mississippi	No	
		Missouri	Yes	
York Water Company	YORW			
		Pennsylvania	Yes	2019 10-K, pp. 43
Total Number of Jurisdictions (Y)			30	
Total Number of Jurisdictions			50	
Percent of Jurisdictions			60.00%	
Total Number of Jurisdictions (excl. AWK) (Y)			19	
Total Number of Jurisdictions (excl. AWK)			34	
Percent of Jurisdictions (excl. AWK)			55.88%	

CAPITAL STRUCTURE ANALYSIS

COMMON EQUITY RATIO [1]

Proxy Group Company	Ticker	2019	2018	MRY
American States Water Company	AWR	55.29%	57.25%	55.29%
American Water Works Company, Inc.	AWK	41.38%	43.36%	41.38%
Atmos Energy Corporation	ATO		63.22%	63.22%
California Water Service Group	CWT	49.28%	47.43%	49.28%
Middlesex Water Company	MSEX	57.27%	60.24%	57.27%
New Jersey Resources Corporation	NJR		61.92%	61.92%
Northwest Natural Gas Company	NWN		50.36%	50.36%
One Gas Inc.	OGS		62.03%	62.03%
SJW Corporation	SJW	40.53%	67.33%	40.53%
South Jersey Industries, Inc.	SJI		53.55%	53.55%
Southwest Gas Corporation	SWX		49.38%	49.38%
Spire Inc.	SR	66.82%	63.73%	66.82%
York Water Company	YORW	56.51%	57.01%	56.51%
Proxy Group Including AWK				
MEAN		52.44%	56.68%	54.43%
LOW		40.53%	43.36%	40.53%
HIGH		66.82%	67.33%	66.82%
Proxy Group Excluding AWK				
MEAN		54.28%	57.79%	55.51%
LOW		40.53%	47.43%	40.53%
HIGH		66.82%	67.33%	66.82%

COMMON EQUITY RATIO - UTILITY OPERATING COMPANIES [2]

Company Name	Ticker	2019	2018	MRY
American States Water Company	AWR	55.29%	57.25%	55.29%
American Water Works Company, Inc.	AWK	41.38%	43.36%	41.38%
Atmos Energy Corporation	ATO		63.22%	63.22%
California Water Service Group	CWT	49.28%	47.43%	49.28%
Middlesex Water Company	MSEX	57.27%	60.24%	57.27%
New Jersey Natural Gas Company	NJR		61.92%	61.92%
Northwest Natural Gas Company	NWN		50.36%	50.36%
Oklahoma Natural Gas Company	OGS		61.94%	61.94%
Texas Gas Service Company, Inc.	OGS		61.95%	61.95%
SJW Corporation	SJW	40.53%	67.33%	40.53%
South Jersey Gas Company	SJI		53.55%	53.55%
Southwest Gas Corporation	SWX		49.38%	49.38%
Spire Alabama Inc.	SR	66.82%	71.48%	66.82%
Spire Gulf Inc.	SR		45.31%	45.31%
Spire Mississippi Inc.	SR		100.00%	100.00%
Spire Missouri Inc.	SR		60.32%	60.32%
York Water Company	YORW	56.51%	57.01%	56.51%

Notes:
[1] Ratios are weighted by actual common capital, preferred equity, and long-term debt of Operating Subsidiaries
[2] Natural Gas Subsidiaries with data listed as N/A from SNL Financial have been excluded from the analysis.
[3] 2019 data for the Natural Gas Subsidiaries is N/A in most cases because the 2019 FERC Form 2 data is not currently available.

CAPITAL STRUCTURE ANALYSIS

LONG-TERM DEBT RATIO [1]

Proxy Group Company	Ticker	2019	2018	MRY
American States Water Company	AWR	44.71%	42.75%	44.71%
American Water Works Company, Inc.	AWK	58.59%	56.59%	58.59%
Atmos Energy Corporation	ATO		36.78%	36.78%
California Water Service Group	CWT	50.72%	52.57%	50.72%
Middlesex Water Company	MSEX	42.36%	39.17%	42.36%
New Jersey Resources Corporation	NJR		38.08%	38.08%
Northwest Natural Gas Company	NWN		49.64%	49.64%
One Gas Inc.	OGS		37.97%	37.97%
SJW Corporation	SJW	59.47%	32.67%	59.47%
South Jersey Industries, Inc.	SJI		46.45%	46.45%
Southwest Gas Corporation	SWX		50.62%	50.62%
Spire Inc.	SR	33.18%	36.27%	33.18%
York Water Company	YORW	43.49%	42.99%	43.49%
Proxy Group Including AWK				
MEAN		47.50%	43.27%	45.54%
LOW		33.18%	32.67%	33.18%
HIGH		59.47%	56.59%	59.47%
Proxy Group Excluding AWK				
MEAN		45.66%	42.16%	44.46%
LOW		33.18%	32.67%	33.18%
HIGH		59.47%	52.57%	59.47%

LONG-TERM DEBT RATIO - UTILITY OPERATING COMPANIES [2]

Company Name	Ticker	2019	2018	MRY
American States Water Company	AWR	44.71%	42.75%	44.71%
American Water Works Company, Inc.	AWK	58.59%	56.59%	58.59%
Atmos Energy Corporation	ATO		36.78%	36.78%
California Water Service Group	CWT	50.72%	52.57%	50.72%
Middlesex Water Company	MSEX	42.36%	39.17%	42.36%
New Jersey Natural Gas Company	NJR		38.08%	38.08%
Northwest Natural Gas Company	NWN		49.64%	49.64%
Oklahoma Natural Gas Company	OGS		38.06%	38.06%
Texas Gas Service Company, Inc.	OGS		38.05%	38.05%
SJW Corporation	SJW	59.47%	32.67%	59.47%
South Jersey Gas Company	SJI		46.45%	46.45%
Southwest Gas Corporation	SWX		50.62%	50.62%
Spire Alabama Inc.	SR	33.18%	28.52%	33.18%
Spire Gulf Inc.	SR		54.69%	54.69%
Spire Mississippi Inc.	SR		0.00%	0.00%
Spire Missouri Inc.	SR		39.68%	39.68%
York Water Company	YORW	43.49%	42.99%	43.49%

Notes:
[1] Ratios are weighted by actual common capital, preferred equity, and long-term debt of Operating Subsidiaries
[2] Natural Gas Subsidiaries with data listed as N/A from SNL Financial have been excluded from the analysis.
[3] 2019 data for the Natural Gas Subsidiaries is N/A in most cases because the 2019 FERC Form 2 data is not currently available.

CAPITAL STRUCTURE ANALYSIS

PREFERRED EQUITY RATIO [1]

Proxy Group Company	Ticker	2019	2018	MRY
American States Water Company	AWR	0.00%	0.00%	0.00%
American Water Works Company, Inc.	AWK	0.03%	0.05%	0.03%
Atmos Energy Corporation	ATO		0.00%	0.00%
California Water Service Group	CWT	0.00%	0.00%	0.00%
Middlesex Water Company	MSEX	0.37%	0.59%	0.37%
New Jersey Resources Corporation	NJR		0.00%	0.00%
Northwest Natural Gas Company	NWN		0.00%	0.00%
One Gas Inc.	OGS		0.00%	0.00%
SJW Corporation	SJW	0.00%	0.00%	0.00%
South Jersey Industries, Inc.	SJI		0.00%	0.00%
Southwest Gas Corporation	SWX		0.00%	0.00%
Spire Inc.	SR	0.00%	0.00%	0.00%
York Water Company	YORW	0.00%	0.00%	0.00%
Proxy Group Including AWK				
MEAN		0.06%	0.05%	0.03%
LOW		0.00%	0.00%	0.00%
HIGH		0.37%	0.59%	0.37%
Proxy Group Excluding AWK				
MEAN		0.06%	0.05%	0.03%
LOW		0.00%	0.00%	0.00%
HIGH		0.37%	0.59%	0.37%

PREFERRED EQUITY RATIO - UTILITY OPERATING COMPANIES [2]

Company Name	Ticker	2019	2018	MRY
American States Water Company	AWR	0.00%	0.00%	0.00%
American Water Works Company, Inc.	AWK	0.03%	0.05%	0.03%
Atmos Energy Corporation	ATO		0.00%	0.00%
California Water Service Group	CWT	0.00%	0.00%	0.00%
Middlesex Water Company	MSEX	0.37%	0.59%	0.37%
New Jersey Natural Gas Company	NJR		0.00%	0.00%
Northwest Natural Gas Company	NWN		0.00%	0.00%
Oklahoma Natural Gas Company	OGS		0.00%	0.00%
Texas Gas Service Company, Inc.	OGS		0.00%	0.00%
SJW Corporation	SJW	0.00%	0.00%	0.00%
South Jersey Gas Company	SJI		0.00%	0.00%
Southwest Gas Corporation	SWX		0.00%	0.00%
Spire Alabama Inc.	SR	0.00%	0.00%	0.00%
Spire Gulf Inc.	SR		0.00%	0.00%
Spire Mississippi Inc.	SR		0.00%	0.00%
Spire Missouri Inc.	SR		0.00%	0.00%
York Water Company	YORW	0.00%	0.00%	0.00%

Notes:
[1] Ratios are weighted by actual common capital, preferred equity, and long-term debt of Operating Subsidiaries
[2] Natural Gas Subsidiaries with data listed as N/A from SNL Financial have been excluded from the analysis.
[3] 2019 data for the Natural Gas Subsidiaries is N/A in most cases because the 2019 FERC Form 2 data is not currently available.

Pennsylvania-American Water Company
Water Services - Cost of Capital

Type of Capital	Ratios	Cost Rate	Weighted Cost Rate
Estimated at December 31, 2020			
Long-Term Debt	43.95%	4.54%	2.00%
Preferred Stock	0.07%	8.73%	0.01%
Common Equity	55.98%	10.80%	6.05%
Total	100.00%		8.06%
Estimated Average For Year Ending December 31, 2021 (Rate Year 1)			
Long-Term Debt	43.88%	4.47%	1.96%
Preferred Stock	0.06%	8.80%	0.01%
Common Equity	56.06%	10.80%	6.05%
Total	100.00%		8.02%
Estimated at December 31, 2022 (Rate Year 2)			
Long-Term Debt	44.02%	4.35%	1.91%
Preferred Stock	0.01%	9.70%	0.00%
Common Equity	55.97%	10.80%	6.04%
Total	100.00%		7.95%

Pennsylvania-American Water Company
Wastewater - Cost of Capital

Type of Capital	Ratios	Cost Rate	Weighted Cost Rate
Estimated at December 31, 2020			
Long-Term Debt	39.34%	4.54%	1.79%
WW Financing	10.49%	2.54%	0.27%
Preferred Stock	0.06%	8.73%	0.01%
Common Equity	50.11%	10.80%	5.41%
Total	100.00%		7.48%
Estimated Average For Year Ending December 31, 2021 (Rate Year 1)			
Long-Term Debt	39.44%	4.47%	1.76%
WW Financing	10.14%	2.55%	0.26%
Preferred Stock	0.05%	8.80%	0.00%
Common Equity	50.37%	10.80%	5.44%
Total	100.00%		7.46%
Estimated at December 31, 2022 (Rate Year 2)			
Long-Term Debt	39.90%	4.35%	1.74%
WW Financing	9.36%	2.60%	0.24%
Preferred Stock	0.01%	9.70%	0.00%
Common Equity	50.73%	10.80%	5.48%
Total	100.00%		7.46%

Pennsylvania-American Water Company
Capitalization and Related Capital Structure Ratios
Actual at December 31, 2019 and Estimated at December 31, 2020, December 31, 2021, and December 31, 2022

Total Company

	Actual at December 31, 2019			Proforma at December 31, 2020			Average Proforma at December 31, 2021 (Rate Year 1)		
	Amount Outstanding	Ratios Excl. S-T	Ratios Incl. S-T	Amount Outstanding	Ratios Excl. S-T	Ratios Incl. S-T	Amount Outstanding	Ratios Excl. S-T	Ratios Incl. S-T
Long term debt	$ 1,668,828,227	44.99%	43.64%	$ 1,783,684,919	44.88%	43.68%	$ 1,813,507,494	44.79%	43.67%
Preferred Stock	$ 4,051,500	0.11%	0.11%	$ 2,851,500	0.07%	0.07%	$ 2,251,500	0.06%	0.05%
Common Equity									
Common Stock	21,506,887			21,506,887			21,506,887		
Paid in Capital	1,322,040,170			1,422,040,170			1,432,040,170		
Retained Earnings	692,749,126			744,467,126			778,984,626		
Total Common Equity	$ 2,036,296,182	54.90%	53.25%	$ 2,188,014,182	55.05%	53.58%	$ 2,232,531,683	55.15%	53.76%
Total Permanent Capital	$ 3,709,175,909	100.00%	97.00%	$ 3,974,550,601	100.00%	97.33%	$ 4,048,290,677	100.00%	97.48%
ST Debt	114,723,817		3.00%	109,023,000		2.67%	104,470,500		2.52%
Total Capital Employed	$ 3,823,899,726		100.00%	$ 4,083,573,601		100.00%	$ 4,152,761,177		100.00%
CWIP	87,251,946			103,906,000			80,260,000		
GENERAL LEDGER	3,823,899,726								

Water Service

	Actual at December 31, 2019			Proforma at December 31, 2020			Average Proforma at December 31, 2021 (Rate Year 1)		
	Amount Outstanding	Ratios Excl. S-T	Ratios Incl. S-T	Amount Outstanding	Ratios Excl. S-T	Ratios Incl. S-T	Amount Outstanding	Ratios Excl. S-T	Ratios Incl. S-T
Long term debt	$ 1,601,450,952	43.98%	42.63%	$ 1,717,501,018	43.95%	42.69%	$ 1,747,908,457	43.88%	42.71%
Preferred Stock	$ 4,051,500	0.11%	0.11%	$ 2,851,500	0.07%	0.07%	$ 2,251,500	0.06%	0.06%
Common Equity									
Common Stock	21,506,887			21,506,887			21,506,887		
Paid in Capital	1,322,040,170			1,422,040,170			1,432,040,170		
Retained Earnings	692,749,126			744,467,126			778,984,626		
Total Common Equity	$ 2,036,296,182	55.91%	54.21%	$ 2,188,014,182	55.98%	54.39%	$ 2,232,531,683	56.06%	54.55%
Total Permanent Capital	$ 3,641,798,635	100.00%	96.95%	$ 3,908,366,700	100.00%	97.15%	$ 3,982,691,640	100.00%	97.32%
ST Debt	114,723,817		3.05%	114,723,817		2.85%	110,171,317		2.68%
Total Capital Employed	$ 3,756,522,451		100.00%	$ 4,023,090,517		100.00%	$ 4,092,862,957		100.00%
CWIP	87,251,946			103,906,000			80,260,000		

Wastewater Sevice

	Actual at December 31, 2019		Proforma at December 31, 2020			Average Proforma at December 31, 2021 (Rate Year 1)	
	Amount Outstanding	Ratios Excl. S-T	Amount Outstanding	Ratios Excl. S-T		Amount Outstanding	Ratios Excl. S-T
Long term debt	$ 220,761,520	38.78%	$ 248,256,380	39.34%		$ 255,170,585	39.44%
LTD WW Specific Financing	67,377,275	11.83%	66,183,901	10.49%		65,599,037	10.14%
Preferred Stock	$ 552,155	0.10%	$ 395,403	0.06%		$ 317,293	0.05%
Total Common Equity	$ 280,645,216	49.29%	$ 316,209,150	50.11%		$ 325,921,359	50.37%
Total Permanent Capital	$ 569,336,166	100.00%	$ 631,044,834	100.00%		$ 647,008,275	100.00%
Rate Base	$ 569,336,166		$ 631,044,834			$ 647,008,275	
WW Specific LTD	67,377,275		66,183,901		$ 15,963,441	65,599,037	
Amount financed by overall Company capital structure excluding WW Specific LTD financing.	$ 501,958,891		$ 564,860,933			$ 581,409,238	

Pennsylvania-American Water Company
Capitalization and Related Capital Structure Ratios
Actual at December 31, 2019 and Estimated at December 31, 2020, De

Total Company

	Year End at December 31, 2021				Proforma at December 31, 2022 (Rate Year 2)		
	Amount Outstanding	Ratios Excl. S-T	Incl. S-T		Amount Outstanding	Ratios Excl. S-T	Incl. S-T
Long term debt	$ 1,843,330,069	44.72%	43.66%		$ 1,953,418,618	44.84%	43.84%
Preferred Stock	$ 1,651,500	0.04%	0.04%		$ 451,500	0.01%	0.01%
Common Equity							
Common Stock	21,506,887				21,506,887		
Paid in Capital	1,442,040,170				1,497,040,170		
Retained Earnings	813,502,126				884,352,126		
Total Common Equity	$ 2,277,049,182	55.24%	53.93%		$ 2,402,899,182	55.15%	53.92%
Total Permanent Capital	$ 4,122,030,751	100.00%	97.63%		$ 4,356,769,300	100.00%	97.77%
ST Debt	99,918,000		2.37%		99,405,000		2.23%
Total Capital Employed	$ 4,221,948,751		100.00%		$ 4,456,174,300		100.00%
CWIP	56,614,000				89,991,000		
GENERAL LEDGER							

Water Service

	Year End at December 31, 2021				Proforma at December 31, 2022 (Rate Year 2)		
	Amount Outstanding	Ratios Excl. S-T	Incl. S-T		Amount Outstanding	Ratios Excl. S-T	Incl. S-T
Long term debt	$ 1,778,315,896	43.83%	42.72%		$ 1,889,585,925	44.02%	42.96%
Preferred Stock	$ 1,651,500	0.04%	0.04%		$ 451,500	0.01%	0.01%
Common Equity							
Common Stock	21,506,887				21,506,887		
Paid in Capital	1,442,040,170				1,497,040,170		
Retained Earnings	813,502,126				884,352,126		
Total Common Equity	$ 2,277,049,182	56.13%	54.70%		$ 2,402,899,182	55.97%	54.64%
Total Permanent Capital	$ 4,057,016,578	100.00%	97.46%		$ 4,292,936,607	100.00%	97.61%
ST Debt	105,618,817		2.54%		105,105,817		2.39%
Total Capital Employed	$ 4,162,635,395		100.00%		$ 4,398,042,424		100.00%
CWIP	56,614,000				89,991,000		

Wastewater Sevice

	Year End at December 31, 2021			Proforma at December 31, 2022 (Rate Year 2)		
	Amount Outstanding	Ratios Excl. S-T		Amount Outstanding	Ratios Excl. S-T	
Long term debt	$ 262,084,791	39.52%		$ 272,178,861	39.90%	
LTD WW Specific Financing	65,014,173	9.81%		63,832,693	9.36%	
Preferred Stock	$ 239,183	0.04%		$ 61,831	0.01%	
Total Common Equity	$ 335,633,568	50.63%		$ 346,066,580	50.73%	
Total Permanent Capital	$ 662,971,715	100.00%		$ 682,139,965	100.00%	
Rate Base	$ 662,971,715			$ 682,139,965		
WW Specific LTD	65,014,173			63,832,693		
Amount financed by overall Company capital structure excluding WW Specific LTD financing.	$ 597,957,542			$ 618,307,272		

Notes:

1 Equity Infusion

$ 100,000,000	2nd Quarter 2020	
20,000,000	3rd Quarter 2021	
55,000,000	3rd Quarter 2022	

2 2020 New LTD (AWCC) $ 120,000,000 May-20

2021 New LTD (AWCC) $ 130,000,000 May-21

2022 New LTD (AWCC) $ 115,000,000 May-22

3 2020 Pennvest Sinking Fund Pymt Total $ 5,108,029 Various
2021 Pennvest Sinking Fund Pymt Total 5,219,850 Various
2022 Pennvest Sinking Fund Pymt Total 4,359,208 Various

4 2009 PEDFA Loan (BD240082)

	12/31/19	12/31/20	12/31/21	Rate Year 1 12/31/21	Rate Year 2 12/31/22
Coatesville Wastewater Treatment Plant	$ 47,000,000	$ 47,000,000	$ 47,000,000	$ 47,000,000	$ 47,000,000
Chemical Improvements at Pittsburgh	16,000,000	16,000,000	16,000,000	16,000,000	16,000,000
New Beck's Run Pump Station	17,000,000	17,000,000	17,000,000	17,000,000	17,000,000
	$ 80,000,000	$ 80,000,000	$ 80,000,000	$ 80,000,000	$ 80,000,000

PENNVEST (Outstanding)

	12/31/19	12/31/20	12/31/21	12/31/22
Pocono Wastewater System (BD240052)	$ 35,279	$ -	$ -	$ -
Clarion Wastewater System (BD240101)	13,450,355	12,727,290	11,996,962	11,259,296
Scranton Wastewater Acquisition (BD240105)	6,891,641	6,456,611	6,017,211	5,573,397
Total	$ 67,377,275	$ 66,183,901	$ 65,014,173	$ 63,832,693

5 Preferred Stock

Series	8.49%	$ 1,200,000	Sinking Fund Redemption 2020
Series	8.49%	1,200,000	Sinking Fund Redemption 2021
Series	8.49%	1,200,000	Sinking Fund Redemption 2022

6 Forecasted Capital Expenditures (Total Company)

	Gross	CIAC/CAC	Net
2020	$ 388,417,421	$ 4,500,000	$ 383,917,421
2021	343,970,199	4,500,000	339,470,199
2022	386,881,306	4,500,000	382,381,306
2023	401,598,974	4,500,000	397,098,974
2024	405,848,675	4,500,000	401,348,675
Total			$ 1,904,216,575

Funding will be based on a combination of LTD issuances and equity infusions which allow for PAWC, on a total-company basis, to reach targeted equity range.

7 PAWC's total-company overall target capital structure goal 55% equity

8 2020-2022 Long-Term Debt Maturities

	Amount Issued	Amount Outstanding at Maturity	Issue Date	Maturity Date	Coupon Rate
BD240010 (GMB)	$ 20,000,000	$ 20,000,000	01/15/06	01/15/21	9.690%
BD240079 (AWCC Note)	100,300,000	45,135,000	01/31/07	12/21/21	5.770%
Total	$ 120,300,000	$ 65,135,000			
PennVest Maturity 2020	$ 3,470,505	$ 35,279	10/01/01	02/01/20	1.184%
PennVest Maturity 2021	0	0			
PennVest Maturity 2022	$ 3,945,656	233,844	01/01/03	12/01/22	2.774%
PennVest Maturity 2022	$ 3,366,155	54,851	04/01/00	03/01/22	3.237%
PennVest Maturity 2022	$ 3,623,800	59,031	04/01/00	03/01/22	3.237%
PennVest Maturity 2022	$ 4,322,665	204,517	08/30/00	09/01/22	3.237%
Total 2022 Maturities	$ 15,258,276	$ 552,243			
Total PennVest Maturities	$ 18,728,781	$ 587,522			

9 Cost Rates

	Total Company	WW Specific LTD	Excl WW Specific LTD	Preferred Stock
2019	4.53%	2.51%	4.61%	8.69%
2020	4.47%	2.54%	4.54%	8.73%
2021 Average	4.40%	2.55%	4.47%	8.80%
2021	4.33%	2.57%	4.39%	8.87%
2022	4.29%	2.60%	4.35%	9.70%

Pennsylvania American Water Company
Wastewater Specific Long-term Debt

12/31/2019

DATE OF ISSUE	DATE OF MATURITY	AMOUNT ISSUED	AMOUNT OUTSTANDING	COUPON RATE	ANNUAL INTEREST	NOTE #	ISSUANCE EXPENSE	NET PROCEEDS	NET PROCEEDS Ratio	SINKING REQUIR.	PERCENT TO TOTAL	EFFECTIVE COST RATE (1)	WEIGHTED COST RATE
PENNVEST- Pocono WW													
10/01/01	02/01/20	3,470,505	35,279	1.184%	418	8	17,155	3,453,350	99.51%	0	0.05%	1.21%	0.00%
PENNVEST- Clarion WW													
04/01/15	09/01/32	15,833,700	13,450,355	1.000%	134,504	25	0	15,833,700	100.00%	0	19.96%	1.00%	0.20%
PEDFA - Coatesville WW													
06/21/19	04/01/39	47,000,000	47,000,000	3.000%	1,410,000	5	1,173,060	45,826,940	97.50%	0	69.76%	3.17%	2.21%
PENNVEST- Scranton WW													
12/29/16	11/01/37	7,785,187	6,891,641	1.000%	68,916	29	0	7,785,187	100.00%	0	10.23%	1.00%	0.10%
		$74,089,392	**$67,377,275**		**$1,613,838**		**$1,190,215**	**$72,899,177**		**$0**	100.00%		2.51%

12/31/2020

DATE OF ISSUE	DATE OF MATURITY	AMOUNT ISSUED	AMOUNT OUTSTANDING	COUPON RATE	ANNUAL INTEREST	NOTE #	ISSUANCE EXPENSE	NET PROCEEDS	NET PROCEEDS Ratio	SINKING REQUIR.	PERCENT TO TOTAL	EFFECTIVE COST RATE (1)	WEIGHTED COST RATE
PENNVEST- Pocono WW													
10/01/01	02/01/20	3,470,505	0	1.184%	0	8	17,155	3,453,350	99.51%	0	0.00%	1.21%	0.00%
PENNVEST- Clarion WW													
04/01/15	09/01/32	15,833,700	12,727,290	1.000%	127,273	25	0	15,833,700	100.00%	0	19.23%	1.00%	0.19%
PEDFA - Coatesville WW													
06/21/19	04/01/39	47,000,000	47,000,000	3.000%	1,410,000	5	1,173,060	45,826,940	97.50%	0	71.01%	3.17%	2.25%
PENNVEST- Scranton WW													
12/29/16	11/01/37	7,785,187	6,456,611	1.000%	64,566	29	0	7,785,187	100.00%	0	9.76%	1.00%	0.10%
		$74,089,392	**$66,183,901**		**$1,601,839**		**$1,190,215**	**$72,899,177**		**$0**	100.00%		2.54%

12/31/2021

DATE OF ISSUE	DATE OF MATURITY	AMOUNT ISSUED	AMOUNT OUTSTANDING	COUPON RATE	ANNUAL INTEREST	NOTE #	ISSUANCE EXPENSE	NET PROCEEDS	NET PROCEEDS Ratio	SINKING REQUIR.	PERCENT TO TOTAL	EFFECTIVE COST RATE (1)	WEIGHTED COST RATE
PENNVEST- Clarion WW													
04/01/15	09/01/32	15,833,700	11,996,962	1.000%	119,970	24	0	15,833,700	100.00%	0	18.45%	1.00%	0.18%
PEDFA - Coatesville WW													
06/21/19	04/01/39	47,000,000	47,000,000	3.000%	1,410,000	5	1,173,060	45,826,940	97.50%	0	72.29%	3.17%	2.29%
PENNVEST- Scranton WW													
12/29/16	11/01/37	7,785,187	6,017,211	1.000%	60,172	28	0	7,785,187	100.00%	0	9.26%	1.00%	0.09%
		$70,618,887	**$65,014,173**		**$1,590,142**		**$1,173,060**	**$69,445,827**		**$0**	100.00%		2.57%

12/31/2022

DATE OF ISSUE	DATE OF MATURITY	AMOUNT ISSUED	AMOUNT OUTSTANDING	COUPON RATE	ANNUAL INTEREST	NOTE #	ISSUANCE EXPENSE	NET PROCEEDS	NET PROCEEDS Ratio	SINKING REQUIR.	PERCENT TO TOTAL	EFFECTIVE COST RATE (1)	WEIGHTED COST RATE
PENNVEST- Clarion WW													
04/01/15	09/01/32	15,833,700	11,259,296	1.000%	112,593	24	0	15,833,700	100.00%	0	17.64%	1.00%	0.18%
PEDFA - Coatesville WW													
06/21/19	04/01/39	47,000,000	47,000,000	3.000%	1,410,000	5	1,173,060	45,826,940	97.50%	0	73.63%	3.17%	2.33%
PENNVEST- Scranton WW													
12/29/16	11/01/37	7,785,187	5,573,397	1.000%	55,734	28	0	7,785,187	100.00%	0	8.73%	1.00%	0.09%
		$70,618,887	**$63,832,693**		**$1,578,327**		**$1,173,060**	**$69,445,827**		**$0**	100.00%		2.60%

Pennsylvania-American Water
Water Services Debt Schedule
December 31, 2019

DATE OF ISSUE	DATE OF MATURITY	AMOUNT ISSUED	AMOUNT OUTSTANDING	COUPON RATE	ANNUAL INTEREST	NOTE #	ISSUANCE EXPENSE	NET PROCEEDS	NET PROCEEDS RATIO	SINKING REQUIR.	PERCENT TO TOTAL	EFFECTIVE COST RATE (1)	WEIGHTED COST RATE
Bonds and Notes													
11/01/03	11/01/33	38,000,000	38,000,000	6.780%	2,576,400		174,946	37,825,054	99.54%		2.37%	6.82%	0.16%
09/01/06	09/01/26	150,000,000	150,000,000	7.800%	11,700,000		2,069,648	147,930,352	98.62%		9.37%	7.94%	0.74%
01/15/06	01/15/21	20,000,000	20,000,000	9.690%	1,938,000		116,061	19,883,939	99.42%		1.25%	9.76%	0.12%
11/01/04	11/01/31	10,000,000	10,000,000	8.820%	882,000		88,352	9,911,648	99.12%		0.62%	8.91%	0.06%
08/01/04	08/01/25	10,000,000	10,000,000	8.150%	815,000		60,119	9,939,881	99.40%		0.62%	8.21%	0.05%
01/31/07	12/21/21	100,300,000	45,135,000	5.770%	2,604,290		332,690	99,967,310	99.67%		2.82%	5.80%	0.16%
12/21/12	12/01/42	23,015,000	23,015,000	4.300%	989,645	1	895,945	22,119,055	96.11%		1.44%	4.54%	0.07%
12/17/12	12/01/42	45,000,000	45,000,000	4.300%	1,935,000	2	582,689	44,417,311	98.71%		2.81%	4.38%	0.12%
11/21/11	10/15/37	35,000,000	35,000,000	5.050%	1,767,500		0	35,000,000	100.00%		2.19%	5.05%	0.11%
11/21/11	10/15/37	15,500,000	15,500,000	5.050%	782,750		740,260	14,759,740	95.22%		0.97%	5.39%	0.05%
11/20/13	03/01/24	67,000,000	67,000,000	3.850%	2,579,500		791,901	66,208,099	98.82%		4.18%	3.99%	0.17%
08/14/14	03/01/25	36,200,000	36,200,000	3.400%	1,230,800		1,189,364	35,010,636	96.71%		2.26%	3.78%	0.09%
08/14/14	12/01/42	65,700,000	65,700,000	4.300%	2,825,100		4,432,879	61,267,121	93.25%		4.10%	4.74%	0.19%
08/10/17	09/01/47	240,000,000	240,000,000	3.750%	9,000,000		3,231,905	236,768,095	98.65%		14.99%	3.83%	0.57%
09/13/17	09/01/27	101,426,171	101,426,171	2.950%	2,992,072	3	11,291,519	90,134,652	88.87%		6.33%	4.34%	0.27%
08/09/18	09/01/28	74,739,360	74,739,360	3.750%	2,802,726		623,814	74,115,546	99.17%		4.67%	3.85%	0.18%
08/09/18	09/01/48	227,489,000	227,489,000	4.200%	9,554,538		2,490,214	224,998,786	98.91%		14.21%	4.26%	0.61%
09/11/18	09/01/28	124,719,875	124,719,875	3.750%	4,676,995	4	8,287,774	116,432,101	93.35%		7.79%	4.59%	0.36%
05/23/19	06/01/29	110,000,000	110,000,000	3.450%	3,795,000		1,141,559	108,858,441	98.96%		6.87%	3.57%	0.25%
06/21/19	04/01/39	33,000,000	33,000,000	3.000%	990,000	5	823,638	32,176,362	97.50%		2.06%	3.17%	0.07%
12/12/19	12/03/29	80,000,000	80,000,000	2.450%	1,960,000	6	1,907,647	78,092,353	97.62%		5.00%	2.72%	0.14%
12/12/19	12/03/29	13,165,000	13,165,000	2.450%	322,543	6	483,935	12,681,065	96.32%		0.82%	2.88%	0.02%
Pennvest Loans													
01/01/03	12/01/22	3,945,656	682,535	2.774%	18,934	7	8,480	3,937,176	99.79%		0.04%	2.79%	0.00%
04/01/00	03/01/22	3,366,155	478,062	3.237%	15,475	8	56,803	3,309,352	98.31%		0.03%	3.35%	0.00%
04/01/00	03/01/22	3,623,800	514,482	3.237%	16,654	9	25,430	3,598,370	99.30%		0.03%	3.28%	0.00%
08/30/00	09/01/22	4,322,665	726,261	3.237%	23,509	10	25,445	4,297,220	99.41%		0.05%	3.27%	0.00%
08/01/04	07/01/24	1,559,205	346,549	2.774%	9,613	11	13,749	1,545,456	99.12%		0.02%	2.83%	0.00%
06/01/05	11/01/24	5,721,348	1,464,193	1.156%	16,926	12	29,484	5,691,864	99.48%		0.09%	1.19%	0.00%
01/01/06	12/01/25	5,670,111	1,464,348	2.763%	40,460	13	34,130	5,635,981	99.40%		0.09%	2.80%	0.00%
09/01/04	08/01/24	5,240,631	1,419,652	2.774%	39,381	14	7,951	5,232,680	99.85%		0.09%	2.78%	0.00%
11/01/04	10/01/24	3,099,441	856,625	2.432%	20,833	15	5,660	3,093,781	99.82%		0.05%	2.44%	0.00%
10/01/09	09/01/29	2,359,891	1,253,409	2.547%	31,924	16	0	2,359,891	100.00%		0.08%	2.55%	0.00%
06/01/11	02/01/31	12,150,000	7,349,400	2.690%	197,699	17	0	12,150,000	100.00%		0.46%	2.69%	0.01%
01/05/12	12/01/31	9,936,500	6,961,539	3.117%	216,991	18	0	9,936,500	100.00%		0.43%	3.12%	0.01%
01/05/12	12/01/31	1,606,709	1,061,017	3.098%	32,870	19	0	1,606,709	100.00%		0.07%	3.10%	0.00%
03/23/12	03/01/41	1,724,610	1,318,041	1.000%	13,180	20	0	1,724,610	100.00%		0.08%	1.00%	0.00%
03/20/12	04/01/31	1,675,790	1,194,683	2.810%	33,571	21	0	1,675,790	100.00%		0.07%	2.81%	0.00%
03/26/12	03/01/32	1,273,465	758,042	2.690%	20,391	22	0	1,273,465	100.00%		0.05%	2.69%	0.00%
03/22/13	04/01/33	1,378,357	929,591	2.196%	20,414	23	0	1,378,357	100.00%		0.06%	2.20%	0.00%
10/15/15	07/01/40	123,663	104,926	1.000%	1,049	24	0	123,663	100.00%		0.01%	1.00%	0.00%
10/15/15	07/01/40	969,823	822,879	1.000%	8,229	25	0	969,823	100.00%		0.05%	1.00%	0.00%
04/21/16	11/01/26	2,141,062	1,594,244	1.356%	21,618	26	0	2,141,062	100.00%		0.10%	1.36%	0.00%
06/14/17	11/01/36	5,549,947	5,061,066	1.439%	72,829	27	0	5,549,947	100.00%		0.32%	1.44%	0.00%
		$1,697,693,236	**$1,601,450,952**		**$69,592,409**		**$41,963,990**	**$1,655,729,246**		**$0**	**100.00%**		**4.61%**

Pennsylvania-American Water
Water Services Debt Schedule
December 31, 2019

Notes to Debt Schedule

(1) Re-issuance 12/21/12 from Parent at a coupon rate of 4.30% for 30 years
(2) New unsecured borrowing at a coupon rate of 4.30% for 30 years
(3) Issuances costs included make whole premium of $10M
(4) Issuances costs included make whole premium of $7.2M
(5) Refinanced June 2019 at a lower rate for the remaining term of the bond
(6) Refinanced Dec 2019 at a lower rate for the remaining term of the bond
(7) Eldersville, Jefferson, and Crosscreek, interest 1.387% for first 70 months and 2.774% (12/2007) for remainder
(8) Strattanville Pennvest Loan. Interest 1.619% from 2002 to 2007 and 3.237% starting March 2007
(9) Franklin Township. Interest 1.619% from 2002 to 2007 and 3.237% starting April 2007
(10) Jackson Township. Interest 1.619% from 2001 to 2006 and 3.237% starting Oct 2007
(11) Farmington Twp., Interest rate 1.387% for first 70 months and 2.774% (07/2009) for remainder
(12) Sandy Ridge, Interest rate 1.000% for first 60 months and 1.156% (07/2010) for remainder
(13) Sligo/Shippenville, Interest rate 1.385% for first 86 months and 2.763% (06/2013) for remainder
(14) Ellwood/Butler Interconnect, Interest rate 1.387% for first 74 months and 2.774% (08/2009) for remainder
(15) Mahoning & Union Twp, Interest rate 1.305% for first 82 months and 2.432% (10/2009) for remainder
(16) Hanover & Collier 1.274% first 2009 - 2014 and 2.547% starting Oct 2014
(17) Mount Pleasant Water System Extension 1.559% first 2011 - 2016 and 2.69% starting March 2016
(18) Rock Run WTP 2.414% first 2011 - 2016 and 3.117% starting Dec 2017
(19) Silver Spring Clearwell 2.376% first 2012 - 2016 and 3.098% starting Jan 2017
(20) Wallaceton Municipal Authority 1.00% for 30 years starting March 2012
(21) Pittsburgh Meter Improvements 1.799% first 2012 - 2017 and 2.81% starting April 2017
(22) Pittsburgh Meter Improvement Project Phase II 1.559% first 60 months and 2.69% starting May 2016
(23) Southwest PA Pipeline Exts Phase II - Interest 1.591% first 5 years - 2.196% starting April 2018
(24) Paint Twp #1 - Interest rate is 1% for the remaining life of the Bond
(25) Paint Twp #2 - Interest rate is 1% for the remaining life of the Bond
(26) Fairview Water Main Extension - Interest rate is 1.356% for the first 5 years, 1.985% April 2021 for remaining 5 years
(27) Washington County Main Extension Project - Interest rate is 1.439% until Oct 2021 - 2.027% for the remaining term

Pennsylvania-American Water
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DATE OF ISSUE	DATE OF MATURITY	AMOUNT ISSUED	AMOUNT OUTSTANDING	COUPON RATE	ANNUAL INTEREST	NOTE #	ISSUANCE EXPENSE	NET PROCEEDS	NET PROCEEDS RATIO	SINKING REQUIR.	PERCENT TO TOTAL	EFFECTIVE COST RATE (1)	WEIGHTED COST RATE
Bonds and Notes													
11/01/03	11/01/33	38,000,000	38,000,000	6.780%	2,576,400		174,946	37,825,054	99.54%		2.21%	6.82%	0.15%
09/01/06	09/01/26	150,000,000	150,000,000	7.800%	11,700,000		2,069,648	147,930,352	98.62%		8.73%	7.94%	0.69%
01/15/06	01/15/21	20,000,000	20,000,000	9.690%	1,938,000		116,061	19,883,939	99.42%		1.16%	9.76%	0.11%
11/01/04	11/01/31	10,000,000	10,000,000	8.820%	882,000		88,352	9,911,648	99.12%		0.58%	8.91%	0.05%
08/01/04	08/01/25	10,000,000	10,000,000	8.150%	815,000		60,119	9,939,881	99.40%		0.58%	8.21%	0.05%
01/31/07	12/21/21	100,300,000	45,135,000	5.770%	2,604,290		332,690	99,967,310	99.67%		2.63%	5.80%	0.15%
12/21/12	12/01/42	23,015,000	23,015,000	4.300%	989,645	1	895,945	22,119,055	96.11%		1.34%	4.54%	0.06%
12/17/12	12/01/42	45,000,000	45,000,000	4.300%	1,935,000	2	582,689	44,417,311	98.71%		2.62%	4.38%	0.11%
11/21/11	10/15/37	35,000,000	35,000,000	5.050%	1,767,500		0	35,000,000	100.00%		2.04%	5.05%	0.10%
11/21/11	10/15/37	15,500,000	15,500,000	5.050%	782,750		740,260	14,759,740	95.22%		0.90%	5.39%	0.05%
11/20/13	03/01/24	67,000,000	67,000,000	3.850%	2,579,500		791,901	66,208,099	98.82%		3.90%	3.99%	0.16%
08/14/14	03/01/25	36,200,000	36,200,000	3.400%	1,230,800		1,189,364	35,010,636	96.71%		2.11%	3.78%	0.08%
08/14/14	12/01/42	65,700,000	65,700,000	4.300%	2,825,100		4,432,879	61,267,121	93.25%		3.83%	4.74%	0.18%
08/10/17	09/01/47	240,000,000	240,000,000	3.750%	9,000,000		3,231,905	236,768,095	98.65%		13.97%	3.83%	0.54%
09/13/17	09/01/27	101,426,171	101,426,171	2.950%	2,992,072	3	11,291,519	90,134,652	88.87%		5.91%	4.34%	0.26%
08/09/18	09/01/28	74,739,360	74,739,360	3.750%	2,802,726		623,814	74,115,546	99.17%		4.35%	3.85%	0.17%
08/09/18	09/01/48	227,489,000	227,489,000	4.200%	9,554,538		2,490,214	224,998,786	98.91%		13.25%	4.26%	0.56%
09/11/18	09/01/28	124,719,875	124,719,875	3.750%	4,676,995	4	8,287,774	116,432,101	93.35%		7.26%	4.59%	0.33%
05/23/19	06/01/29	110,000,000	110,000,000	3.450%	3,795,000		1,141,559	108,858,441	98.96%		6.40%	3.57%	0.23%
06/21/19	04/01/39	33,000,000	33,000,000	3.000%	990,000	5	823,638	32,176,362	97.50%		1.92%	3.17%	0.06%
12/12/19	12/03/29	80,000,000	80,000,000	2.450%	1,960,000	6	1,907,647	78,092,353	97.62%		4.66%	2.72%	0.13%
12/12/19	12/03/29	13,165,000	13,165,000	2.450%	322,543	6	483,935	12,681,065	96.32%		0.77%	2.88%	0.02%
05/15/20	06/01/50	120,000,000	120,000,000	3.530%	4,236,000		1,200,000	118,800,000	99.00%		6.99%	3.58%	0.25%
Pennvest Loans													
01/01/03	12/01/22	3,945,656	461,298	2.774%	12,796	7	8,480	3,937,176	99.79%		0.03%	2.79%	0.00%
04/01/00	03/01/22	3,366,155	269,876	3.237%	8,736	8	56,803	3,309,352	98.31%		0.02%	3.35%	0.00%
04/01/00	03/01/22	3,623,800	290,437	3.237%	9,401	9	25,430	3,598,370	99.30%		0.02%	3.28%	0.00%
08/30/00	09/01/22	4,322,665	469,605	3.237%	15,201	10	25,445	4,297,220	99.41%		0.03%	3.27%	0.00%
08/01/04	07/01/24	1,559,205	274,646	2.774%	7,619	11	13,749	1,545,456	99.12%		0.02%	2.83%	0.00%
06/01/05	11/01/24	5,721,348	1,173,091	1.156%	13,561	12	29,484	5,691,864	99.48%		0.07%	1.19%	0.00%
01/01/06	12/01/25	5,670,111	1,236,814	2.763%	34,173	13	34,130	5,635,981	99.40%		0.07%	2.80%	0.00%
09/01/04	08/01/24	5,240,631	1,130,700	2.774%	31,366	14	7,951	5,232,680	99.85%		0.07%	2.78%	0.00%
11/01/04	10/01/24	3,099,441	687,549	2.432%	16,721	15	5,660	3,093,781	99.82%		0.04%	2.44%	0.00%
10/01/09	09/01/29	2,359,891	1,138,688	2.547%	29,002	16	0	2,359,891	100.00%		0.07%	2.55%	0.00%
06/01/11	02/01/31	12,150,000	6,777,403	2.690%	182,312	17	0	12,150,000	100.00%		0.39%	2.69%	0.01%
01/05/12	12/01/31	9,936,500	6,520,383	3.117%	203,240	18	0	9,936,500	100.00%		0.38%	3.12%	0.01%
01/05/12	12/01/31	1,606,709	986,858	3.098%	30,573	19	0	1,606,709	100.00%		0.06%	3.10%	0.00%
03/23/12	03/01/41	1,724,610	1,262,091	1.000%	12,621	20	0	1,724,610	100.00%		0.07%	1.00%	0.00%
03/20/12	04/01/31	1,675,790	1,103,880	2.810%	31,019	21	0	1,675,790	100.00%		0.06%	2.81%	0.00%
03/26/12	03/01/32	1,273,465	700,539	2.690%	18,845	22	0	1,273,465	100.00%		0.04%	2.69%	0.00%
03/22/13	04/01/33	1,378,357	868,469	2.196%	19,072	23	0	1,378,357	100.00%		0.05%	2.20%	0.00%
10/15/15	07/01/40	123,663	100,312	1.000%	1,003	24	0	123,663	100.00%		0.01%	1.00%	0.00%
10/15/15	07/01/40	969,823	786,693	1.000%	7,867	25	0	969,823	100.00%		0.05%	1.00%	0.00%
04/21/16	11/01/26	2,141,062	1,377,380	1.356%	18,677	26	0	2,141,062	100.00%		0.08%	1.36%	0.00%
06/14/17	11/01/36	5,549,947	4,794,899	1.439%	68,999	27	0	5,549,947	100.00%		0.28%	1.44%	0.00%
		$1,817,693,236	**$1,717,501,018**		**$73,728,663**		**$43,163,990**	**$1,774,529,246**			**100.00%**		**4.54%**

Pennsylvania-American Water
Water Services Debt Schedule
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Notes to Debt Schedule

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(2) New unsecured borrowing at a coupon rate of 4.30% for 30 years
(3) Issuances costs included make whole premium of $10M
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(5) Refinanced June 2019 at a lower rate for the remaining term of the bond
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(7) Eldersville, Jefferson, and Crosscreek, interest 1.387% for first 70 months and 2.774% (12/2007) for remainder
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(16) Hanover & Collier 1.274% first 2009 - 2014 and 2.547% starting Oct 2014
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(18) Rock Run WTP 2.414% first 2011 - 2016 and 3.117% starting Dec 2017
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(22) Pittsburgh Meter Improvement Project Phase II 1.559% first 60 months and 2.69% starting May 2016
(23) Southwest PA Pipeline Exts Phase II - Interest 1.591% first 5 years - 2.196% starting April 2018
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(25) Paint Twp #2 - Interest rate is 1% for the remaining life of the Bond
(26) Fairview Water Main Extension - Interest rate is 1.356% for the first 5 years, 1.985% April 2021 for remaining 5 years
(27) Washington County Main Extension Project - Interest rate is 1.439% until Oct 2021 - 2.027% for the remaining term

Pennsylvania-American Water
Water Services Debt Schedule
December 31, 2021

DATE OF ISSUE	DATE OF MATURITY	AMOUNT ISSUED	AMOUNT OUTSTANDING	COUPON RATE	ANNUAL INTEREST	NOTE #	ISSUANCE EXPENSE	NET PROCEEDS	NET PROCEEDS RATIO	SINKING REQUIR.	PERCENT TO TOTAL	EFFECTIVE COST RATE (1)	WEIGHTED COST RATE
Bonds and Notes													
11/01/03	11/01/33	38,000,000	38,000,000	6.780%	2,576,400		174,946	37,825,054	99.54%		2.14%	6.82%	0.15%
09/01/06	09/01/26	150,000,000	150,000,000	7.800%	11,700,000		2,069,648	147,930,352	98.62%		8.43%	7.94%	0.67%
01/15/06	01/15/21	20,000,000	0	9.690%	0		116,061	19,883,939	99.42%		0.00%	9.76%	0.00%
11/01/04	11/01/31	10,000,000	10,000,000	8.820%	882,000		88,352	9,911,648	99.12%		0.56%	8.91%	0.05%
08/01/04	08/01/25	10,000,000	10,000,000	8.150%	815,000		60,119	9,939,881	99.40%		0.56%	8.21%	0.05%
01/31/07	12/21/21	100,300,000	0	5.770%	0		332,690	99,967,310	99.67%		0.00%	5.80%	0.00%
12/21/12	12/01/42	23,015,000	23,015,000	4.300%	989,645	1	895,945	22,119,055	96.11%		1.29%	4.54%	0.06%
12/17/12	12/01/42	45,000,000	45,000,000	4.300%	1,935,000	2	582,689	44,417,311	98.71%		2.53%	4.38%	0.11%
11/21/11	10/15/37	35,000,000	35,000,000	5.050%	1,767,500		0	35,000,000	100.00%		1.97%	5.05%	0.10%
11/21/11	10/15/37	15,500,000	15,500,000	5.050%	782,750		740,260	14,759,740	95.22%		0.87%	5.39%	0.05%
11/20/13	03/01/24	67,000,000	67,000,000	3.850%	2,579,500		791,901	66,208,099	98.82%		3.77%	3.99%	0.15%
08/14/14	03/01/25	36,200,000	36,200,000	3.400%	1,230,800		1,189,364	35,010,636	96.71%		2.04%	3.78%	0.08%
08/14/14	12/01/42	65,700,000	65,700,000	4.300%	2,825,100		4,432,879	61,267,121	93.25%		3.69%	4.74%	0.18%
08/10/17	09/01/47	240,000,000	240,000,000	3.750%	9,000,000		3,231,905	236,768,095	98.65%		13.50%	3.83%	0.52%
09/13/17	09/01/27	101,426,171	101,426,171	2.950%	2,992,072	3	11,291,519	90,134,652	88.87%		5.70%	4.34%	0.25%
08/09/18	09/01/28	74,739,360	74,739,360	3.750%	2,802,726		623,814	74,115,546	99.17%		4.20%	3.85%	0.16%
08/09/18	09/01/48	227,489,000	227,489,000	4.200%	9,554,538		2,490,214	224,998,786	98.91%		12.79%	4.26%	0.54%
09/11/18	09/01/28	124,719,875	124,719,875	3.750%	4,676,995	4	8,287,774	116,432,101	93.35%		7.01%	4.59%	0.32%
05/23/19	06/01/29	110,000,000	110,000,000	3.450%	3,795,000		1,141,559	108,858,441	98.96%		6.19%	3.57%	0.22%
06/21/19	04/01/39	33,000,000	33,000,000	3.000%	990,000	5	823,638	32,176,362	97.50%		1.86%	3.17%	0.06%
12/12/19	12/03/29	80,000,000	80,000,000	2.450%	1,960,000	6	1,907,647	78,092,353	97.62%		4.50%	2.72%	0.12%
12/12/19	12/03/29	13,165,000	13,165,000	2.450%	322,543	6	483,935	12,681,065	96.32%		0.74%	2.88%	0.02%
05/15/20	06/01/50	120,000,000	120,000,000	3.530%	4,236,000		1,200,000	118,800,000	99.00%		6.75%	3.58%	0.24%
05/15/21	06/01/51	130,000,000	130,000,000	3.560%	4,628,000		1,300,000	128,700,000	99.00%		7.31%	3.61%	0.26%
Pennvest Loans													
01/01/03	12/01/22	3,945,656	233,844	2.774%	6,487	7	8,480	3,937,176	99.79%		0.01%	2.79%	0.00%
04/01/00	03/01/22	3,366,155	54,851	3.237%	1,776	8	56,803	3,309,352	98.31%		0.00%	3.35%	0.00%
04/01/00	03/01/22	3,623,800	59,031	3.237%	1,911	9	56,803	3,566,997	98.43%		0.00%	3.34%	0.00%
08/30/00	09/01/22	4,322,665	204,517	3.237%	6,620	10	25,445	4,297,220	99.41%		0.01%	3.27%	0.00%
08/01/04	07/01/24	1,559,205	200,723	2.774%	5,568	11	13,749	1,545,456	99.12%		0.01%	2.83%	0.00%
06/01/05	11/01/24	5,721,348	878,607	1.156%	10,157	12	29,484	5,691,864	99.48%		0.05%	1.19%	0.00%
01/01/06	12/01/25	5,670,111	1,002,913	2.763%	27,710	13	34,130	5,635,981	99.40%		0.06%	2.80%	0.00%
09/01/04	08/01/24	5,240,631	833,630	2.774%	23,125	14	7,951	5,232,680	99.85%		0.05%	2.78%	0.00%
11/01/04	10/01/24	3,099,441	514,315	2.432%	12,508	15	5,660	3,093,781	99.82%		0.03%	2.44%	0.00%
10/01/09	09/01/29	2,359,891	1,021,010	2.547%	26,005	16	0	2,359,891	100.00%		0.06%	2.55%	0.00%
06/01/11	02/01/31	12,150,000	6,189,828	2.690%	166,506	17	0	12,150,000	100.00%		0.35%	2.69%	0.01%
01/05/12	12/01/31	9,936,500	6,065,081	3.117%	189,049	18	0	9,936,500	100.00%		0.34%	3.12%	0.01%
01/05/12	12/01/31	1,606,709	910,369	3.098%	28,203	19	0	1,606,709	100.00%		0.05%	3.10%	0.00%
03/23/12	03/01/41	1,724,610	1,205,579	1.000%	12,056	20	0	1,724,610	100.00%		0.07%	1.00%	0.00%
03/20/12	04/01/31	1,675,790	1,010,492	2.810%	28,395	21	0	1,675,790	100.00%		0.06%	2.81%	0.00%
03/26/12	03/01/32	1,273,465	641,470	2.690%	17,256	22	0	1,273,465	100.00%		0.04%	2.69%	0.00%
03/22/13	04/01/33	1,378,357	805,992	2.196%	17,700	23	0	1,378,357	100.00%		0.05%	2.20%	0.00%
10/15/15	07/01/40	123,663	95,651	1.000%	957	24	0	123,663	100.00%		0.01%	1.00%	0.00%
10/15/15	07/01/40	969,823	750,143	1.000%	7,501	25	0	969,823	100.00%		0.04%	1.00%	0.00%
04/21/16	11/01/26	2,141,062	1,157,556	1.985%	22,977	26	0	2,141,062	100.00%		0.07%	1.98%	0.00%
06/14/17	11/01/36	5,549,947	4,525,887	1.439%	65,128	27	0	5,549,947	100.00%		0.25%	1.44%	0.00%
		$1,947,693,236	**$1,778,315,896**		**$73,719,164**		**$44,495,363**	**$1,903,197,873**			**100.00%**		**4.39%**

Pennsylvania-American Water
Water Services Debt Schedule
December 31, 2021
Notes to Debt Schedule

(1) Re-issuance 12/21/12 from Parent at a coupon rate of 4.30% for 30 years
(2) New unsecured borrowing at a coupon rate of 4.30% for 30 years
(3) Issuances costs included make whole premium of $10M
(4) Issuances costs included make whole premium of $7.2M
(5) Refinanced June 2019 at a lower rate for the remaining term of the bond
(6) Refinanced Dec 2019 at a lower rate for the remaining term of the bond
(7) Eldersville, Jefferson, and Crosscreek, interest 1.387% for first 70 months and 2.774% (12/2007) for remainder
(8) Strattanville Pennvest Loan. Interest 1.619% from 2002 to 2007 and 3.237% starting March 2007
(9) Franklin Township. Interest 1.619% from 2002 to 2007 and 3.237% starting April 2007
(10) Jackson Township. Interest 1.619% from 2001 to 2006 and 3.237% starting Oct 2007
(11) Farmington Twp., Interest rate 1.387% for first 70 months and 2.774% (07/2009) for remainder
(12) Sandy Ridge, Interest rate 1.000% for first 60 months and 1.156% (07/2010) for remainder
(13) Sligo/Shippenville, Interest rate 1.385% for first 86 months and 2.763% (06/2013) for remainder
(14) Ellwood/Butler Interconnect, Interest rate 1.387% for first 74 months and 2.774% (08/2009) for remainder
(15) Mahoning & Union Twp, Interest rate 1.305% for first 82 months and 2.432% (10/2009) for remainder
(16) Hanover & Collier 1.274% first 2009 - 2014 and 2.547% starting Oct 2014
(17) Mount Pleasant Water System Extension 1.559% first 2011 - 2016 and 2.69% starting March 2016
(18) Rock Run WTP 2.414% first 2011 - 2016 and 3.117% starting Dec 2017
(19) Silver Spring Clearwell 2.376% first 2012 - 2016 and 3.098% starting Jan 2017
(20) Wallaceton Municipal Authority 1.00% for 30 years starting March 2012
(21) Pittsburgh Meter Improvements 1.799% first 2012 - 2017 and 2.81% starting April 2017
(22) Pittsburgh Meter Improvement Project Phase II 1.559% first 60 months and 2.69% starting May 2016
(23) Southwest PA Pipeline Exts Phase II - Interest 1.591% first 5 years - 2.196% starting April 2018
(24) Paint Twp #1 - Interest rate is 1% for the remaining life of the Bond
(25) Paint Twp #2 - Interest rate is 1% for the remaining life of the Bond
(26) Fairview Water Main Extension - Interest rate is 1.356% for the first 5 years, 1.985% April 2021 for remaining 5 years
(27) Washington County Main Extension Project - Interest rate is 1.439% until Oct 2021 - 2.027% for the remaining term

Pennsylvania-American Water
Water Services Debt Schedule
December 31, 2022

DATE OF ISSUE	DATE OF MATURITY	AMOUNT ISSUED	AMOUNT OUTSTANDING	COUPON RATE	ANNUAL INTEREST	NOTE #	ISSUANCE EXPENSE	NET PROCEEDS	NET PROCEEDS RATIO	SINKING REQUIR.	PERCENT TO TOTAL	EFFECTIVE COST RATE (1)	WEIGHTED COST RATE
Bonds and Notes													
11/01/03	11/01/33	38,000,000	38,000,000	6.780%	2,576,400		174,946	37,825,054	99.54%		2.01%	6.82%	0.14%
09/01/06	09/01/26	150,000,000	150,000,000	7.800%	11,700,000		2,069,648	147,930,352	98.62%		7.94%	7.94%	0.63%
11/01/04	11/01/31	10,000,000	10,000,000	8.820%	882,000		88,352	9,911,648	99.12%		0.53%	8.91%	0.05%
08/01/04	08/01/25	10,000,000	10,000,000	8.150%	815,000		60,119	9,939,881	99.40%		0.53%	8.21%	0.04%
12/21/12	12/01/42	23,015,000	23,015,000	4.300%	989,645	1	895,945	22,119,055	96.11%		1.22%	4.54%	0.06%
12/17/12	12/01/42	45,000,000	45,000,000	4.300%	1,935,000	2	582,689	44,417,311	98.71%		2.38%	4.38%	0.10%
11/21/11	10/15/37	35,000,000	35,000,000	5.050%	1,767,500		0	35,000,000	100.00%		1.85%	5.05%	0.09%
11/21/11	10/15/37	15,500,000	15,500,000	5.050%	782,750		740,260	14,759,740	95.22%		0.82%	5.39%	0.04%
11/20/13	03/01/24	67,000,000	67,000,000	3.850%	2,579,500		791,901	66,208,099	98.82%		3.55%	3.99%	0.14%
08/14/14	03/01/25	36,200,000	36,200,000	3.400%	1,230,800		1,189,364	35,010,636	96.71%		1.92%	3.78%	0.07%
08/14/14	12/01/42	65,700,000	65,700,000	4.300%	2,825,100		4,432,879	61,267,121	93.25%		3.48%	4.74%	0.16%
08/10/17	09/01/47	240,000,000	240,000,000	3.750%	9,000,000		3,231,905	236,768,095	98.65%		12.70%	3.83%	0.49%
09/13/17	09/01/27	101,426,171	101,426,171	2.950%	2,992,072	3	11,291,519	90,134,652	88.87%		5.37%	4.34%	0.23%
08/09/18	09/01/28	74,739,360	74,739,360	3.750%	2,802,726		623,814	74,115,546	99.17%		3.96%	3.85%	0.15%
08/09/18	09/01/48	227,489,000	227,489,000	4.200%	9,554,538		2,490,214	224,998,786	98.91%		12.04%	4.26%	0.51%
09/11/18	09/01/28	124,719,875	124,719,875	3.750%	4,676,995	4	8,287,774	116,432,101	93.35%		6.60%	4.59%	0.30%
05/23/19	06/01/29	110,000,000	110,000,000	3.450%	3,795,000		1,141,559	108,858,441	98.96%		5.82%	3.57%	0.21%
06/21/19	04/01/39	33,000,000	33,000,000	3.000%	990,000	5	823,638	32,176,362	97.50%		1.75%	3.17%	0.06%
12/12/19	12/03/29	80,000,000	80,000,000	2.450%	1,960,000	6	1,907,647	78,092,353	97.62%		4.23%	2.72%	0.12%
12/12/19	12/03/29	13,165,000	13,165,000	2.450%	322,543	6	483,935	12,681,065	96.32%		0.70%	2.88%	0.02%
05/15/20	06/01/50	120,000,000	120,000,000	3.530%	4,236,000		1,200,000	118,800,000	99.00%		6.35%	3.58%	0.23%
05/15/21	06/01/51	130,000,000	130,000,000	3.560%	4,628,000		1,300,000	128,700,000	99.00%		6.88%	3.61%	0.25%
05/15/22	06/01/52	115,000,000	115,000,000	3.590%	4,128,500		1,150,000	113,850,000	99.00%		6.09%	3.64%	0.22%
Pennvest Loans													
01/01/03	12/01/22	3,945,656	0	2.774%	0	7	8,480	3,937,176	99.79%		0.00%	2.79%	0.00%
04/01/00	03/01/22	3,366,155	0	3.237%	0	8	56,803	3,309,352	98.31%		0.00%	3.35%	0.00%
04/01/00	03/01/22	3,623,800	0	3.237%	0	9	25,430	3,598,370	99.30%		0.00%	3.28%	0.00%
08/30/00	09/01/22	4,322,665	0	3.237%	0	10	25,445	4,297,220	99.41%		0.00%	3.27%	0.00%
08/01/04	07/01/24	1,559,205	124,723	2.774%	3,460	11	13,749	1,545,456	99.12%		0.01%	2.83%	0.00%
06/01/05	11/01/24	5,721,348	580,700	1.156%	6,713	12	29,484	5,691,864	99.48%		0.03%	1.19%	0.00%
01/01/06	12/01/25	5,670,111	762,467	2.763%	21,067	13	34,130	5,635,981	99.40%		0.04%	2.80%	0.00%
09/01/04	08/01/24	5,240,631	528,214	2.774%	14,653	14	7,951	5,232,680	99.85%		0.03%	2.78%	0.00%
11/01/04	10/01/24	3,099,441	336,821	2.432%	8,191	15	5,660	3,093,781	99.82%		0.02%	2.44%	0.00%
10/01/09	09/01/29	2,359,891	900,300	2.547%	22,931	16	0	2,359,891	100.00%		0.05%	2.55%	0.00%
06/01/11	02/01/31	12,150,000	5,586,251	2.690%	150,270	17	0	12,150,000	100.00%		0.30%	2.69%	0.01%
01/05/12	12/01/31	9,936,500	5,595,180	3.117%	174,402	18	0	9,936,500	100.00%		0.30%	3.12%	0.01%
01/05/12	12/01/31	1,606,709	831,477	3.098%	25,759	19	0	1,606,709	100.00%		0.04%	3.10%	0.00%
03/23/12	03/01/41	1,724,610	1,148,499	1.000%	11,485	20	0	1,724,610	100.00%		0.06%	1.00%	0.00%
03/20/12	04/01/31	1,675,790	914,446	2.810%	25,696	21	0	1,675,790	100.00%		0.05%	2.81%	0.00%
03/26/12	03/01/32	1,273,465	580,793	2.690%	15,623	22	0	1,273,465	100.00%		0.03%	2.69%	0.00%
03/22/13	04/01/33	1,378,357	742,128	2.196%	16,297	23	0	1,378,357	100.00%		0.04%	2.20%	0.00%
10/15/15	07/01/40	123,663	90,944	1.000%	909	24	0	123,663	100.00%		0.00%	1.00%	0.00%
10/15/15	07/01/40	969,823	713,225	1.000%	7,132	25	0	969,823	100.00%		0.04%	1.00%	0.00%
04/21/16	11/01/26	2,141,062	931,997	1.985%	18,500	26	0	2,141,062	100.00%		0.05%	1.98%	0.00%
06/14/17	11/01/36	5,549,947	4,263,353	1.439%	61,350	27	0	5,549,947	100.00%		0.23%	1.44%	0.00%
		$1,942,393,236	**$1,889,585,925**		**$77,754,507**		**$45,165,239**	**$1,897,227,997**			**100.00%**		**4.35%**

Pennsylvania-American Water
Water Services Debt Schedule
December 31, 2022

Notes to Debt Schedule

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(27) Washington County Main Extension Project - Interest rate is 1.439% until Oct 2021 - 2.027% for the remaining term

Pennsylvania-American Water Company
Calculation of the Embedded Cost of Preferred Stock
Actual at December 31, 2019
Estimated at December 31, 2020, December 31, 2021 and December 31, 2022

	Series		Principal Amount Outstanding	Percent to Total	Effective Cost Rate	Weighted Cost Rate
December 31, 2019						
	9.75%		$178,000	4.39%	9.96%	0.44%
	9.35%		273,500	6.75%	9.53%	0.64%
	8.49%		3,600,000	88.86%	8.56%	7.61%
		Total	$4,051,500	100.00%		8.69%
December 31, 2020						
	9.75%		$178,000	6.24%	9.96%	0.62%
	9.35%		273,500	9.59%	9.53%	0.91%
	8.49%		2,400,000	84.17%	8.56%	7.20%
		Total	$2,851,500	100.00%		8.73%
December 31, 2021						
	9.75%		$178,000	10.78%	9.96%	1.07%
	9.35%		273,500	16.56%	9.53%	1.58%
	8.49%		1,200,000	72.66%	8.56%	6.22%
		Total	$1,651,500	100.00%		8.87%
December 31, 2022						
	9.75%		$178,000	39.42%	9.96%	3.93%
	9.35%		273,500	60.58%	9.53%	5.77%
	8.49%		0	0.00%	8.56%	0.00%
		Total	$451,500	100.00%		9.70%

Pennsylvania-American Water Company
Common Stock Stock as of December 31, 2019

Designation of Kind and Class (a)	Par Value Per Share (b)	Number of Shares Authorized (c)	Amount Authorized (d)	Number of Shares Issued & Outstanding (e)	Amount Outstanding (f)
Common Stock	5.50	10,000,000	$55,000,000	3,910,343	$21,506,887

American Water Company
Capitalization and Financial Statistics
2014-2019

	2019	2018	2017	2016	2015	2014
Amount of Capital Employed						
Permanent Capital	15,579,000,000	14,475,000,000	13,110,000,000	12,400,000,000	11,605,000,000	10,868,000,000
Long-Term Debt	8,667,000,000	7,640,000,000	6,812,000,000	6,323,000,000	5,916,000,000	5,488,000,000
Short-Term Debt	786,000,000	964,000,000	905,000,000	849,000,000	628,000,000	450,000,000
Preferred Stock	5,000,000	7,000,000	8,000,000	10,000,000	12,000,000	15,000,000
Common Equity	6,121,000,000	5,864,000,000	5,385,000,000	5,218,000,000	5,049,000,000	4,915,000,000
Total Capital	15,579,000,000	14,475,000,000	13,110,000,000	12,400,000,000	11,605,000,000	10,868,000,000
Capital Structure Ratios						
Based on Permanent Capital						
Long-Term Debt	55.63%	52.78%	51.96%	50.99%	50.98%	50.50%
Short-Term Debt	5.05%	6.66%	6.90%	6.85%	5.41%	4.14%
Preferred Stock	0.03%	0.05%	0.06%	0.08%	0.10%	0.14%
Common Equity	39.29%	40.51%	41.08%	42.08%	43.51%	45.22%
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Capital Structure Ratios						
Based on Total Capital						
Long-Term Debt	55.6%	52.8%	52.0%	51.0%	51.0%	50.5%
Short-term Debt	5.0%	6.7%	6.9%	6.8%	5.4%	4.1%
Preferred Stock	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%
Common Equity	39.3%	40.5%	41.1%	42.1%	43.5%	45.2%
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Rate of Return on Book Equity	10.15%	9.67%	7.91%	8.97%	9.43%	8.61%
Operating Ratio [1]						
Coverage incl. AFUDC						
Times interest earned- pre-tax	3.18	3.25	3.67	3.37	3.54	3.37
Times Interest earned- post-tax	2.63	2.62	2.25	2.44	2.55	2.41
Overall Coverage: All interest & Preferred Dividend [2]	2.63	2.62	2.25	2.44	2.55	2.41
Coverage excl. AFUDC [3]						
Times interest earned- pre-tax						
Times Interest earned- post-tax						
Overall Coverage: All interest & Preferred Dividend						
Quality of Earnings & Cash Flow						
AFUDC/Income Available for Common Equity [4]						
Effective Income Tax Rate	25.5%	28.1%	53.3%	39.2%	39.1%	39.8%
Gross Cash Flow/ Total Debt	18.49%	19.51%	22.30%	21.58%	23.24%	23.48%
Gross Cash Flow Interest Coverage [5]	4.58	4.80	5.03	4.76	4.94	4.66
Dividend payout ratio	0.57	0.56	0.68	0.56	0.50	0.51
CWIP/Net Plant	0.04	0.03	0.04	0.03	0.03	0.02

Notes:
[1] Operating Ratio not included because AWK does not report amortization separately.
[2] AWK has not paid a preferred dividend
[3] AWK does not report AFUDC separately, as a result the TIE coverage ratios were only calculated including AFUDC.
[4] Ratio not developed because AWK does not separately report AFUDC.
[5] Relies on Net Interest.

Pennsylvania-American Water Company
Capitalization and Financial Statistics
2014-2018

	2018	2017	2016	2015	2014
Amount of Capital Employed					
Permanent Capital	3,497,560,000	3,300,732,000	2,988,602,000	2,635,607,000	2,514,173,000
Long-Term Debt	1,563,533,000	1,369,184,000	1,151,518,000	1,160,785,000	1,149,264,000
Short-Term Debt	77,958,000	321,689,000	395,936,000	74,383,000	73,766,000
Preferred Stock	3,874,000	5,252,000	6,452,000	7,652,000	8,852,000
Common Equity	1,852,195,000	1,604,607,000	1,434,696,000	1,392,787,000	1,282,291,000
Total Capital	3,497,560,000	3,300,732,000	2,988,602,000	2,635,607,000	2,514,173,000
Capital Structure Ratios					
Based on Permanent Capital					
Long-Term Debt	44.70%	41.48%	38.53%	44.04%	45.71%
Short-Term Debt	2.23%	9.75%	13.25%	2.82%	2.93%
Preferred Stock	0.11%	0.16%	0.22%	0.29%	0.35%
Common Equity	52.96%	48.61%	48.01%	52.85%	51.00%
	100.00%	100.00%	100.00%	100.00%	100.00%
Capital Structure Ratios					
Based on Total Capital					
Long-Term Debt	44.7%	41.5%	38.5%	44.0%	45.7%
Short-term Debt	2.2%	9.7%	13.2%	2.8%	2.9%
Preferred Stock	0.1%	0.2%	0.2%	0.3%	0.4%
Common Equity	53.0%	48.6%	48.0%	52.8%	51.0%
	100.00%	100.00%	100.00%	100.00%	100.00%
Rate of Return on Book Equity	10.21%	10.02%	10.67%	10.29%	10.93%
Operating Ratio	49.6%	46.6%	47.8%	48.4%	48.4%
Coverage incl. AFUDC					
Times interest earned- pre-tax	4.38	4.87	4.98	4.72	4.57
Times Interest earned- post-tax	3.43	3.26	3.32	3.19	3.11
Overall Coverage: All interest & Preferred Dividend [1	3.43	3.26	3.32	3.19	3.11
Coverage excl. AFUDC					
Times interest earned- pre-tax	4.30	4.86	4.97	4.70	4.56
Times Interest earned- post-tax	3.34	3.26	3.32	3.16	3.09
Overall Coverage: All interest & Preferred Dividend [1	3.34	3.26	3.32	3.16	3.09
Quality of Earnings & Cash Flow					
AFUDC/Income Available for Common Equity	3.3%	0.7%	0.4%	0.9%	0.7%
Effective Income Tax Rate	28.8%	41.4%	41.3%	40.7%	40.7%
Gross Cash Flow/ Total Debt	26.25%	24.55%	25.60%	32.44%	28.58%
Gross Cash Flow Interest Coverage	5.39	5.69	5.86	6.01	5.17
Dividend payout ratio	0.73	0.72	0.73	0.75	0.73
CWIP/Net Plant	0.01	0.03	0.03	0.02	0.01

Notes:
[1] PAWC did not pay preferred dividends over the analytical period.