AP EXHIBIT 4-A

AQUA PENNSYLVANIA, INC.

Docket No. R-2024-3047822

EXHIBIT TO ACCOMPANY

THE DIRECT TESTIMONY OF
PAUL R. MOUL
WITH REGARD TO
COST OF CAPITAL

BEFORE THE

PENNSYLVANIA PUBLIC UTILITY COMMISSION

May 23, 2024

AQUA PENNSYLVANIA, INC.
Index of Schedules

Aqua Pennsylvania, Inc.
Summary Cost of Capital
Estimated at December 31, 2025

Type of Capital	Ratios	Cost Rate	Weighted Cost Rate
Long-Term Debt	46.05%	4.32%	1.99%
Common Equity	53.95%	10.95%	5.91%
Total	100.00%		7.90%

Indicated levels of fixed charge coverage assuming that the Company could actually achieve its overall cost of capital:

Pre-tax coverage of interest expense based upon a 28.8921% composite federal and state income tax rate (10.30% ÷ 1.99%)	5.18 x
Post-tax coverage of interest expense (7.90% ÷ 1.99%)	3.97 x

Aqua Pennsylvania, Inc.
Cost of Equity
With Market Data through
March 31, 2024

Discounted Cash Flow (DCF)	***D_1/P_0*** [1]	**+**	***g*** [2]	**+**	***lev.*** [3]	**=**	***k***
Water Group	2.63%	+	6.75%	+	1.20%	=	10.58%

Risk Premium (RP)			***I*** [4]	**+**	***RP*** [5]	**=**	***k***
Water Group			5.00%	+	6.50%	=	11.50%

Capital Asset Pricing Model (CAPM	***Rf*** [6]	**+**	***ß*** [7]	***x (Rm-Rf*** [8]	**)**	**+**	***size*** [9]	**=**	***k***
Water Group	3.75%	+	1.10	x (8.21%	)	+	1.02%	=	13.80%

Comparable Earnings (CE) [10]	***Historical***	***Forecast***	***Average***
Comparable Earnings Group	12.7%	13.1%	12.90%

References
[1] Schedule 7, page 1
[2] Schedule 9, page 1
[3] Schedule 10, page 1
[4] risk-free rate of return (Schedule 13, page 2) and a yield
[5] Schedule 12, page 1
[6] Schedule 13, page 2
[7] Schedule 9, page 1
[8] Schedule 13, page 2
[9] Schedule 13, page 3
[10] Schedule 14, page 2

Aqua Pennsylvania, Inc.
Capitalization and Financial Statistics
2022-2018, Inclusive

	2022	2021	2020	2019	2018	
			(Millions of Dollars)			
Amount of Capital Employed						
Permanent Capital	$ 4,384.6	$ 3,960.6	$ 3,725.2	$ 3,466.0	$ 3,169.8	
Short-Term Debt	$ 20.0	$ 35.0	$ 49.2	$ 25.7	$ 15.4	
Total Capital	$ 4,404.6	$ 3,995.6	$ 3,774.4	$ 3,491.7	$ 3,185.3	
Capital Structure Ratios						
Based on Permanent Capital:						Average
Long-Term Debt	43.8%	45.5%	48.7%	48.8%	46.5%	46.7%
Common Equity [1]	56.2%	54.5%	51.3%	51.2%	53.5%	53.3%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Based on Total Capital:						
Total Debt incl. Short Term	44.1%	46.0%	49.3%	49.2%	46.8%	47.1%
Common Equity [1]	55.9%	54.0%	50.7%	50.8%	53.2%	52.9%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Rate of Return on Book Common Equity [1]	9.9%	9.8%	10.2%	11.2%	11.3%	10.5%
Operating Ratio [2]	48.7%	51.1%	48.7%	50.4%	51.4%	50.1%
Coverage incl. AFUDC [3]						
Pre-tax: All Interest Charges	4.44 x	3.76 x	3.49 x	3.51 x	3.68 x	3.78 x
Post-tax: All Interest Charges	4.09 x	3.73 x	3.49 x	3.80 x	4.00 x	3.82 x
Coverage excl. AFUDC [3]						
Pre-tax: All Interest Charges	4.28 x	3.63 x	3.41 x	3.37 x	3.52 x	3.64 x
Post-tax: All Interest Charges	3.92 x	3.60 x	3.41 x	3.65 x	3.84 x	3.68 x
Quality of Earnings & Cash Flow						
AFC/Income Avail. for Common Equity	5.3%	36.7%	3.3%	5.3%	5.3%	11.2%
Effective Income Tax Rate	10.3%	1.1%	0.1%	-11.4%	-11.8%	-2.3%
Internal Cash Generation/Construction [4]	110.5%	89.8%	69.8%	52.1%	54.3%	75.3%
Gross Cash Flow/ Avg. Total Debt [5]	18.1%	16.4%	15.2%	16.9%	17.7%	16.9%
Gross Cash Flow Interest Coverage [6]	5.54 x	5.10 x	5.04 x	5.28 x	5.48 x	5.29 x
Common Dividend Coverage [7]	#DIV/0! x	#DIV/0! x	5.43 x	2.72 x	3.12 x	#DIV/0! x

See Page 2 for Notes.

Aqua Pennsylvania, Inc.
Capitalization and Financial Statistics
2018-2022, Inclusive

Notes:

(1) Excluding Accumulated Other Comprehensive Income ("OCI") from the equity account.

(2) Total operating expenses, maintenance, depreciation and taxes other than income as a percentage of operating revenues.

(3) Coverage calculations represent the number of times available earnings, both including and excluding AFUDC (allowance for funds used during construction) as reported in its entirety, cover fixed charges.

(4) Internal cash generation/gross construction is the percentage of gross construction expenditures provided by internally-generated funds from operations after payment of all cash dividends divided by gross construction expenditures.

(5) Gross Cash Flow (sum of net income, depreciation, amortization, net deferred income taxes and investment tax credits, less AFUDC) as a percentage of average total debt.

(6) Gross Cash Flow (sum of net income, depreciation, amortization, net deferred income taxes and investment tax credits, less total AFUDC) plus interest charges, divided by interest charges.

(7) Common dividend coverage is the relationship of internally generated funds from operations after payment of preferred stock dividends to common dividends paid.

Source of Information: Certified Annual Reports by PricewaterhouseCoopers LLP

Water Group
Capitalization and Financial Statistics [1]
2018-2022, Inclusive

	2022	2021	2020	2019	2018	Average
			(Millions of Dollars)			
Amount of Capital Employed						
Permanent Capital	$ 4,807.3	$ 4,528.6	$ 4,107.0	$ 3,466.3	$ 2,855.0	
Short-Term Debt	$ 245.5	$ 102.2	$ 241.8	$ 142.1	$ 151.3	
Total Capital	$ 5,052.8	$ 4,630.8	$ 4,348.8	$ 3,608.4	$ 3,006.3	
Market-Based Financial Ratios						
Price-Earnings Multiple	33 x	32 x	30 x	39 x	30 x	33 x
Market/Book Ratio	321.7%	344.7%	311.6%	325.1%	299.2%	320.5%
Dividend Yield	1.8%	1.8%	2.0%	1.9%	2.1%	1.9%
Dividend Payout Ratio	60.8%	54.1%	56.9%	71.4%	60.6%	60.8%
Capital Structure Ratios						
Based on Permanent Capital:						
Long-Term Debt	48.5%	50.6%	50.5%	48.8%	45.7%	48.8%
Preferred Stock	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%
Common Equity [2]	51.5%	49.4%	49.4%	51.2%	54.3%	51.1%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Based on Total Capital:						
Total Debt incl. Short Term	51.6%	51.8%	53.1%	50.4%	48.1%	51.0%
Preferred Stock	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%
Common Equity [2]	48.4%	48.1%	46.9%	49.6%	51.8%	49.0%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Rate of Return on Book Common Equity [2]	9.7%	11.0%	10.5%	9.5%	10.0%	10.1%
Operating Ratio [3]	72.3%	72.1%	71.0%	71.3%	69.0%	71.1%
Coverage incl. AFUDC [4]						
Pre-tax: All Interest Charges	3.89 x	4.21 x	3.99 x	3.67 x	3.77 x	3.91 x
Post-tax: All Interest Charges	3.57 x	3.86 x	3.65 x	3.31 x	3.35 x	3.55 x
Overall Coverage: All Int. & Pfd. Div.	3.56 x	3.85 x	3.64 x	3.30 x	3.33 x	3.54 x
Coverage excl. AFUDC [4]						
Pre-tax: All Interest Charges	3.75 x	4.07 x	3.83 x	3.50 x	3.67 x	3.76 x
Post-tax: All Interest Charges	3.43 x	3.72 x	3.49 x	3.15 x	3.24 x	3.41 x
Overall Coverage: All Int. & Pfd. Div.	3.42 x	3.71 x	3.48 x	3.14 x	3.23 x	3.40 x
Quality of Earnings & Cash Flow						
AFC/Income Avail. for Common Equity	5.6%	5.3%	6.1%	8.7%	5.1%	6.2%
Effective Income Tax Rate	10.9%	9.4%	10.9%	14.9%	15.9%	12.4%
Internal Cash Generation/Construction [5]	48.1%	51.8%	50.3%	45.9%	50.8%	49.4%
Gross Cash Flow/ Avg. Total Debt [6]	16.7%	16.7%	17.1%	17.4%	20.3%	17.6%
Gross Cash Flow Interest Coverage [7]	5.46 x	5.58 x	5.25 x	4.78 x	5.18 x	5.25 x
Common Dividend Coverage [8]	3.21 x	3.24 x	3.28 x	2.91 x	3.30 x	3.19 x

See Page 2 for Notes.

Water Group
Capitalization and Financial Statistics
2018-2022, Inclusive

Notes:

(1) All capitalization and financial statistics for the group are the arithmetic average of the achieved results for each individual company in the group.
(2) Excluding Accumulated Other Comprehensive Income ("OCI") from the equity account.
(3) Total operating expenses, maintenance, depreciation and taxes other than income taxes as a percent of operating revenues.
(4) Coverage calculations represent the number of times available earnings, both including and excluding AFUDC (allowance for funds used during construction) as reported in its entirety, cover fixed charges.
(5) Internal cash generation/gross construction is the percentage of gross construction expenditures provided by internally-generated funds from operations after payment of all cash dividends divided by gross construction expenditures.
(6) Gross Cash Flow (sum of net income, depreciation, amortization, net deferred income taxes and investment tax credits, less total AFUDC) plus interest charges, divided by interest charges.
(7) Gross Cash Flow plus interest charges divided by interest charges.
(8) Common dividend coverage is the relationship of internally-generated funds from operations after payment of preferred stock dividends to common dividends paid.

Basis of Selection:

The Water Group companies have the following common characteristics: (i) they are listed in the "Water Utility Industry" section (basic and expanded editions) of The Value Line Investment Survey, and (ii) their stock is publicly traded.

		Corporate Credit Ratings		Stock	Value Line
Ticker	Company	Moody's	S&P	Traded	Beta
AWR	American States Water	A2	A+	NYSE	0.70
AWK	American Water Works Co.	A3	A	NYSE	0.95
ARTNA	Artesian Resources Corp.	-	-	NASDAQ	0.75
CWT	California Water Serv. Grp.	-	A+	NYSE	0.75
WTRG	Essential Utilities, Inc.	Baa2	A	NASDAQ	1.00
MSEX	Middlesex Water Company	-	A	NASDAQ	0.75
SJW	SJW Corporation	-	A-	NYSE	0.85
YORW	York Water Company	-	A-	NASDAQ	0.80
	Average	A3	A		0.82

Note: Ratings are those of utility subsidiaries

Source of Information: Utility COMPUSTAT
Moody's Investors Service
Standard & Poor's Corporation

Standard & Poor's Public Utilities
Capitalization and Financial Statistics [1]
2018-2022, Inclusive

	2022	2021	2020	2019	2018	Average
			(Millions of Dollars)			
Amount of Capital Employed						
Permanent Capital	$ 42,136.6	$ 40,154.3	$ 38,732.9	$ 36,461.6	$ 32,871.6	
Short-Term Debt	$ 1,713.7	$ 1,397.4	$ 1,154.1	$ 1,221.9	$ 1,420.3	
Total Capital	$ 43,850.3	$ 41,551.7	$ 39,887.0	$ 37,683.5	$ 34,291.9	
Market-Based Financial Ratios						
Price-Earnings Multiple	23 x	22 x	23 x	20 x	21 x	22 x
Market/Book Ratio	219.2%	220.7%	218.2%	220.9%	204.4%	216.7%
Dividend Yield	3.3%	3.5%	3.6%	3.2%	3.5%	3.4%
Dividend Payout Ratio	72.5%	72.9%	78.0%	62.7%	68.7%	71.0%
Capital Structure Ratios						
Based on Permanent Captial:						
Long-Term Debt	58.3%	57.4%	58.1%	56.7%	55.0%	57.1%
Preferred Stock	2.2%	2.3%	2.6%	2.4%	2.5%	2.4%
Common Equity [2]	39.6%	40.4%	39.4%	41.0%	42.5%	40.5%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Based on Total Capital:						
Total Debt incl. Short Term	60.0%	58.9%	59.4%	58.1%	57.0%	58.7%
Preferred Stock	2.1%	2.2%	2.5%	2.3%	2.4%	2.3%
Common Equity [2]	37.9%	38.9%	38.1%	39.6%	40.7%	39.1%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Rate of Return on Book Common Equity [2]	9.9%	9.4%	10.2%	10.3%	10.3%	10.0%
Operating Ratio [3]	83.1%	83.1%	79.8%	79.3%	79.8%	81.0%
Coverage incl. AFUDC [4]						
Pre-tax: All Interest Charges	3.28 x	3.16 x	2.80 x	3.05 x	2.94 x	3.05 x
Post-tax: All Interest Charges	2.94 x	2.87 x	2.60 x	3.10 x	2.59 x	2.82 x
Overall Coverage: All Int. & Pfd. Div.	2.89 x	2.81 x	2.55 x	3.04 x	2.55 x	2.77 x
Coverage excl. AFUDC [4]						
Pre-tax: All Interest Charges	3.17 x	3.06 x	2.70 x	2.95 x	2.84 x	2.94 x
Post-tax: All Interest Charges	2.84 x	2.78 x	2.50 x	3.00 x	2.48 x	2.72 x
Overall Coverage: All Int. & Pfd. Div.	2.79 x	2.72 x	2.46 x	2.94 x	2.44 x	2.67 x
Quality of Earnings & Cash Flow						
AFC/Income Avail. for Common Equity	7.1%	7.4%	6.8%	6.0%	7.3%	6.9%
Effective Income Tax Rate	12.9%	10.6%	9.9%	12.2%	42.0%	17.5%
Internal Cash Generation/Construction [5]	60.2%	60.5%	58.6%	65.9%	66.2%	62.3%
Gross Cash Flow/ Avg. Total Debt [6]	15.1%	15.0%	15.9%	17.5%	17.4%	16.2%
Gross Cash Flow Interest Coverage [7]	5.70 x	5.17 x	4.90 x	4.97 x	4.98 x	5.14 x
Common Dividend Coverage [8]	3.49 x	3.47 x	3.52 x	5.56 x	4.80 x	4.17 x

See Page 2 for Notes.

Standard & Poor's Public Utilities
Capitalization and Financial Statistics
2018-2022, Inclusive

Notes:

(1) All capitalization and financial statistics for the group are the arithmetic average of the achieved results for each individual company in the group.
(2) Excluding Accumulated Other Comprehensive Income ("OCI") from the equity account
(3) Total operating expenses, maintenance, depreciation and taxes other than income taxes as a percent of operating revenues.
(4) Coverage calculations represent the number of times available earnings, both including and excluding AFUDC (allowance for funds used during construction) as reported in its entirety, cover fixed charges.
(5) Internal cash generation/gross construction is the percentage of gross construction expenditures provided by internally-generated funds from operations after payment of all cash dividends divided by gross construction expenditures.
(6) Gross Cash Flow (sum of net income, depreciation, amortization, net deferred income taxes and investment tax credits, less total AFUDC) as a percentage of average total debt.
(7) Gross Cash Flow (sum of net income, depreciation, amortization, net deferred income taxes and investment tax credits, less total AFUDC) plus interest charges, divided by interest charges.
(8) Common dividend coverage is the relationship of internally-generated funds from operations after payment of preferred stock dividends to common dividends paid.

Source of Information: Annual Reports to Shareholders
Utility COMPUSTAT

Standard & Poor's Public Utilities

Company Identities

	Ticker	Credit Rating [1] Moody's	Credit Rating [1] S&P	Common Stock Traded	Value Line Beta
Alliant Energy Corporation	LNT	Baa1	A-	NYSE	0.85
Ameren Corporation	AEE	Baa1	BBB+	NYSE	0.85
American Electric Power	AEP	Baa1	A-	NYSE	0.75
American Water Works	AWK	Baa1	A	NYSE	0.90
CenterPoint Energy	CNP	Baa1	BBB+	NYSE	1.10
CMS Energy	CMS	Baa1	A-	NYSE	0.80
Consolidated Edison	ED	Baa1	A-	NYSE	0.75
Dominion Energy	D	A2	BBB+	NYSE	0.85
DTE Energy Co.	DTE	A2	A-	NYSE	0.95
Duke Energy	DUK	A2	BBB+	NYSE	0.85
Edison Int'l	EIX	Baa1	BBB	NYSE	0.95
Entergy Corp.	ETR	Baa1	BBB+	NYSE	0.95
Evergy, Inc.	EVRG	Baa1	A-	NYSE	0.90
Eversource	ES	A3	A	NYSE	0.90
Exelon Corp.	EXC	A2	BBB+	NDQ	NMF
FirstEnergy Corp.	FE	A3	BBB	NYSE	0.85
NextEra Energy Inc.	NEE	A1	A	NYSE	0.95
NiSource Inc.	NI	Baa2	BBB+	NYSE	0.85
NRG Energy Inc.	NRG	Ba1	BB	NYSE	1.10
Pinnacle West Capital	PNW	A3	BBB+	NYSE	0.90
PPL Corp.	PPL	A3	A	NYSE	1.05
Public Serv. Enterprise Inc.	PEG	A3	A-	NYSE	0.90
Sempra Energy	SRE	A3	BBB+	NYSE	0.95
Southern Co.	SO	Baa1	BBB+	NYSE	0.90
WEC Energy Corp.	WEC	A2	A-	NYSE	0.80
Xcel Energy Inc	XEL	A2	A-	NYSE	0.80
Average for S&P Utilities		A3	BBB+		0.90

Note: [1] Ratings are those of utility subsidiaries

Source of Information: Moody's Investors Service, Inc.
S&P Global Inc.
The Value Line Investment Survey

Aqua Pennsylvania, Inc.
Capitalization and Related Capital Structure Ratios
Actual at December 31, 2023 and Estimated at December 31, 2024 and December 31, 2025

	Actual at December 31, 2023			Estimated at December 31, 2024			Estimated at December 31, 2025		
	Amount Outstanding	Ratios		Amount Outstanding	Ratios		Amount Outstanding	Ratios	
		Excl. S-T Debt	Incl. S-T Debt		Excl. S-T Debt	Incl. S-T Debt		Excl. S-T Debt	Incl. S-T Debt
Long-Term Debt[1]	$2,218,808,602	48.52%	48.27%	$2,204,911,964 [2]	45.31%	44.85%	$2,312,128,264 [2]	46.05%	45.60%
Common Equity									
Common stock, net of Treasury stock	109,000			109,000			109,000		
Capital in excess of par value	(58,754,203)			18,245,797 [3]			18,245,797		
Retained earnings	2,413,249,516			2,643,446,270 [4]			2,690,014,594 [4]		
Total Common Equity	2,354,604,313	51.48%	51.23%	2,661,801,067	54.69%	54.14%	2,708,369,391	53.95%	53.41%
Total Permanent Capital	4,573,412,915	100.00%	99.50%	4,866,713,032	100.00%	98.98%	5,020,497,654	100.00%	99.01%
Revolving Credit Facility	23,123,092		0.50%	50,000,000 [5]		1.02%	50,000,000 [5]		0.99%
Total Capital Employed	$4,596,536,008		100.00%	$4,916,713,032		100.00%	$5,070,497,654		100.00%

Notes: [1] Includes current portion of long-term debt.

[2] Reflects the issuance and retirement of long-term debt as follows:

Redemptions & maturities	$ (13,896,638)	$ (17,783,701)
New issuance of FMBs	-	125,000,000
Total	$ (13,896,638)	$ 107,216,299

[3] Reflects capital contribution $ 77,000,000

[4] Reflects build-up of Retained Earnings of:

Net Income	$ 230,196,754	$ 252,568,323
Dividends	-	(206,000,000)
Total	$ 230,196,754	$ 46,568,323

[5] Projection of short-term debt.

Source of Information: Company provided data

Aqua Pennsylvania, Inc.
Calculation of the Embedded Cost of Long-Term Debt
Actual at December 31, 2023

Series	Date of Maturity	Principal Amount Outstanding	Percent to Total	Effective [1] Cost Rate	Weighted Cost Rate
First Mortgage Bonds	09/15/26	11,800,000	0.53%	9.30%	0.05%
First Mortgage Bonds	05/15/25	15,000,000	0.68%	7.73%	0.05%
First Mortgage Bonds	05/10/27	15,000,000	0.68%	6.06%	0.04%
First Mortgage Bonds	05/10/27	5,000,000	0.23%	6.06%	0.01%
First Mortgage Bonds	05/15/28	3,000,000	0.14%	5.98%	0.01%
First Mortgage Bonds	12/01/41	40,000,000	1.80%	3.89%	0.07%
First Mortgage Bonds	12/01/42	20,000,000	0.90%	3.89%	0.04%
First Mortgage Bonds	12/01/47	20,000,000	0.90%	3.94%	0.04%
First Mortgage Bonds	11/01/31	25,000,000	1.13%	4.00%	0.05%
First Mortgage Bonds	11/01/45	25,000,000	1.13%	4.67%	0.05%
First Mortgage Bonds	11/01/46	25,000,000	1.13%	4.68%	0.05%
First Mortgage Bonds	01/15/35	25,000,000	1.13%	3.73%	0.04%
First Mortgage Bonds	01/15/40	15,000,000	0.68%	4.10%	0.03%
First Mortgage Bonds	01/15/45	13,000,000	0.59%	4.14%	0.02%
First Mortgage Bonds	12/29/54	12,000,000	0.54%	4.19%	0.02%
First Mortgage Bonds	01/15/36	65,000,000	2.93%	3.85%	0.11%
First Mortgage Bonds	01/15/37	20,000,000	0.90%	3.90%	0.04%
First Mortgage Bonds	01/15/38	25,000,000	1.13%	3.93%	0.04%
First Mortgage Bonds	01/15/46	60,000,000	2.70%	4.23%	0.11%
First Mortgage Bonds	01/15/47	20,000,000	0.90%	4.25%	0.04%
First Mortgage Bonds	01/15/48	20,000,000	0.90%	4.27%	0.04%
First Mortgage Bonds	01/15/51	25,000,000	1.13%	3.89%	0.04%
First Mortgage Bonds	01/15/56	60,000,000	2.70%	3.99%	0.11%
First Mortgage Bonds	02/01/42	10,000,000	0.45%	3.69%	0.02%
First Mortgage Bonds	02/01/44	40,000,000	1.80%	3.73%	0.07%
First Mortgage Bonds	07/15/55	40,000,000	1.80%	4.05%	0.07%
First Mortgage Bonds	07/15/57	40,000,000	1.80%	4.07%	0.07%
First Mortgage Bonds	10/15/54	35,000,000	1.58%	4.07%	0.06%
First Mortgage Bonds	10/15/55	20,000,000	0.90%	4.08%	0.04%
First Mortgage Bonds	10/15/57	20,000,000	0.90%	4.10%	0.04%
First Mortgage Bonds	07/15/42	25,000,000	1.13%	4.02%	0.05%
First Mortgage Bonds	07/15/45	10,000,000	0.45%	4.07%	0.02%
First Mortgage Bonds	07/15/48	65,000,000	2.93%	4.12%	0.12%
First Mortgage Bonds	11/15/47	65,000,000	2.93%	4.47%	0.13%
First Mortgage Bonds	11/15/52	30,000,000	1.35%	4.52%	0.06%
First Mortgage Bonds	11/15/53	30,000,000	1.35%	4.54%	0.06%
First Mortgage Bonds	05/31/49	75,000,000	3.38%	4.03%	0.14%
First Mortgage Bonds	05/31/54	25,000,000	1.13%	4.08%	0.05%
First Mortgage Bonds	05/31/59	25,000,000	1.13%	4.13%	0.05%
First Mortgage Bonds	09/26/54	50,000,000	2.25%	4.10%	0.09%
First Mortgage Bonds	09/26/58	75,000,000	3.38%	4.14%	0.14%
First Mortgage Bonds	09/26/59	50,000,000	2.25%	4.15%	0.09%
First Mortgage Bonds	01/01/52	75,000,000	3.38%	3.47%	0.12%
First Mortgage Bonds	01/01/53	50,000,000	2.25%	3.49%	0.08%
First Mortgage Bonds	06/01/51	75,000,000	3.38%	3.50%	0.12%
First Mortgage Bonds	06/01/55	50,000,000	2.25%	3.55%	0.08%
First Mortgage Bonds	06/01/56	50,000,000	2.25%	3.56%	0.08%
First Mortgage Bonds	12/01/53	50,000,000	2.25%	2.92%	0.07%
First Mortgage Bonds	12/01/57	50,000,000	2.25%	2.95%	0.07%
First Mortgage Bonds	12/01/57	50,000,000	2.25%	2.96%	0.07%
First Mortgage Bonds	12/01/52	125,000,000	5.63%	4.52%	0.25%
First Mortgage Bonds	02/01/43	75,000,000	3.38%	5.62%	0.19%
First Mortgage Bonds	08/01/53	175,000,000	7.89%	5.49%	0.43%
First Mortgage Bonds	08/01/61	50,000,000	2.25%	5.57%	0.13%
Unsecured Note	03/30/24	10,000,000	0.45%	5.95%	0.03%
Unsecured Note	03/30/33	10,000,000	0.45%	5.96%	0.03%
Unsecured Note	03/30/34	10,000,000	0.45%	5.96%	0.03%
Pennvest	03/01/24	85,663	0.00%	2.75%	0.00%
Pennvest	04/01/24	46,850	0.00%	2.79%	0.00%
Pennvest	01/01/25	313,538	0.01%	3.49%	0.00%
Pennvest	05/01/25	613,432	0.03%	3.48%	0.00%
Pennvest	03/01/24	28,579	0.00%	2.79%	0.00%
Pennvest	06/01/24	10,451	0.00%	2.79%	0.00%
Pennvest	04/01/35	23,459	0.00%	1.03%	0.00%
Pennvest	03/23/25	217,754	0.01%	2.70%	0.00%
Pennvest	05/01/26	231,331	0.01%	2.74%	0.00%
Pennvest	04/01/26	138,129	0.01%	2.80%	0.00%
Pennvest	05/01/26	45,326	0.00%	3.50%	0.00%
Pennvest	05/01/27	102,612	0.00%	2.80%	0.00%
Pennvest	10/01/26	414,178	0.02%	3.08%	0.00%
Pennvest	10/01/26	186,268	0.01%	3.40%	0.00%
Pennvest	07/01/27	439,761	0.02%	2.81%	0.00%
Pennvest	04/01/27	562,334	0.03%	2.59%	0.00%
Pennvest	10/01/27	247,222	0.01%	3.24%	0.00%
Pennvest	05/01/28	530,967	0.02%	2.59%	0.00%
Pennvest	10/01/28	360,075	0.02%	2.58%	0.00%
Pennvest	02/01/29	140,671	0.01%	2.59%	0.00%
Pennvest	02/01/30	436,224	0.02%	2.59%	0.00%
Pennvest	07/01/29	707,508	0.03%	2.59%	0.00%
Pennvest	08/01/29	204,680	0.01%	3.09%	0.00%
Pennvest	05/01/30	489,231	0.02%	2.59%	0.00%
Pennvest	09/01/30	580,352	0.03%	2.60%	0.00%
Pennvest	01/01/31	429,364	0.02%	2.60%	0.00%
Pennvest	11/01/30	486,672	0.02%	2.74%	0.00%
Pennvest	09/01/30	474,864	0.02%	2.60%	0.00%
Pennvest	02/01/31	513,138	0.02%	3.20%	0.00%
Pennvest	10/01/30	855,711	0.04%	1.56%	0.00%
Pennvest	12/01/30	1,214,786	0.05%	2.60%	0.00%
Pennvest	01/01/31	328,877	0.01%	2.61%	0.00%
Pennvest	01/01/34	963,089	0.04%	1.56%	0.00%
Pennvest	04/01/31	438,859	0.02%	1.05%	0.00%
Pennvest	09/01/39	4,293,886	0.19%	1.16%	0.00%
Pennvest	12/01/33	569,396	0.03%	2.59%	0.00%
Pennvest	12/01/33	895,037	0.04%	2.59%	0.00%
Pennvest - LWW	02/01/23	41,369	0.00%	1.19%	0.00%
Pennvest - LWW	01/01/32	346,959	0.02%	1.04%	0.00%
Long Term- Debt		$ 2,218,808,602	100.00%		4.24%

Notes: [1] As calculated on page 4 of this schedule.

Source of Information: Company provided data

Aqua Pennsylvania, Inc.
Calculation of the Embedded Cost of Long-Term Debt
Actual at December 31, 2024

Series	Date of Maturity	Principal Amount Outstanding	Percent to Total	Effective [1] Cost Rate	Weighted Cost Rate
First Mortgage Bonds	09/15/26	11,800,000	0.54%	9.30%	0.05%
First Mortgage Bonds	05/15/25	15,000,000	0.68%	7.73%	0.05%
First Mortgage Bonds	05/10/27	15,000,000	0.68%	6.06%	0.04%
First Mortgage Bonds	05/10/27	5,000,000	0.23%	6.06%	0.01%
First Mortgage Bonds	05/15/28	3,000,000	0.14%	5.98%	0.01%
First Mortgage Bonds	12/01/41	40,000,000	1.81%	3.89%	0.07%
First Mortgage Bonds	12/01/42	20,000,000	0.91%	3.89%	0.04%
First Mortgage Bonds	12/01/47	20,000,000	0.91%	3.94%	0.04%
First Mortgage Bonds	11/01/31	25,000,000	1.13%	4.00%	0.05%
First Mortgage Bonds	11/01/45	25,000,000	1.13%	4.67%	0.05%
First Mortgage Bonds	11/01/46	25,000,000	1.13%	4.68%	0.05%
First Mortgage Bonds	01/15/35	25,000,000	1.13%	3.73%	0.04%
First Mortgage Bonds	01/15/40	15,000,000	0.68%	4.10%	0.03%
First Mortgage Bonds	01/15/45	13,000,000	0.59%	4.14%	0.02%
First Mortgage Bonds	12/29/54	12,000,000	0.54%	4.19%	0.02%
First Mortgage Bonds	01/15/36	65,000,000	2.95%	3.85%	0.11%
First Mortgage Bonds	01/15/37	20,000,000	0.91%	3.90%	0.04%
First Mortgage Bonds	01/15/38	25,000,000	1.13%	3.93%	0.04%
First Mortgage Bonds	01/15/46	60,000,000	2.72%	4.23%	0.12%
First Mortgage Bonds	01/15/47	20,000,000	0.91%	4.25%	0.04%
First Mortgage Bonds	01/15/48	20,000,000	0.91%	4.27%	0.04%
First Mortgage Bonds	01/15/51	25,000,000	1.13%	3.89%	0.04%
First Mortgage Bonds	01/15/56	60,000,000	2.72%	3.99%	0.11%
First Mortgage Bonds	02/01/42	10,000,000	0.45%	3.69%	0.02%
First Mortgage Bonds	02/01/44	40,000,000	1.81%	3.73%	0.07%
First Mortgage Bonds	07/15/55	40,000,000	1.81%	4.05%	0.07%
First Mortgage Bonds	07/15/57	40,000,000	1.81%	4.07%	0.07%
First Mortgage Bonds	10/15/54	35,000,000	1.59%	4.07%	0.06%
First Mortgage Bonds	10/15/55	20,000,000	0.91%	4.08%	0.04%
First Mortgage Bonds	10/15/57	20,000,000	0.91%	4.10%	0.04%
First Mortgage Bonds	07/15/42	25,000,000	1.13%	4.02%	0.05%
First Mortgage Bonds	07/15/45	10,000,000	0.45%	4.07%	0.02%
First Mortgage Bonds	07/15/48	65,000,000	2.95%	4.12%	0.12%
First Mortgage Bonds	11/15/47	65,000,000	2.95%	4.47%	0.13%
First Mortgage Bonds	11/15/52	30,000,000	1.36%	4.52%	0.06%
First Mortgage Bonds	11/15/53	30,000,000	1.36%	4.54%	0.06%
First Mortgage Bonds	05/31/49	75,000,000	3.40%	4.03%	0.14%
First Mortgage Bonds	05/31/54	25,000,000	1.13%	4.08%	0.05%
First Mortgage Bonds	05/31/59	25,000,000	1.13%	4.13%	0.05%
First Mortgage Bonds	09/26/54	50,000,000	2.27%	4.10%	0.09%
First Mortgage Bonds	09/26/58	75,000,000	3.40%	4.14%	0.14%
First Mortgage Bonds	09/26/59	50,000,000	2.27%	4.15%	0.09%
First Mortgage Bonds	01/01/52	75,000,000	3.40%	3.47%	0.12%
First Mortgage Bonds	01/01/53	50,000,000	2.27%	3.49%	0.08%
First Mortgage Bonds	06/01/51	75,000,000	3.40%	3.50%	0.12%
First Mortgage Bonds	06/01/55	50,000,000	2.27%	3.55%	0.08%
First Mortgage Bonds	06/01/56	50,000,000	2.27%	3.56%	0.08%
First Mortgage Bonds	12/01/53	50,000,000	2.27%	2.92%	0.07%
First Mortgage Bonds	12/01/57	50,000,000	2.27%	2.95%	0.07%
First Mortgage Bonds	12/01/57	50,000,000	2.27%	2.96%	0.07%
First Mortgage Bonds	12/01/52	125,000,000	5.67%	4.52%	0.26%
First Mortgage Bonds	02/01/43	75,000,000	3.40%	5.62%	0.19%
First Mortgage Bonds	08/01/53	175,000,000	7.94%	5.49%	0.44%
First Mortgage Bonds	08/01/61	50,000,000	2.27%	5.57%	0.13%
Unsecured Note	03/30/33	10,000,000	0.45%	5.96%	0.03%
Unsecured Note	03/30/34	10,000,000	0.45%	5.96%	0.03%
Pennvest	03/23/25	199,517	0.01%	2.70%	0.00%
Pennvest	05/01/26	93,767	0.00%	2.74%	0.00%
Pennvest	04/01/26	82,066	0.00%	2.80%	0.00%
Pennvest	05/01/26	26,259	0.00%	3.50%	0.00%
Pennvest	05/01/27	61,191	0.00%	2.80%	0.00%
Pennvest	10/01/26	296,986	0.01%	3.08%	0.00%
Pennvest	10/01/26	122,355	0.01%	3.40%	0.00%
Pennvest	07/01/27	289,309	0.01%	2.81%	0.00%
Pennvest	04/01/27	410,979	0.02%	2.59%	0.00%
Pennvest	10/01/27	175,252	0.01%	3.24%	0.00%
Pennvest	05/01/28	398,652	0.02%	2.59%	0.00%
Pennvest	10/01/28	282,065	0.01%	2.58%	0.00%
Pennvest	02/01/29	112,968	0.01%	2.59%	0.00%
Pennvest	02/01/30	356,208	0.02%	2.59%	0.00%
Pennvest	07/01/29	600,183	0.03%	2.59%	0.00%
Pennvest	08/01/29	170,088	0.01%	3.09%	0.00%
Pennvest	05/01/30	408,909	0.02%	2.59%	0.00%
Pennvest	09/01/30	496,022	0.02%	2.60%	0.00%
Pennvest	01/01/31	370,313	0.02%	2.60%	0.00%
Pennvest	11/01/30	423,166	0.02%	2.74%	0.00%
Pennvest	09/01/30	411,544	0.02%	2.60%	0.00%
Pennvest	02/01/31	446,179	0.02%	3.20%	0.00%
Pennvest	10/01/30	744,672	0.03%	1.56%	0.00%
Pennvest	12/01/30	1,053,064	0.05%	2.60%	0.00%
Pennvest	01/01/31	292,180	0.01%	2.61%	0.00%
Pennvest	01/01/34	845,044	0.04%	1.56%	0.00%
Pennvest	04/01/31	390,438	0.02%	1.05%	0.00%
Pennvest	09/01/39	3,885,745	0.18%	1.16%	0.00%
Pennvest	12/01/33	503,547	0.02%	2.59%	0.00%
Pennvest	12/01/33	842,302	0.04%	2.59%	0.00%
Pennvest - LWW	02/01/23	15,454	0.00%	1.19%	0.00%
Pennvest - LWW	01/01/32	305,541	0.01%	1.04%	0.00%
Long Term- Debt		$2,204,911,964	100.00%		4.24%

Notes: [1] As calculated on page 4 of this schedule.

Source of Information: Company provided data

Aqua Pennsylvania, Inc.
Calculation of the Embedded Cost of Long-Term Debt
Actual at December 31, 2025

Series	Date of Maturity	Principal Amount Outstanding	Percent to Total	Effective [1] Cost Rate	Weighted Cost Rate
First Mortgage Bonds	09/15/26	11,800,000	0.51%	9.30%	0.05%
First Mortgage Bonds	05/15/25	-	0.00%	7.73%	0.00%
First Mortgage Bonds	05/10/27	15,000,000	0.65%	6.06%	0.04%
First Mortgage Bonds	05/10/27	5,000,000	0.22%	6.06%	0.01%
First Mortgage Bonds	05/15/28	3,000,000	0.13%	5.98%	0.01%
First Mortgage Bonds	12/01/41	40,000,000	1.73%	3.89%	0.07%
First Mortgage Bonds	12/01/42	20,000,000	0.87%	3.89%	0.03%
First Mortgage Bonds	12/01/47	20,000,000	0.87%	3.94%	0.03%
First Mortgage Bonds	11/01/31	25,000,000	1.08%	4.00%	0.04%
First Mortgage Bonds	11/01/45	25,000,000	1.08%	4.67%	0.05%
First Mortgage Bonds	11/01/46	25,000,000	1.08%	4.68%	0.05%
First Mortgage Bonds	01/15/35	25,000,000	1.08%	3.73%	0.04%
First Mortgage Bonds	01/15/40	15,000,000	0.65%	4.10%	0.03%
First Mortgage Bonds	01/15/45	13,000,000	0.56%	4.14%	0.02%
First Mortgage Bonds	12/29/54	12,000,000	0.52%	4.19%	0.02%
First Mortgage Bonds	01/15/36	65,000,000	2.81%	3.85%	0.11%
First Mortgage Bonds	01/15/37	20,000,000	0.87%	3.90%	0.03%
First Mortgage Bonds	01/15/38	25,000,000	1.08%	3.93%	0.04%
First Mortgage Bonds	01/15/46	60,000,000	2.60%	4.23%	0.11%
First Mortgage Bonds	01/15/47	20,000,000	0.87%	4.25%	0.04%
First Mortgage Bonds	01/15/48	20,000,000	0.87%	4.27%	0.04%
First Mortgage Bonds	01/15/51	25,000,000	1.08%	3.89%	0.04%
First Mortgage Bonds	01/15/56	60,000,000	2.60%	3.99%	0.10%
First Mortgage Bonds	02/01/42	10,000,000	0.43%	3.69%	0.02%
First Mortgage Bonds	02/01/44	40,000,000	1.73%	3.73%	0.06%
First Mortgage Bonds	07/15/55	40,000,000	1.73%	4.05%	0.07%
First Mortgage Bonds	07/15/57	40,000,000	1.73%	4.07%	0.07%
First Mortgage Bonds	10/15/54	35,000,000	1.51%	4.07%	0.06%
First Mortgage Bonds	10/15/55	20,000,000	0.87%	4.08%	0.04%
First Mortgage Bonds	10/15/57	20,000,000	0.87%	4.10%	0.04%
First Mortgage Bonds	07/15/42	25,000,000	1.08%	4.02%	0.04%
First Mortgage Bonds	07/15/45	10,000,000	0.43%	4.07%	0.02%
First Mortgage Bonds	07/15/48	65,000,000	2.81%	4.12%	0.12%
First Mortgage Bonds	11/15/47	65,000,000	2.81%	4.47%	0.13%
First Mortgage Bonds	11/15/52	30,000,000	1.30%	4.52%	0.06%
First Mortgage Bonds	11/15/53	30,000,000	1.30%	4.54%	0.06%
First Mortgage Bonds	05/31/49	75,000,000	3.24%	4.03%	0.13%
First Mortgage Bonds	05/31/54	25,000,000	1.08%	4.08%	0.04%
First Mortgage Bonds	05/31/59	25,000,000	1.08%	4.13%	0.04%
First Mortgage Bonds	09/26/54	50,000,000	2.16%	4.10%	0.09%
First Mortgage Bonds	09/26/58	75,000,000	3.24%	4.14%	0.13%
First Mortgage Bonds	09/26/59	50,000,000	2.16%	4.15%	0.09%
First Mortgage Bonds	01/01/52	75,000,000	3.24%	3.47%	0.11%
First Mortgage Bonds	01/01/53	50,000,000	2.16%	3.49%	0.08%
First Mortgage Bonds	06/01/51	75,000,000	3.24%	3.50%	0.11%
First Mortgage Bonds	06/01/55	50,000,000	2.16%	3.55%	0.08%
First Mortgage Bonds	06/01/56	50,000,000	2.16%	3.56%	0.08%
First Mortgage Bonds	12/01/53	50,000,000	2.16%	2.92%	0.06%
First Mortgage Bonds	12/01/57	50,000,000	2.16%	2.95%	0.06%
First Mortgage Bonds	12/01/57	50,000,000	2.16%	2.96%	0.06%
First Mortgage Bonds	12/01/52	125,000,000	5.41%	4.52%	0.24%
First Mortgage Bonds	02/01/43	75,000,000	3.24%	5.62%	0.18%
First Mortgage Bonds	08/01/53	175,000,000	7.57%	5.49%	0.42%
First Mortgage Bonds	08/01/61	50,000,000	2.16%	5.57%	0.12%
First Mortgage Bonds	08/31/55	125,000,000	5.41%	6.07%	0.33%
Unsecured Note	03/30/33	10,000,000	0.43%	5.96%	0.03%
Unsecured Note	03/30/34	10,000,000	0.43%	5.96%	0.03%
Pennvest	03/23/25	181,097	0.01%	2.70%	0.00%
Pennvest	05/01/26	(0)	0.00%	2.74%	0.00%
Pennvest	04/01/26	24,464	0.00%	2.80%	0.00%
Pennvest	05/01/26	6,656	0.00%	3.50%	0.00%
Pennvest	05/01/27	18,310	0.00%	2.80%	0.00%
Pennvest	10/01/26	176,501	0.01%	3.08%	0.00%
Pennvest	10/01/26	56,464	0.00%	3.40%	0.00%
Pennvest	07/01/27	133,716	0.01%	2.81%	0.00%
Pennvest	04/01/27	255,371	0.01%	2.59%	0.00%
Pennvest	10/01/27	101,421	0.00%	3.24%	0.00%
Pennvest	05/01/28	262,047	0.01%	2.59%	0.00%
Pennvest	10/01/28	202,039	0.01%	2.58%	0.00%
Pennvest	02/01/29	84,552	0.00%	2.59%	0.00%
Pennvest	02/01/30	274,130	0.01%	2.59%	0.00%
Pennvest	07/01/29	490,092	0.02%	2.59%	0.00%
Pennvest	08/01/29	134,604	0.01%	3.09%	0.00%
Pennvest	05/01/30	326,105	0.01%	2.59%	0.00%
Pennvest	09/01/30	409,518	0.02%	2.60%	0.00%
Pennvest	01/01/31	309,740	0.01%	2.60%	0.00%
Pennvest	11/01/30	358,024	0.02%	2.74%	0.00%
Pennvest	09/01/30	346,500	0.01%	2.60%	0.00%
Pennvest	02/01/31	377,494	0.02%	3.20%	0.00%
Pennvest	10/01/30	630,092	0.03%	1.56%	0.00%
Pennvest	12/01/30	888,884	0.04%	2.60%	0.00%
Pennvest	01/01/31	254,538	0.01%	2.61%	0.00%
Pennvest	01/01/34	723,957	0.03%	1.56%	0.00%
Pennvest	04/01/31	340,770	0.01%	1.05%	0.00%
Pennvest	09/01/39	3,471,399	0.15%	1.16%	0.00%
Pennvest	12/01/33	437,036	0.02%	2.59%	0.00%
Pennvest	12/01/33	789,037	0.03%	2.59%	0.00%
Pennvest - LWW	02/01/23		0.00%	1.19%	0.00%
Pennvest - LWW	01/01/32	263,706	0.01%	1.04%	0.00%
Long Term- Debt		$2,312,128,264	100.00%		4.32%

Notes: [1] As calculated on page 4 of this schedule.

Source of Information: Company provided data

Aqua Pennsylvania, Inc.
Calculation of the Effective Cost of Long-Term Debt by Series

Series	Date of Issue	Date of Maturity	Coupon Rate	Principal Amount Issued	Discount and Expense	Net Proceeds	Net Proceeds Ratio	Effective Cost Rate [1]
First Mortgage Bonds	11/01/91	09/15/26	9.29%	12,000,000	14,126	11,985,874	99.88%	9.30%
First Mortgage Bonds	05/19/95	05/15/25	7.72%	15,000,000	21,914	14,978,086	99.85%	7.73%
First Mortgage Bonds	05/10/04	05/10/27	6.06%	15,000,000		15,000,000	100.00%	6.06%
First Mortgage Bonds	05/10/04	05/10/27	6.06%	5,000,000		5,000,000	100.00%	6.06%
First Mortgage Bonds	05/10/04	05/15/28	5.98%	3,000,000		3,000,000	100.00%	5.98%
First Mortgage Bonds	11/13/12	12/01/41	3.79%	40,000,000	659,070	39,340,930	98.35%	3.89%
First Mortgage Bonds	11/13/12	12/01/42	3.80%	20,000,000	334,026	19,665,974	98.33%	3.89%
First Mortgage Bonds	11/13/12	12/01/47	3.85%	20,000,000	352,633	19,647,367	98.24%	3.94%
First Mortgage Bonds	10/24/13	11/01/31	3.94%	25,000,000	201,066	24,798,934	99.20%	4.00%
First Mortgage Bonds	10/24/13	11/01/45	4.61%	25,000,000	263,207	24,736,793	98.95%	4.67%
First Mortgage Bonds	10/24/13	11/01/46	4.62%	25,000,000	265,632	24,734,368	98.94%	4.68%
First Mortgage Bonds	12/29/14	01/15/35	3.64%	25,000,000	305,400	24,694,600	98.78%	3.73%
First Mortgage Bonds	12/29/14	01/15/40	4.01%	15,000,000	199,703	14,800,297	98.67%	4.10%
First Mortgage Bonds	12/29/14	01/15/45	4.06%	13,000,000	182,732	12,817,268	98.59%	4.14%
First Mortgage Bonds	12/29/14	12/29/54	4.11%	12,000,000	180,056	11,819,944	98.50%	4.19%
First Mortgage Bonds	12/03/15	01/15/36	3.77%	65,000,000	707,954	64,292,046	98.91%	3.85%
First Mortgage Bonds	12/03/15	01/15/37	3.82%	20,000,000	221,531	19,778,469	98.89%	3.90%
First Mortgage Bonds	12/03/15	01/15/38	3.85%	25,000,000	281,120	24,718,880	98.88%	3.93%
First Mortgage Bonds	12/03/15	01/15/46	4.16%	60,000,000	731,351	59,268,649	98.78%	4.23%
First Mortgage Bonds	12/03/15	01/15/47	4.18%	20,000,000	245,464	19,754,536	98.77%	4.25%
First Mortgage Bonds	12/03/15	01/15/48	4.20%	20,000,000	247,296	19,752,704	98.76%	4.27%
First Mortgage Bonds	12/15/16	01/15/51	3.85%	25,000,000	196,629	24,803,371	99.21%	3.89%
First Mortgage Bonds	12/15/16	01/15/56	3.95%	60,000,000	479,934	59,520,066	99.20%	3.99%
First Mortgage Bonds	01/31/17	02/01/42	3.65%	10,000,000	70,479	9,929,521	99.30%	3.69%
First Mortgage Bonds	01/31/17	02/01/44	3.69%	40,000,000	281,977	39,718,023	99.30%	3.73%
First Mortgage Bonds	07/21/17	07/15/55	4.04%	40,000,000	58,486	39,941,514	99.85%	4.05%
First Mortgage Bonds	07/21/17	07/15/57	4.06%	40,000,000	58,746	39,941,254	99.85%	4.07%
First Mortgage Bonds	10/26/17	10/15/54	4.06%	35,000,000	50,700	34,949,300	99.86%	4.07%
First Mortgage Bonds	10/26/17	10/15/55	4.07%	20,000,000	29,050	19,970,950	99.85%	4.08%
First Mortgage Bonds	10/26/17	10/15/57	4.09%	20,000,000	29,195	19,970,805	99.85%	4.10%
First Mortgage Bonds	06/29/18	07/15/42	3.99%	25,000,000	111,417	24,888,583	99.55%	4.02%
First Mortgage Bonds	06/29/18	07/15/45	4.04%	10,000,000	45,080	9,954,920	99.55%	4.07%
First Mortgage Bonds	06/29/18	07/15/48	4.09%	65,000,000	295,698	64,704,302	99.55%	4.12%
First Mortgage Bonds	11/15/18	11/15/47	4.44%	65,000,000	353,337	64,646,663	99.46%	4.47%
First Mortgage Bonds	11/15/18	11/15/52	4.49%	30,000,000	165,356	29,834,644	99.45%	4.52%
First Mortgage Bonds	11/15/18	11/15/53	4.51%	30,000,000	165,653	29,834,347	99.45%	4.54%
First Mortgage Bonds	05/31/19	05/31/49	4.02%	75,000,000	166,939	74,833,061	99.78%	4.03%
First Mortgage Bonds	05/31/19	05/31/54	4.07%	25,000,000	56,159	24,943,841	99.78%	4.08%
First Mortgage Bonds	05/31/19	05/31/59	4.12%	25,000,000	56,543	24,943,457	99.77%	4.13%
First Mortgage Bonds	09/26/19	09/26/54	4.09%	50,000,000	98,153	49,901,847	99.80%	4.10%
First Mortgage Bonds	09/26/19	09/26/58	4.13%	75,000,000	147,930	74,852,070	99.80%	4.14%
First Mortgage Bonds	09/26/19	09/26/59	4.14%	50,000,000	98,722	49,901,278	99.80%	4.15%
First Mortgage Bonds	12/20/19	01/01/52	3.39%	75,000,000	1,193,179	73,806,821	98.41%	3.47%
First Mortgage Bonds	12/20/19	01/01/53	3.41%	50,000,000	796,715	49,203,285	98.41%	3.49%
First Mortgage Bonds	05/01/20	06/01/51	3.49%	75,000,000	204,488	74,795,512	99.73%	3.50%
First Mortgage Bonds	05/01/20	06/01/55	3.54%	50,000,000	136,761	49,863,239	99.73%	3.55%
First Mortgage Bonds	05/01/20	06/01/56	3.55%	50,000,000	136,855	49,863,145	99.73%	3.56%
First Mortgage Bonds	11/20/20	12/01/53	2.85%	50,000,000	719,562	49,280,438	98.56%	2.92%
First Mortgage Bonds	11/20/20	12/01/57	2.89%	50,000,000	720,181	49,279,819	98.56%	2.95%
First Mortgage Bonds	11/20/20	12/01/57	2.90%	50,000,000	720,316	49,279,684	98.56%	2.96%
First Mortgage Bonds	10/20/22	12/01/52	4.50%	125,000,000	398,259	124,601,741	99.68%	4.52%
First Mortgage Bonds	01/31/23	02/01/43	5.60%	75,000,000	207,565	74,792,435	99.72%	5.62%
First Mortgage Bonds	08/24/23	08/01/53	5.48%	175,000,000	370,583	174,629,417	99.79%	5.49%
First Mortgage Bonds	08/24/23	08/01/61	5.56%	50,000,000	106,185	49,893,815	99.79%	5.57%
First Mortgage Bonds	08/31/25	08/31/55	6.05%	125,000,000	402,875	124,597,125	99.68%	6.07%
Unsecured Note	03/31/06	03/30/24	5.95%	10,000,000	4,663	9,995,337	99.95%	5.95%
Unsecured Note	03/31/06	03/30/33	5.95%	10,000,000	12,451	9,987,549	99.88%	5.96%
Unsecured Note	03/31/06	03/30/34	5.95%	10,000,000	12,988	9,987,012	99.87%	5.96%
Unsecured Note	09/29/06	09/30/21	5.64%	5,461,000	517	5,460,483	99.99%	5.64%
Pennvest	06/27/02	03/01/24	2.730%	5,538,900	16,000	5,522,900	99.71%	2.75%
Pennvest	11/05/02	04/01/24	2.774%	2,201,840	6,741	2,195,099	99.69%	2.79%
Pennvest	08/07/03	01/01/25	3.470%	6,365,625	22,551	6,343,074	99.65%	3.49%
Pennvest	08/07/03	05/01/25	3.460%	9,975,741	35,461	9,940,280	99.64%	3.48%
Pennvest	12/19/03	03/01/24	2.774%	1,646,400	5,335	1,641,065	99.68%	2.79%
Pennvest	06/01/04	06/01/24	2.774%	333,878	1,057	332,821	99.68%	2.79%
Pennvest	12/01/04	04/01/35	1.000%	600,000	4,313	595,687	99.28%	1.03%
Pennvest	03/23/05	03/23/25	2.668%	2,122,850	9,551	2,113,299	99.55%	2.70%
Pennvest	04/21/05	05/01/26	2.711%	1,054,868	4,599	1,050,269	99.56%	2.74%
Pennvest	05/25/05	04/01/26	2.774%	321,522	1,537	319,985	99.52%	2.80%
Pennvest	05/25/05	05/01/26	3.468%	677,839	3,383	674,456	99.50%	3.50%
Pennvest	08/02/05	05/01/27	2.774%	2,311,200	11,634	2,299,566	99.50%	2.80%
Pennvest	08/25/05	10/01/26	3.052%	1,151,000	5,691	1,145,309	99.51%	3.08%
Pennvest	10/02/05	10/01/26	3.365%	2,249,960	13,381	2,236,579	99.41%	3.40%
Pennvest	04/05/06	07/01/27	2.774%	2,611,380	15,469	2,595,911	99.41%	2.81%
Pennvest	07/25/06	04/01/27	2.556%	1,253,000	7,042	1,245,958	99.44%	2.59%
Pennvest	07/25/06	10/01/27	3.195%	2,225,000	14,115	2,210,885	99.37%	3.24%
Pennvest	04/18/07	05/01/28	2.554%	1,395,800	9,121	1,386,679	99.35%	2.59%
Pennvest	05/27/08	10/01/28	2.547%	698,000	3,446	694,554	99.51%	2.58%
Pennvest	06/04/08	02/01/29	2.547%	1,708,100	10,436	1,697,664	99.39%	2.59%
Pennvest	06/17/08	02/01/30	2.547%	2,045,000	15,976	2,029,024	99.22%	2.59%
Pennvest	09/30/08	07/01/29	2.547%	723,069	4,772	718,297	99.34%	2.59%
Pennvest	09/30/08	08/01/29	3.046%	1,493,848	11,274	1,482,574	99.25%	3.09%
Pennvest	02/05/09	05/01/30	2.547%	1,697,000	12,948	1,684,052	99.24%	2.59%
Pennvest	07/22/09	09/01/30	2.547%	1,132,200	9,438	1,122,762	99.17%	2.60%
Pennvest	01/26/10	01/01/31	2.547%	1,226,000	10,552	1,215,448	99.14%	2.60%
Pennvest	04/15/10	11/01/30	2.690%	1,217,305	10,346	1,206,959	99.15%	2.74%
Pennvest	09/09/10	09/01/30	2.547%	1,402,518	11,126	1,391,392	99.21%	2.60%
Pennvest	09/09/10	02/01/31	3.143%	2,144,750	18,475	2,126,275	99.14%	3.20%
Pennvest	10/07/10	10/01/30	1.510%	3,138,825	26,608	3,112,217	99.15%	1.56%
Pennvest	12/15/10	12/01/30	2.547%	2,347,056	20,558	2,326,498	99.12%	2.60%
Pennvest	01/27/11	01/01/31	2.547%	975,645	9,141	966,504	99.06%	2.61%
Pennvest	01/27/11	01/01/34	1.510%	9,955,500	86,991	9,868,509	99.13%	1.56%
Pennvest	04/12/11	04/01/31	1.000%	1,413,729	12,069	1,401,660	99.15%	1.05%
Pennvest	04/16/19	09/01/39	1.000%	586,692	17,472	569,221	97.02%	1.16%
Pennvest	11/30/10	12/01/33	2.547%	882,000	6,867	875,133	99.22%	2.59%
Pennvest	11/30/10	12/01/33	2.547%	882,000	6,867	875,133	99.22%	2.59%
Pennvest - LWW	03/01/13	02/01/23	1.156%	1,635,581	5,531	1,630,050	99.66%	1.19%
Pennvest - LWW	09/22/10	01/01/32	1.000%	975,645	7,411	968,234	99.24%	1.04%

Notes: [1] The effective cost for each issue is the yield to maturity using as inputs the date of issue, the date of maturity, the coupon rate, and the net proceeds ratio.

Company provided data

Monthly Dividend Yields for
Water Group
for the Twelve Months Ending March 2024

Company	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	12-Month Average	6-Month Average	3-Month Average
American States Water Co (AWR)	1.80%	1.79%	1.83%	1.95%	2.04%	2.19%	2.21%	2.15%	2.14%	2.32%	2.41%	2.39%			
American Water Works Co Inc (AWK)	1.92%	1.96%	1.99%	1.93%	2.04%	2.29%	2.42%	2.15%	2.15%	2.29%	2.39%	2.32%			
Artesian Resource Corp Class A (ARTNA)	2.08%	2.30%	2.41%	2.51%	2.46%	2.71%	2.97%	2.76%	2.81%	3.20%	3.37%	3.14%			
California Water Service Group (CWT)	1.86%	1.83%	2.02%	1.97%	2.07%	2.21%	2.15%	2.06%	2.01%	2.31%	2.27%	2.24%			
Essential Utilities, Inc. (WTRG)	2.70%	2.82%	2.89%	2.92%	3.34%	3.60%	3.70%	3.46%	3.30%	3.45%	3.54%	3.33%			
Middlesex Water Co (MSEX)	1.72%	1.54%	1.55%	1.56%	1.66%	1.89%	2.06%	2.04%	1.99%	2.33%	2.56%	2.48%			
SJW Corp (SJW)	2.01%	1.99%	2.18%	2.17%	2.32%	2.54%	2.45%	2.32%	2.33%	2.71%	2.91%	2.84%			
The York Water Co (YORW)	1.93%	1.92%	1.96%	1.97%	2.00%	2.16%	2.34%	2.22%	2.18%	2.36%	2.38%	2.33%			
Average	**2.00%**	**2.02%**	**2.10%**	**2.12%**	**2.24%**	**2.45%**	**2.54%**	**2.40%**	**2.36%**	**2.62%**	**2.73%**	**2.63%**	**2.35%**	**2.55%**	**2.66%**

Note: Monthly dividend yields are calculated by dividing the annualized quarterly dividend by the month-end closing stock price adjusted by the fraction of the ex-dividend.

Source of Information: http://performance.morningstar.com/stock/performance-return
http://www.nasdaq.com

Forward-looking Dividend Yield					
	1/2 Growth	D_0/P_0	(.5g)	D_1/P_0	$K = \frac{D_0(1+g)^0 + D_0(1+g)^0 + D_0(1+g)^1 + D_0(1+g)^1}{P_0} + g$
		2.55%	1.033750	2.63%	
	Discrete	D_0/P_0	Adj.	D_1/P_0	$K = \frac{D_0(1+g)^{.25} + D_0(1+g)^{.50} + D_0(1+g)^{.75} + D_0(1+g)^{1.00}}{P_0} + g$
		2.55%	1.041843	2.65%	
	Quarterly	D_0/P_0	Adj.	D_1/P_0	$K = \left[\left(1 + \frac{D_0(1+g)^{.25}}{P_0}\right)^4 - 1\right] + g$
		0.6367%	1.016464	2.61%	
	Average			2.63%	
	Growth rate			6.75%	
	K			9.38%	

Historical Growth Rates
Earnings Per Share, Dividends Per Share,
Book Value Per Share, and Cash Flow Per Share

Company	Earnings per Share		Dividends per Share		Book Value per Share		Cash Flow per Share	
	Value Line		Value Line		Value Line		Value Line	
	5 Year	10 Year	5 Year	10 Year	5 Year	10 Year	5 Year	10 Year
American States Water	9.00%	7.00%	9.00%	9.00%	6.50%	5.00%	6.00%	4.50%
American Water Works Co., Inc.	15.00%	11.00%	9.50%	10.00%	7.50%	6.00%	10.50%	8.00%
Artesian Res. Corp.	3.50%	-	3.50%	-	5.00%	-	4.00%	-
California Water Serv. Grp.	4.00%	5.00%	6.50%	4.50%	10.00%	7.50%	5.00%	5.00%
Essential Utilities, Inc.	7.00%	6.50%	7.00%	7.50%	14.00%	10.00%	8.00%	6.50%
Middlesex Water Company	5.50%	8.50%	6.50%	5.00%	9.50%	7.00%	7.50%	8.00%
SJW Corporation	-0.50%	7.50%	8.00%	7.50%	8.00%	9.50%	5.00%	7.00%
York Water Company	8.00%	-	4.00%	-	8.50%	-	7.50%	-
Average	6.44%	7.58%	6.75%	7.25%	8.63%	7.50%	6.69%	6.50%

Source of Information: Value Line Investment Survey, April 5, 2024

Earnings Per Share, Dividends Per Share,
Book Value Per Share, and Cash Flow Per Share

Water Group	I/B/E/S First Call	Zacks	Value Line Earnings Per Share	Value Line Dividends Per Share	Value Line Book Value Per Share	Value Line Cash Flow Per Share	Value Line Percent Retained to Common Equity
American States Water	4.40%	6.30%	6.50%	8.50%	11.50%	5.50%	4.50%
American Water Works	7.50%	7.80%	3.00%	8.50%	6.50%	3.00%	4.50%
Artesian Resources Corp.	4.00%	NA	-	-	-	-	-
California Water Serv. Grp.	10.80%	NA	10.00%	6.00%	4.50%	3.50%	4.50%
Essential Utilities, Inc.	5.20%	5.60%	7.00%	8.00%	4.50%	6.50%	3.50%
Middlesex Water Company	2.70%	NA	6.50%	5.00%	1.00%	3.00%	6.00%
SJW Corporation	7.50%	7.50%	6.50%	4.50%	3.50%	-1.50%	3.50%
York Water Company	4.90%	NA	-	-	-	-	-
Average	5.88%	6.80%	6.58%	6.75%	5.25%	3.33%	4.42%

Source of Information :

Yahoo First Call, April 3, 2024
Zacks, April 3, 2024
Value Line, April 5, 2024

Water Group
Financial Risk Adjustment

	American States Water Co (NYSE:AWR)	American Water Works Co. (NYSE:AWK)	Artesian Resources Corp (NDS:ARTNA)	California Water Service Group (NYSE:CWT)	Essential Utilities, Inc. (NYSE:WTRG)	Middlesex Water Co. (NDS:MSEX)	SJW Corp (NYSE:SJW)	The York Water Company (NDS:YORW)	Average
Fiscal Year	12/31/23	12/31/23	12/31/23	12/31/23	12/31/23	12/31/23	12/31/23	12/31/23	
Capitalization at Fair Values									
Debt(D)	$556,214	$11,376,000	$162,720	$965,444	$5,980,722	$363,045	$1,394,412	$175,000	2,621,695
Preferred(P)	0	3,000	0	0	0	2,084	0	0	636
Equity(E)	2,973,981	25,702,427	426,313	2,994,144	10,207,606	1,169,414	2,092,703	553,511	5,765,012
Total	$3,530,195	$37,081,427	$589,033	$3,959,588	$16,188,328	$1,534,543	$3,487,115	$728,511	8,387,343
Capital Structure Ratios									
Debt(D)	15.76%	30.68%	27.62%	24.38%	36.94%	23.66%	39.99%	24.02%	27.88%
Preferred(P)	0.00%	0.01%	0.00%	0.00%	0.00%	0.14%	0.00%	0.00%	0.02%
Equity(E)	84.24%	69.31%	72.38%	75.62%	63.06%	76.21%	60.01%	75.98%	72.10%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.01%	100.00%	100.00%	100.00%
Common Stock									
Issued	36,980.612	200,144.968	10,285.000	57,724.000	276,595.228	17,821.000	32,023.004	14,332.245	
Treasury	0.000	5,414.867	0.000	0.000	3,299.191	0.000	0.000	0.000	
Outstanding	36,980.612	194,730.101	10,285.000	57,724.000	273,296.037	17,821.000	32,023.004	14,332.245	
Market Price`	$80.42	$131.99	$41.45	$51.87	$37.35	$65.62	$65.35	$38.62	
Capitalization at Carrying Amounts									Average
Debt(D)	$579,047	$12,190,000	$180,542	$1,053,440	$6,938,009	$364,674	$1,583,441	$182,643	2,883,975
Preferred(P)	0	3,000	0	0	0	2,084	0	0	636
Equity(E)	776,109	9,797,000	230,397	1,430,312	5,896,183	422,991	1,233,397	221,178	2,500,946
Total	$1,355,156	$21,990,000	$410,939	$2,483,752	$12,834,192	$789,749	$2,816,838	$403,821	5,385,556
Capital Structure Ratios									
Debt(D)	42.73%	55.43%	43.93%	42.41%	54.06%	46.18%	56.21%	45.23%	48.27%
Preferred(P)	0.00%	0.01%	0.00%	0.00%	0.00%	0.26%	0.00%	0.00%	0.03%
Equity(E)	57.27%	44.55%	56.07%	57.59%	45.94%	53.56%	43.79%	54.77%	51.69%
Total	100.00%	99.99%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%
Betas Value Line	0.70	0.95	0.75	0.75	1.00	0.75	0.85	0.80	0.82

Hamada

Bl	=	Bu	[1+	(1 - t)	D/E	+	P/E	]
0.82	=	Bu	[1+	(1-0.21)	0.3867	+	0.0003	]
0.82	=	Bu	[1+	0.79	0.3867	+	0.0003	]
0.82	=	Bu	1.3058					
0.63	=	Bu						

Hamada

Bl	=	0.63	[1+	(1 - t)	D/E	+	P/E	]
Bl	=	0.63	[1+	0.79	0.9338	+	0.0006	]
Bl	=	0.63	1.7383					
Bl	=	1.10						

M&M

ku	=	ke	-	(((	ku	-	i	)		1-t	)		D	/	E	) - (	ku	- d) P / E
8.53%	=	9.38%	-	(((	8.53%	-	5.72%	)		0.79	)		27.88%	/	72.10%	) - (	8.52%	- 5.68%) 0.02% / 72.10%
8.53%	=	9.38%	-	(((	2.81%			)		0.79	)		0.3867			) - (	2.84%	) 0.0003
8.53%	=	9.38%	-	((	2.22%						)		0.3867			) - (	2.84%	) 0.0003
8.53%	=	9.38%	-		0.86%											-	0.00%	

M&M

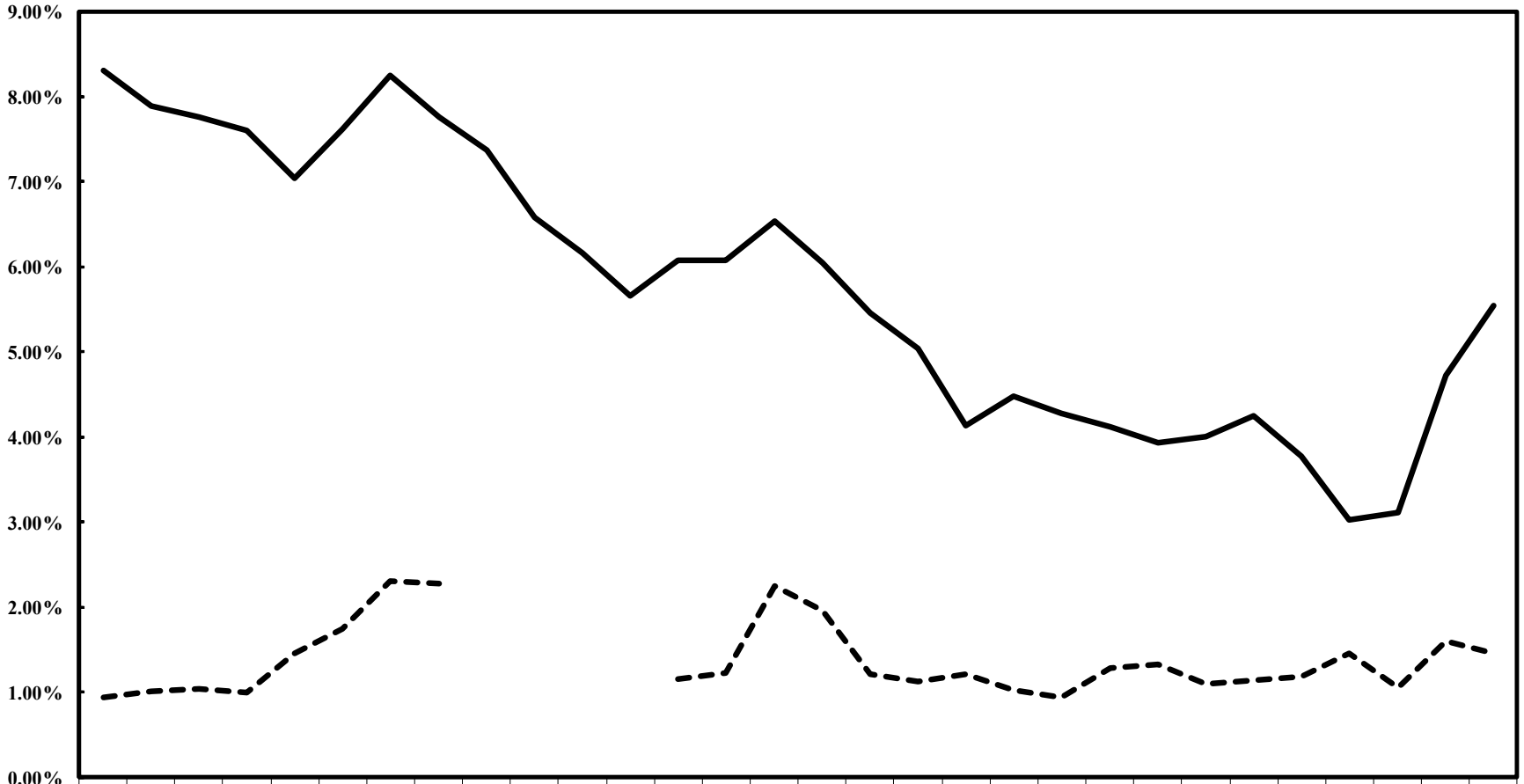
ke	=	ku	+	(((	ku	-	i	)		1-t	)		D	/	E	) + (	ku	- d) P / E
10.58%	=	8.53%	+	(((	8.53%	-	5.72%	)		0.79	)		48.27%	/	51.69%	) + (	8.53%	- 5.68%) 0.03% / 51.69%
10.58%	=	8.53%	+	(((	2.81%			)		0.79	)		0.9338			) + (	2.85%	) 0.0006
10.58%	=	8.53%	+	((	2.22%						)		0.9338			) + (	2.85%	) 0.0006
10.58%	=	8.53%	+		2.07%											+	0.00%	

Interest Rates for Investment Grade Public Utility Bonds
Yearly for 2018-2022 and 2023
and the Twelve Months Ended March 2024

Years	Aa Rated	A Rated	Baa Rated	Average
2018	4.09%	4.25%	4.67%	4.34%
2019	3.61%	3.77%	4.19%	3.86%
2020	2.79%	3.02%	3.39%	3.07%
2021	2.97%	3.11%	3.36%	3.15%
2022	4.53%	4.72%	5.03%	4.77%
Five-Year Average	3.60%	3.77%	4.13%	3.84%
2023	5.39%	5.54%	5.84%	5.59%
Months				
Apr-23	5.00%	5.13%	5.47%	5.20%
May-23	5.24%	5.36%	5.71%	5.44%
Jun-23	5.26%	5.38%	5.73%	5.46%
Jul-23	5.30%	5.41%	5.73%	5.48%
Aug-23	5.58%	5.71%	6.08%	5.77%
Sep-23	5.72%	5.86%	6.15%	5.91%
Oct-23	6.19%	6.34%	6.61%	6.38%
Nov-23	5.82%	5.96%	6.20%	5.99%
Dec-23	5.27%	5.42%	5.68%	5.46%
Jan-24	5.34%	5.48%	5.73%	5.51%
Feb-24	5.42%	5.56%	5.79%	5.59%
Mar-24	5.43%	5.55%	5.79%	5.59%
Twelve-Month Average	5.46%	5.60%	5.89%	5.65%
Six-Month Average	5.58%	5.72%	5.97%	5.75%
Three-Month Average	5.40%	5.53%	5.77%	5.56%

Source: Mergent Bond Record

Yields on
A-rated Public Utility Bonds and
Spreads over 30-Year Treasuries



	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
A-rated Public Utility	8.31	7.89	7.75	7.60	7.04	7.62	8.24	7.76	7.37	6.58	6.16	5.65	6.07	6.07	6.53	6.04	5.46	5.04	4.13	4.48	4.28	4.12	3.93	4.00	4.25	3.77	3.02	3.11	4.72	5.54
Spread vs. 30-year	0.94	1.01	1.04	0.99	1.46	1.75	2.30	2.27					1.16	1.23	2.25	1.96	1.21	1.13	1.21	1.03	0.94	1.28	1.33	1.10	1.14	1.19	1.46	1.06	1.60	1.45

A rated Public Utility Bonds over 30-Year Treasuries

Year	A-rated Public Utility	30-Year Treasuries Yield	30-Year Treasuries Spread
Jan-99	6.97%	5.16%	1.81%
Feb-99	7.09%	5.37%	1.72%
Mar-99	7.26%	5.58%	1.68%
Apr-99	7.22%	5.55%	1.67%
May-99	7.47%	5.81%	1.66%
Jun-99	7.74%	6.04%	1.70%
Jul-99	7.71%	5.98%	1.73%
Aug-99	7.91%	6.07%	1.84%
Sep-99	7.93%	6.07%	1.86%
Oct-99	8.06%	6.26%	1.80%
Nov-99	7.94%	6.15%	1.79%
Dec-99	8.14%	6.35%	1.79%
Jan-00	8.35%	6.63%	1.72%
Feb-00	8.25%	6.23%	2.02%
Mar-00	8.28%	6.05%	2.23%
Apr-00	8.29%	5.85%	2.44%
May-00	8.70%	6.15%	2.55%
Jun-00	8.36%	5.93%	2.43%
Jul-00	8.25%	5.85%	2.40%
Aug-00	8.13%	5.72%	2.41%
Sep-00	8.23%	5.83%	2.40%
Oct-00	8.14%	5.80%	2.34%
Nov-00	8.11%	5.78%	2.33%
Dec-00	7.84%	5.49%	2.35%
Jan-01	7.80%	5.54%	2.26%
Feb-01	7.74%	5.45%	2.29%
Mar-01	7.68%	5.34%	2.34%
Apr-01	7.94%	5.65%	2.29%
May-01	7.99%	5.78%	2.21%
Jun-01	7.85%	5.67%	2.18%
Jul-01	7.78%	5.61%	2.17%
Aug-01	7.59%	5.48%	2.11%
Sep-01	7.75%	5.48%	2.27%
Oct-01	7.63%	5.32%	2.31%
Nov-01	7.57%	5.12%	2.45%
Dec-01	7.83%	5.48%	2.35%
Jan-02	7.66%	5.45%	2.21%
Feb-02	7.54%	5.40%	2.14%
Mar-02	7.76%		
Apr-02	7.57%		
May-02	7.52%		
Jun-02	7.42%		
Jul-02	7.31%		
Aug-02	7.17%		
Sep-02	7.08%		
Oct-02	7.23%		
Nov-02	7.14%		
Dec-02	7.07%		
Jan-03	7.07%		
Feb-03	6.93%		
Mar-03	6.79%		
Apr-03	6.64%		
May-03	6.36%		
Jun-03	6.21%		
Jul-03	6.57%		
Aug-03	6.78%		
Sep-03	6.56%		
Oct-03	6.43%		
Nov-03	6.37%		
Dec-03	6.27%		
Jan-04	6.15%		
Feb-04	6.15%		
Mar-04	5.97%		
Apr-04	6.35%		
May-04	6.62%		
Jun-04	6.46%		
Jul-04	6.27%		
Aug-04	6.14%		
Sep-04	5.98%		
Oct-04	5.94%		
Nov-04	5.97%		
Dec-04	5.92%		
Jan-05	5.78%		
Feb-05	5.61%		
Mar-05	5.83%		
Apr-05	5.64%		
May-05	5.53%		
Jun-05	5.40%		
Jul-05	5.51%		
Aug-05	5.50%		
Sep-05	5.52%		
Oct-05	5.79%		
Nov-05	5.88%		
Dec-05	5.80%		

Year	A-rated Public Utility	30-Year Treasuries Yield	30-Year Treasuries Spread
Jan-06	5.75%		
Feb-06	5.82%	4.54%	1.28%
Mar-06	5.98%	4.73%	1.25%
Apr-06	6.29%	5.06%	1.23%
May-06	6.42%	5.20%	1.22%
Jun-06	6.40%	5.15%	1.25%
Jul-06	6.37%	5.13%	1.24%
Aug-06	6.20%	5.00%	1.20%
Sep-06	6.00%	4.85%	1.15%
Oct-06	5.98%	4.85%	1.13%
Nov-06	5.80%	4.69%	1.11%
Dec-06	5.81%	4.68%	1.13%
Jan-07	5.96%	4.85%	1.11%
Feb-07	5.90%	4.82%	1.08%
Mar-07	5.85%	4.72%	1.13%
Apr-07	5.97%	4.87%	1.10%
May-07	5.99%	4.90%	1.09%
Jun-07	6.30%	5.20%	1.10%
Jul-07	6.25%	5.11%	1.14%
Aug-07	6.24%	4.93%	1.31%
Sep-07	6.18%	4.79%	1.39%
Oct-07	6.11%	4.77%	1.34%
Nov-07	5.97%	4.52%	1.45%
Dec-07	6.16%	4.53%	1.63%
Jan-08	6.02%	4.33%	1.69%
Feb-08	6.21%	4.52%	1.69%
Mar-08	6.21%	4.39%	1.82%
Apr-08	6.29%	4.44%	1.85%
May-08	6.28%	4.60%	1.68%
Jun-08	6.38%	4.69%	1.69%
Jul-08	6.40%	4.57%	1.83%
Aug-08	6.37%	4.50%	1.87%
Sep-08	6.49%	4.27%	2.22%
Oct-08	7.56%	4.17%	3.39%
Nov-08	7.60%	4.00%	3.60%
Dec-08	6.52%	2.87%	3.65%
Jan-09	6.39%	3.13%	3.26%
Feb-09	6.30%	3.59%	2.71%
Mar-09	6.42%	3.64%	2.78%
Apr-09	6.48%	3.76%	2.72%
May-09	6.49%	4.23%	2.26%
Jun-09	6.20%	4.52%	1.68%
Jul-09	5.97%	4.41%	1.56%
Aug-09	5.71%	4.37%	1.34%
Sep-09	5.53%	4.19%	1.34%
Oct-09	5.55%	4.19%	1.36%
Nov-09	5.64%	4.31%	1.33%
Dec-09	5.79%	4.49%	1.30%
Jan-10	5.77%	4.60%	1.17%
Feb-10	5.87%	4.62%	1.25%
Mar-10	5.84%	4.64%	1.20%
Apr-10	5.81%	4.69%	1.12%
May-10	5.50%	4.29%	1.21%
Jun-10	5.46%	4.13%	1.33%
Jul-10	5.26%	3.99%	1.27%
Aug-10	5.01%	3.80%	1.21%
Sep-10	5.01%	3.77%	1.24%
Oct-10	5.10%	3.87%	1.23%
Nov-10	5.37%	4.19%	1.18%
Dec-10	5.56%	4.42%	1.14%
Jan-11	5.57%	4.52%	1.05%
Feb-11	5.68%	4.65%	1.03%
Mar-11	5.56%	4.51%	1.05%
Apr-11	5.55%	4.50%	1.05%
May-11	5.32%	4.29%	1.03%
Jun-11	5.26%	4.23%	1.03%
Jul-11	5.27%	4.27%	1.00%
Aug-11	4.69%	3.65%	1.04%
Sep-11	4.48%	3.18%	1.30%
Oct-11	4.52%	3.13%	1.39%
Nov-11	4.25%	3.02%	1.23%
Dec-11	4.33%	2.98%	1.35%
Jan-12	4.34%	3.03%	1.31%
Feb-12	4.36%	3.11%	1.25%
Mar-12	4.48%	3.28%	1.20%
Apr-12	4.40%	3.18%	1.22%
May-12	4.20%	2.93%	1.27%
Jun-12	4.08%	2.70%	1.38%
Jul-12	3.93%	2.59%	1.34%
Aug-12	4.00%	2.77%	1.23%
Sep-12	4.02%	2.88%	1.14%
Oct-12	3.91%	2.90%	1.01%
Nov-12	3.84%	2.80%	1.04%
Dec-12	4.00%	2.88%	1.12%

Year	A-rated Public Utility	30-Year Treasuries Yield	30-Year Treasuries Spread
Jan-13	4.15%	3.08%	1.07%
Feb-13	4.18%	3.17%	1.01%
Mar-13	4.20%	3.16%	1.04%
Apr-13	4.00%	2.93%	1.07%
May-13	4.17%	3.11%	1.06%
Jun-13	4.53%	3.40%	1.13%
Jul-13	4.68%	3.61%	1.07%
Aug-13	4.73%	3.76%	0.97%
Sep-13	4.80%	3.79%	1.01%
Oct-13	4.70%	3.68%	1.02%
Nov-13	4.77%	3.80%	0.97%
Dec-13	4.81%	3.89%	0.92%
Jan-14	4.63%	3.77%	0.86%
Feb-14	4.53%	3.66%	0.87%
Mar-14	4.51%	3.62%	0.89%
Apr-14	4.41%	3.52%	0.89%
May-14	4.26%	3.39%	0.87%
Jun-14	4.29%	3.42%	0.87%
Jul-14	4.23%	3.33%	0.90%
Aug-14	4.13%	3.20%	0.93%
Sep-14	4.24%	3.26%	0.98%
Oct-14	4.06%	3.04%	1.02%
Nov-14	4.09%	3.04%	1.05%
Dec-14	3.95%	2.83%	1.12%
Jan-15	3.58%	2.46%	1.12%
Feb-15	3.67%	2.57%	1.10%
Mar-15	3.74%	2.63%	1.11%
Apr-15	3.75%	2.59%	1.16%
May-15	4.17%	2.96%	1.21%
Jun-15	4.39%	3.11%	1.28%
Jul-15	4.40%	3.07%	1.33%
Aug-15	4.25%	2.86%	1.39%
Sep-15	4.39%	2.95%	1.44%
Oct-15	4.29%	2.89%	1.40%
Nov-15	4.40%	3.03%	1.37%
Dec-15	4.35%	2.97%	1.38%
Jan-16	4.27%	2.86%	1.41%
Feb-16	4.11%	2.62%	1.49%
Mar-16	4.16%	2.68%	1.48%
Apr-16	4.00%	2.62%	1.38%
May-16	3.93%	2.63%	1.30%
Jun-16	3.78%	2.45%	1.33%
Jul-16	3.57%	2.23%	1.34%
Aug-16	3.59%	2.26%	1.33%
Sep-16	3.66%	2.35%	1.31%
Oct-16	3.77%	2.50%	1.27%
Nov-16	4.08%	2.86%	1.22%
Dec-16	4.27%	3.11%	1.16%
Jan-16	4.27%	2.86%	1.41%
Feb-16	4.11%	2.62%	1.49%
Mar-16	4.16%	2.68%	1.48%
Apr-16	4.00%	2.62%	1.38%
May-16	3.93%	2.63%	1.30%
Jun-16	3.78%	2.45%	1.33%
Jul-16	3.57%	2.23%	1.34%
Aug-16	3.59%	2.26%	1.33%
Sep-16	3.66%	2.35%	1.31%
Oct-16	3.77%	2.50%	1.27%
Nov-16	4.08%	2.86%	1.22%
Dec-16	4.27%	3.11%	1.16%
Jan-17	4.14%	3.02%	1.12%
Feb-17	4.18%	3.03%	1.15%
Mar-17	4.23%	3.08%	1.15%
Apr-17	4.12%	2.94%	1.18%
May-17	4.12%	2.96%	1.16%
Jun-17	3.94%	2.80%	1.14%
Jul-17	3.99%	2.88%	1.11%
Aug-17	3.86%	2.80%	1.06%
Sep-17	3.87%	2.78%	1.09%
Oct-17	3.91%	2.88%	1.03%
Nov-17	3.83%	2.80%	1.03%
Dec-17	3.79%	2.77%	1.02%
Jan-18	3.86%	2.88%	0.98%
Feb-18	4.09%	3.13%	0.96%
Mar-18	4.13%	3.09%	1.04%
Apr-18	4.17%	3.07%	1.10%
May-18	4.28%	3.13%	1.15%
Jun-18	4.27%	3.05%	1.22%
Jul-18	4.27%	3.01%	1.26%
Aug-18	4.26%	3.04%	1.22%
Sep-18	4.32%	3.15%	1.17%
Oct-18	4.45%	3.34%	1.11%
Nov-18	4.52%	3.36%	1.16%
Dec-18	4.37%	3.10%	1.27%

Year	A-rated Public Utility	30-Year Treasuries Yield	30-Year Treasuries Spread
Jan-19	4.35%	3.04%	1.31%
Feb-19	4.25%	3.02%	1.23%
Mar-19	4.16%	2.98%	1.18%
Apr-19	4.08%	2.94%	1.14%
May-19	3.98%	2.82%	1.16%
Jun-19	3.82%	2.57%	1.25%
Jul-19	3.69%	2.57%	1.12%
Aug-19	3.29%	2.12%	1.17%
Sep-19	3.37%	2.16%	1.21%
Oct-19	3.39%	2.19%	1.20%
Nov-19	3.43%	2.28%	1.15%
Dec-19	3.40%	2.30%	1.10%
Jan-20	3.29%	2.22%	1.07%
Feb-20	3.11%	1.97%	1.14%
Mar-20	3.50%	1.46%	2.04%
Apr-20	3.19%	1.27%	1.92%
May-20	3.14%	1.38%	1.76%
Jun-20	3.07%	1.49%	1.58%
Jul-20	2.74%	1.31%	1.43%
Aug-20	2.73%	1.36%	1.37%
Sep-20	2.84%	1.42%	1.42%
Oct-20	2.95%	1.57%	1.38%
Nov-20	2.85%	1.62%	1.23%
Dec-20	2.77%	1.67%	1.10%
Jan-21	2.91%	1.82%	1.09%
Feb-21	3.09%	2.04%	1.05%
Mar-21	3.44%	2.34%	1.10%
Apr-21	3.30%	2.30%	1.00%
May-21	3.33%	2.32%	1.01%
Jun-21	3.16%	2.16%	1.00%
Jul-21	2.95%	1.94%	1.01%
Aug-21	2.95%	1.92%	1.03%
Sep-21	2.96%	1.94%	1.02%
Oct-21	3.09%	2.06%	1.03%
Nov-21	3.02%	1.94%	1.08%
Dec-21	3.13%	1.85%	1.28%
Jan-22	3.33%	2.10%	1.23%
Feb-22	3.68%	2.25%	1.43%
Mar-22	3.98%	2.41%	1.57%
Apr-22	4.32%	2.81%	1.51%
May-22	4.75%	3.07%	1.68%
Jun-22	4.86%	3.25%	1.61%
Jul-22	4.78%	3.10%	1.68%
Aug-22	4.76%	3.13%	1.63%
Sep-22	5.28%	3.56%	1.72%
Oct-22	5.88%	4.04%	1.84%
Nov-22	5.75%	4.00%	1.75%
Dec-22	5.28%	3.66%	1.62%
Jan-23	5.20%	3.66%	1.54%
Feb-23	5.29%	3.80%	1.49%
Mar-23	5.39%	3.77%	1.62%
Apr-23	5.13%	3.68%	1.45%
May-23	5.36%	3.86%	1.50%
Jun-23	5.38%	3.87%	1.51%
Jul-23	5.41%	3.96%	1.45%
Aug-23	5.71%	4.28%	1.43%
Sep-23	5.86%	4.47%	1.39%
Oct-23	6.34%	4.95%	1.39%
Nov-23	5.96%	4.66%	1.30%
Dec-23	5.42%	4.14%	1.28%
Jan-24	5.48%	4.26%	1.22%
Feb-24	5.56%	4.38%	1.18%
Mar-24	5.55%	4.36%	1.19%

Recent Average: 12-month	1.36%
6-month	1.26%
3-month	1.20%

Common Equity Risk Premiums
Years 1926-2022

	Large Common Stocks	Long-Term Corp. Bonds	Equity Risk Premium	Long-Term Govt. Bonds Yields
Low Interest Rates	12.40%	5.27%	7.13%	2.83%
Average Across All Interest Rates	12.02%	6.06%	5.96%	4.91%
High Interest Rates	11.63%	6.87%	4.76%	7.03%

Source of Information: 2023 SBBI Yearbook Stocks, Bonds, Bills, and Inflation

Basic Series
Annual Total Returns (except yields)

Year	Large Common Stocks	Long-Term Corp. Bonds	Long-Term Govt. Bonds Yields
1926	11.62%	7.37%	3.54%
1927	37.49%	7.44%	3.17%
1928	43.61%	2.84%	3.40%
1929	-8.42%	3.27%	3.40%
1930	-24.90%	7.98%	3.30%
1931	-43.34%	-1.85%	4.07%
1932	-8.19%	10.82%	3.15%
1933	53.99%	10.38%	3.36%
1934	-1.44%	13.84%	2.93%
1935	47.67%	9.61%	2.76%
1936	33.92%	6.74%	2.55%
1937	-35.03%	2.75%	2.73%
1938	31.12%	6.13%	2.52%
1939	-0.41%	3.97%	2.26%
1940	-9.78%	3.39%	1.94%
1941	-11.59%	2.73%	2.04%
1942	20.34%	2.60%	2.46%
1943	25.90%	2.83%	2.48%
1944	19.75%	4.73%	2.46%
1945	36.44%	4.08%	1.99%
1946	-8.07%	1.72%	2.12%
1947	5.71%	-2.34%	2.43%
1948	5.50%	4.14%	2.37%
1949	18.79%	3.31%	2.09%
1950	31.71%	2.12%	2.24%
1951	24.02%	-2.69%	2.69%
1952	18.37%	3.52%	2.79%
1953	-0.99%	3.41%	2.74%
1954	52.62%	5.39%	2.72%
1955	31.56%	0.48%	2.95%
1956	6.56%	-6.81%	3.45%
1957	-10.78%	8.71%	3.23%
1958	43.36%	-2.22%	3.82%
1959	11.96%	-0.97%	4.47%
1960	0.47%	9.07%	3.80%
1961	26.89%	4.82%	4.15%
1962	-8.73%	7.95%	3.95%
1963	22.80%	2.19%	4.17%
1964	16.48%	4.77%	4.23%
1965	12.45%	-0.46%	4.50%
1966	-10.06%	0.20%	4.55%
1967	23.98%	-4.95%	5.56%
1968	11.06%	2.57%	5.98%
1969	-8.50%	-8.09%	6.87%
1970	3.86%	18.37%	6.48%
1971	14.30%	11.01%	5.97%
1972	18.99%	7.26%	5.99%
1973	-14.69%	1.14%	7.26%
1974	-26.47%	-3.06%	7.60%
1975	37.23%	14.64%	8.05%
1976	23.93%	18.65%	7.21%
1977	-7.16%	1.71%	8.03%
1978	6.57%	-0.07%	8.98%
1979	18.61%	-4.18%	10.12%
1980	32.50%	-2.76%	11.99%
1981	-4.92%	-1.24%	13.34%
1982	21.55%	42.56%	10.95%
1983	22.56%	6.26%	11.97%
1984	6.27%	16.86%	11.70%
1985	31.73%	30.09%	9.56%
1986	18.67%	19.85%	7.89%
1987	5.25%	-0.27%	9.20%
1988	16.61%	10.70%	9.19%
1989	31.69%	16.23%	8.16%
1990	-3.10%	6.78%	8.44%
1991	30.47%	19.89%	7.30%
1992	7.62%	9.39%	7.26%
1993	10.08%	13.19%	6.54%
1994	1.32%	-5.76%	7.99%
1995	37.58%	27.20%	6.03%
1996	22.96%	1.40%	6.73%
1997	33.36%	12.95%	6.02%
1998	28.58%	10.76%	5.42%
1999	21.04%	-7.45%	6.82%
2000	-9.10%	12.87%	5.58%
2001	-11.89%	10.65%	5.75%
2002	-22.10%	16.33%	4.84%
2003	28.68%	5.27%	5.11%
2004	10.88%	8.72%	4.84%
2005	4.91%	5.87%	4.61%
2006	15.79%	3.24%	4.91%
2007	5.49%	2.60%	4.50%
2008	-37.00%	8.78%	3.03%
2009	26.46%	3.02%	4.58%
2010	15.06%	12.44%	4.14%
2011	2.11%	17.95%	2.55%
2012	16.00%	10.68%	2.46%
2013	32.39%	-7.07%	3.78%
2014	13.69%	17.28%	2.46%
2015	1.38%	-1.02%	2.68%
2016	11.96%	6.70%	2.72%
2017	21.83%	12.25%	2.54%
2018	-4.38%	-4.73%	2.84%
2019	31.49%	19.95%	2.25%
2020	18.40%	15.40%	1.37%
2021	28.71%	-2.66%	1.88%
2022	-18.11%	-26.18%	4.24%

Yields for Treasury Constant Maturities
Yearly for 2018-2022 and 2023
and the Twelve Months Ended March 2024

Years	1-Year	2-Year	3-Year	5-Year	7-Year	10-Year	20-Year	30-Year
2018	2.33%	2.53%	2.63%	2.75%	2.85%	2.91%	3.02%	3.11%
2019	2.05%	1.97%	1.94%	1.96%	2.05%	2.14%	2.40%	2.58%
2020	0.38%	0.40%	0.43%	0.54%	0.73%	0.89%	1.35%	1.56%
2021	0.10%	0.27%	0.46%	0.86%	1.19%	1.44%	1.98%	2.05%
2022	2.79%	2.98%	3.05%	3.00%	3.01%	2.95%	3.30%	3.12%
Five-Year Average	1.53%	1.63%	1.70%	1.82%	1.97%	2.07%	2.41%	2.48%
2023	5.08%	4.58%	4.30%	4.06%	4.02%	3.96%	4.25%	4.09%
Months								
Apr-23	4.68%	4.02%	3.76%	3.54%	3.50%	3.46%	3.80%	3.68%
May-23	4.91%	4.13%	3.82%	3.59%	3.58%	3.57%	3.96%	3.86%
Jun-23	5.24%	4.64%	4.27%	3.95%	3.85%	3.75%	4.04%	3.87%
Jul-23	5.37%	4.83%	4.47%	4.14%	4.03%	3.90%	4.15%	3.96%
Aug-23	5.37%	4.90%	4.59%	4.31%	4.26%	4.17%	4.46%	4.28%
Sep-23	5.44%	5.02%	4.74%	4.49%	4.46%	4.38%	4.65%	4.47%
Oct-23	5.42%	5.07%	4.89%	4.77%	4.82%	4.80%	5.13%	4.95%
Nov-23	5.28%	4.88%	4.64%	4.49%	4.53%	4.50%	4.84%	4.66%
Dec-23	4.96%	4.46%	4.19%	4.00%	4.04%	4.02%	4.32%	4.14%
Jan-24	4.79%	4.32%	4.11%	3.98%	4.03%	4.06%	4.39%	4.26%
Feb-24	4.92%	4.54%	4.33%	4.19%	4.21%	4.21%	4.49%	4.38%
Mar-24	4.99%	4.59%	4.38%	4.20%	4.21%	4.21%	4.46%	4.36%
Twelve-Month Average	5.11%	4.62%	4.35%	4.14%	4.13%	4.09%	4.39%	4.24%
Six-Month Average	5.06%	4.64%	4.42%	4.27%	4.31%	4.30%	4.61%	4.46%
Three-Month Average	4.90%	4.48%	4.27%	4.12%	4.15%	4.16%	4.45%	4.33%

Source: Federal Reserve statistical release H.15

Measures of the Risk-Free Rate & Corporate Bond Yields

The forecast of Treasury and Corporate yields
per the consensus of nearly 50 economists
reported in the Blue Chip Financial Forecasts dated December 1, 2023 and April 1, 2024

		Treasury					Corporate	
Year	Quarter	1-Year Bill	2-Year Note	5-Year Note	10-Year Note	30-Year Bond	Aaa Bond	Baa Bond
2024	Second	4.8%	4.4%	4.1%	4.1%	4.3%	5.0%	5.9%
2024	Third	4.5%	4.1%	3.9%	4.0%	4.2%	4.9%	5.8%
2024	Fourth	4.2%	3.9%	3.8%	3.9%	4.2%	4.9%	5.8%
2025	First	3.9%	3.7%	3.7%	3.9%	4.1%	4.8%	5.8%
2025	Second	3.7%	3.6%	3.6%	3.8%	4.1%	4.8%	5.8%
2025	Third	3.6%	3.5%	3.6%	3.8%	4.0%	4.8%	5.7%
Long-range CONSENSUS								
2025		3.7%	3.7%	3.7%	3.9%	4.1%	5.0%	6.0%
2026		3.4%	3.5%	3.7%	3.9%	4.1%	4.9%	6.0%
2027		3.3%	3.4%	3.7%	3.9%	4.1%	4.9%	6.0%
2028		3.3%	3.4%	3.7%	3.9%	4.2%	5.0%	6.0%
2029		3.2%	3.4%	3.7%	3.9%	4.2%	5.0%	6.0%
Averages:								
	2025-2029	3.4%	3.5%	3.7%	3.9%	4.1%	4.9%	6.0%
	2030-2034	3.2%	3.4%	3.7%	3.9%	4.2%	5.0%	6.0%

Measures of the Market Premium

Historical Market Premium

Avg. to Low Interest Rates	(Rm)	(Rf)	
1926-2022 Arith. mean	12.21%	3.87%	8.34%

Forecast Market Premium

Value Line	Dividend Yield		Median Appreciation Potential		Median Total Return
As of: 29-Mar-24	2.1%	+	9.73%	=	11.83%
Risk-free Rate of Return (Rf)					3.75%
					8.08%
Average - Historical/Forecast					8.21%

Comparable Earnings Approach
Using Non-Utility Companies with
Timeliness of 3, 4 & 5; Safety Rank of 1, 2 & 3; Financial Strength of B+, B++, & A;
Price Stability of 80 to 100; Betas of .70 to 1.00; and Technical Rank of 3, 4 & 5

Company	Industry	Timeliness Rank	Safety Rank	Financial Strength	Price Stability	Beta	Technical Rank
Altria Group Inc	Tobacco	3	2	A	95	0.85	3
Analog Devices Inc	Semiconductor	4	2	A	90	1.00	3
Arthur J Gallagher and Company	Financial Svcs. (Div.)	4	1	A	95	0.95	3
Avnet Inc	Electronics	3	3	B++	80	1.00	3
Baxter International Inc	Med Supp Invasive	3	2	A	95	0.70	4
Brady Corp	Diversified Co.	3	2	B++	90	0.95	3
Casella Waste Systems Inc	Environmental	5	3	B+	85	0.85	3
Caseys General Stores Inc	Retail/Wholesale Food	3	2	B++	90	0.90	3
CH Robinson Worldwide Inc	Industrial Services	3	2	A	90	0.70	3
Commerce Bancshares Inc	Bank (Midwest)	3	3	B++	90	0.90	3
CSG Systems International Inc	IT Services	3	2	B+	95	0.75	3
Dolby Laboratories Inc	Entertainment Tech	4	2	A	90	0.95	3
Exponent Inc.	Information Services	4	3	B+	80	0.95	4
Federal Signal Corp	Heavy Truck & Equip	3	3	B++	90	0.95	3
GATX Corp	Railroad	3	3	B++	85	0.95	3
Heartland Express Inc	Trucking	3	2	A	95	0.75	3
Henry Schein Inc	Med Supp Non-Invasive	3	3	B++	80	1.00	3
Houlihan Lokey	Investment Banking	4	2	A	90	0.75	3
IDEX Corporation	Machinery	4	2	B++	100	0.95	3
J and J Snack Foods Corp	Food Processing	4	2	A	85	0.90	3
Keysight Technologies	Precision Instrument	3	2	A	80	0.90	3
Kimberly Clark Corp	Household Products	4	1	A	100	0.70	5
Kraft Heinz Co.	Food Processing	3	3	B++	90	0.75	5
Landstar System	Trucking	4	1	A	100	0.80	3
McCormick and Co	Food Processing	5	1	A	95	0.80	5
Motorola Solutions Inc	Telecom. Equipment	3	2	B++	95	0.95	3
MSA Safety	Machinery	3	2	A	85	0.95	3
Northwest Bancshares Inc	Thrift	3	3	B+	95	0.90	3
O Reilly Automotive Inc	Retail Automotive	3	2	B++	90	0.90	3
OSI Systems Inc	Precision Instrument	3	2	B++	90	0.90	3
Otis Worldwide	Machinery	3	2	B++	100	0.95	3
Packaging Corp	Packaging & Container	3	2	B++	90	0.95	3
Pfizer Inc	Drug	3	2	A	90	0.80	3
Philip Morris International Inc	Tobacco	4	2	A	90	0.95	4
Premier Inc.	Healthcare Information	3	2	A	80	0.70	5
Quest Diagnostics Inc	Medical Services	3	2	B++	90	0.75	5
Republic Services Inc	Environmental	3	1	A	100	0.85	3
Royal Gold Inc	Precious Metals	3	3	B++	80	0.75	5
SBA Communications	Wireless Networking	4	3	B+	80	0.90	4
Schneider National	Trucking	4	3	B++	85	0.75	4
Sensient Technologies Corp	Food Processing	4	2	B++	90	0.90	4
Sherwin Williams	Retail Building Supply	3	2	A	90	0.95	3
Silgan Holdings Inc	Packaging & Container	3	2	B+	100	0.85	5
Sonoco Products	Packaging & Container	3	2	A	95	1.00	4
Stepan Company	Chemical (Specialty)	4	2	B++	85	0.80	3
Toro Co	Machinery	3	3	B++	80	1.00	3
Trimas Corporation	Diversified Co.	3	3	B+	80	0.85	5
UniFirst Corp	Industrial Services	4	2	A	90	0.90	3
VeriSign Inc	Internet	3	2	A	95	0.90	3
Werner Enterprises Inc	Trucking	4	2	B++	95	0.75	3
Average		3	2	B++	90	0.87	3
Water Group	Average	4	2	B++	91	0.82	4

Source of Information: Value Line Investment Survey for Windows, April 2024

Comparable Earnings Approach
Five -Year Average Historical Earned Returns
for Years 2019-2023 and
Projected 3-5 Year Returns

Company	2019	2020	2021	2022	2023	Average	Projected 2027-29
Altria Group Inc	NMF	NMF	-	NMF	NMF	-	NMF
Analog Devices Inc	16.3%	15.2%	6.8%	13.6%	14.2%	13.2%	15.5%
Arthur J Gallagher and Company	12.8%	13.2%	10.7%	8.9%	12.5%	11.6%	18.0%
Avnet Inc	11.0%	5.4%	6.6%	16.5%	16.2%	11.1%	10.5%
Baxter International Inc	21.8%	18.4%	20.2%	30.4%	24.0%	23.0%	25.0%
Brady Corp	15.4%	13.0%	13.5%	16.5%	17.6%	15.2%	17.0%
Casella Waste Systems Inc	25.8%	25.2%	9.7%	10.7%	3.5%	15.0%	7.5%
Caseys General Stores Inc	16.1%	16.2%	15.2%	16.8%	15.5%	16.0%	16.0%
CH Robinson Worldwide Inc	34.5%	26.9%	41.8%	69.5%	27.8%	40.1%	53.0%
Commerce Bancshares Inc	13.4%	10.4%	15.4%	19.8%	16.2%	15.0%	14.0%
CSG Systems International Inc	20.9%	13.9%	16.6%	12.4%	19.0%	16.6%	22.5%
Dolby Laboratories Inc	11.1%	9.5%	11.9%	8.2%	8.5%	9.8%	10.0%
Exponent Inc.	23.5%	22.8%	24.3%	31.9%	28.2%	26.1%	27.0%
Federal Signal Corp	17.2%	14.7%	13.9%	14.0%	15.5%	15.1%	16.5%
GATX Corp	10.9%	6.5%	9.0%	10.7%	11.3%	9.7%	14.0%
Heartland Express Inc	10.7%	9.8%	10.9%	9.6%	1.7%	8.5%	8.5%
Henry Schein Inc	23.4%	12.0%	18.4%	15.6%	13.0%	16.5%	16.0%
Houlihan Lokey	18.7%	22.6%	30.3%	16.0%	15.0%	20.5%	23.0%
IDEX Corporation	19.6%	15.6%	17.2%	20.3%	17.6%	18.1%	14.5%
J and J Snack Foods Corp	11.4%	2.3%	6.6%	5.5%	8.7%	6.9%	12.5%
Keysight Technologies	30.0%	27.8%	30.8%	33.4%	32.0%	30.8%	25.0%
Kimberly Clark Corp	-	NMF	NMF	236.6%	231.3%	234.0%	85.5%
Kraft Heinz Co.	6.8%	7.1%	7.3%	7.1%	7.4%	7.1%	9.0%
Landstar System	31.6%	27.8%	44.3%	48.6%	26.9%	35.8%	22.0%
McCormick and Co	20.8%	19.4%	18.7%	14.6%	14.4%	17.6%	16.0%
Motorola Solutions Inc	-	-	-	-	-	-	32.0%
MSA Safety	25.9%	22.4%	22.1%	24.1%	28.7%	24.6%	23.5%
Northwest Bancshares Inc	8.2%	4.9%	9.7%	9.0%	8.7%	8.1%	8.5%
O Reilly Automotive Inc	350.1%	1249.3%	-	NMF	NMF	799.7%	NMF
OSI Systems Inc	11.7%	13.2%	11.6%	18.1%	12.6%	13.4%	13.5%
Otis Worldwide	-	NMF	NMF	NMF	NMF	-	NMF
Packaging Corp	22.7%	16.9%	24.8%	28.4%	19.6%	22.5%	26.0%
Pfizer Inc	25.8%	11.0%	29.0%	32.8%	2.4%	20.2%	22.0%
Philip Morris International Inc	-	-	-	-	-	-	NMF
Premier Inc.	20.9%	18.1%	13.7%	13.5%	12.8%	15.8%	12.0%
Quest Diagnostics Inc	15.9%	22.6%	28.4%	20.0%	15.3%	20.4%	17.0%
Republic Services Inc	13.2%	13.4%	14.8%	16.1%	16.0%	14.7%	16.0%
Royal Gold Inc	4.4%	6.9%	9.5%	8.2%	8.1%	7.4%	14.0%
SBA Communications	-	-	-	NMF	NMF	-	NMF
Schneider National	6.6%	10.3%	16.7%	16.1%	8.0%	11.5%	12.5%
Sensient Technologies Corp	14.2%	11.7%	14.1%	13.9%	8.9%	12.6%	12.0%
Sherwin Williams	47.9%	62.6%	89.3%	73.6%	72.0%	69.1%	NMF
Silgan Holdings Inc	18.9%	24.6%	23.0%	25.7%	16.8%	21.8%	16.5%
Sonoco Products	19.8%	18.2%	19.4%	22.6%	19.6%	19.9%	16.5%
Stepan Company	11.6%	12.9%	12.8%	12.6%	4.0%	10.8%	8.0%
Toro Co	31.9%	29.6%	35.6%	32.8%	21.8%	30.3%	39.0%
Trimas Corporation	9.5%	11.8%	9.1%	10.2%	5.9%	9.3%	11.5%
UniFirst Corp	10.0%	7.8%	8.1%	5.4%	5.2%	7.3%	8.0%
VeriSign Inc	-	-	-	-	NMF	-	NMF
Werner Enterprises Inc	15.0%	15.1%	17.6%	16.5%	8.0%	14.4%	10.5%
Average						40.6%	19.0%
Median						15.5%	16.0%
Average (excluding companies with values >20%)						12.7%	13.1%

Comparable Earnings Approach
Screening Parameters

Timeliness Rank

The rank for a stock's probable relative market performance in the year ahead. Stocks ranked 1 (Highest) or 2 (Above Average) are likely to outpace the year-ahead market. Those ranked 4 (Below Average) or 5 (Lowest) are not expected to outperform most stocks over the next 12 months. Stocks ranked 3 (Average) will probably advance or decline with the market in the year ahead. Investors should try to limit purchases to stocks ranked 1 (Highest) or 2 (Above Average) for Timeliness.

Safety Rank

A measure of potential risk associated with individual common stocks rather than large diversified portfolios (for which Beta is good risk measure). Safety is based on the stability of price, which includes sensitivity to the market (see Beta) as well as the stock's inherent volatility, adjusted for trend and other factors including company size, the penetration of its markets, product market volatility, the degree of financial leverage, the earnings quality, and the overall condition of the balance sheet. Safety Ranks range from 1 (Highest) to 5 (Lowest). Conservative investors should try to limit purchases to equities ranked 1 (Highest) or 2 (Above Average) for Safety.

Financial Strength

The financial strength of each of the more than 1,600 companies in the VS II data base is rated relative to all the others. The ratings range from A++ to C in nine steps. (For screening purposes, think of an A rating as "greater than" a B). Companies that have the best relative financial strength are given an A++ rating, indicating ability to weather hard times better than the vast majority of other companies. Those who don't quite merit the top rating are given an A+ grade, and so on. A rating as low as C++ is considered satisfactory. A rating of C+ is well below average, and C is reserved for companies with very serious financial problems. The ratings are based upon a computer analysis of a number of key variables that determine (a) financial leverage, (b) business risk, and (c) company size, plus the judgment of Value Line's analysts and senior editors regarding factors that cannot be quantified across-the-board for companies. The primary variables that are indexed and studied include equity coverage of debt, equity coverage of intangibles, "quick ratio", accounting methods, variability of return, fixed charge coverage, stock price stability, and company size.

Price Stability Index

An index based upon a ranking of the weekly percent changes in the price of the stock over the last five years. The lower the standard deviation of the changes, the more stable the stock. Stocks ranking in the top 5% (lowest standard deviations) carry a Price Stability Index of 100; the next 5%, 95; and so on down to 5. One standard deviation is the range around the average weekly percent change in the price that encompasses about two thirds of all the weekly percent change figures over the last five years. When the range is wide, the standard deviation is high and the stock's Price Stability Index is low.

Beta

A measure of the sensitivity of the stock's price to overall fluctuations in the New York Stock Exchange Composite Average. A Beta of 1.50 indicates that a stock tends to rise (or fall) 50% more than the New York Stock Exchange Composite Average. Use Beta to measure the stock market risk inherent in any diversified portfolio of, say, 15 or more companies. Otherwise, use the Safety Rank, which measures total risk inherent in an equity, including that portion attributable to market fluctuations. Beta is derived from a least squares regression analysis between weekly percent changes in the price of a stock and weekly percent changes in the NYSE Average over a period of five years. In the case of shorter price histories, a smaller time period is used, but two years is the minimum. The Betas are periodically adjusted for their long-term tendency to regress toward 1.00.

Technical Rank

A prediction of relative price movement, primarily over the next three to six months. It is a function of price action relative to all stocks followed by Value Line. Stocks ranked 1 (Highest) or 2 (Above Average) are likely to outpace the market. Those ranked 4 (Below Average) or 5 (Lowest) are not expected to outperform most stocks over the next six months. Stocks ranked 3 (Average) will probably advance or decline with the market. Investors should use the Technical and Timeliness Ranks as complements to one another.

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

DOCKET NOS. R-2024-3047822, R-2024-3047824

AQUA PENNSYLVANIA, INC.
AQUA PENNSYLVANIA WASTEWATER, INC.

PREPARED DIRECT TESTIMONY OF PAUL R. MOUL

Topics Addressed:

Cost of Capital

DATE SERVED: May 23, 2024
DATE ADMITTED: _____

Aqua Statement No. 7

Aqua Pennsylvania, Inc.
Direct Testimony of Paul R. Moul
Table of Contents

GLOSSARY OF ACRONYMS AND DEFINED TERMS	
ACRONYM	**DEFINED TERM**
AFUDC	Allowance for Funds Used During Construction
AP	Aqua Pennsylvania, Inc.
b	Represents the retention rate that consists of the fraction of earnings that are not paid out as dividends
β	Beta
b x r	Represents internal growth
CAPM	Capital Asset Pricing Model
CCR	Corporate Credit Rating
CE	Comparable Earnings
CWIP	Construction Work in Progress
DCF	Discounted Cash Flow
DDBP	Disinfectants/Disinfection By-Products
EPA	Environmental Protection Agency
ESWTR	Enhanced Surface Water Treatment Rule
EU	Essential Utilities, Inc.
FOMC	Federal Open Market Committee
G	Growth rate
FPFTY	Fully Projected Future Test Year
FTY	Future test year
GDP	Gross Domestic Product
HTY	Historic test year
IGF	Internally generated funds
Lev	Leverage modification
M&A	Merger and Acquisition
M&M	Modigliani & Miller
PFAS	Per- and Polyfluoroalkyl Substance, also known as “forever chemicals”
PPUC	Pennsylvania Public Utility Commission
r	Represents the expected rate of return on common equity
Rf	Risk-free rate of return

GLOSSARY OF ACRONYMS AND DEFINED TERMS	
ACRONYM	**DEFINED TERM**
Rm	Market return
Rm-Rf	Market premium
RP	Risk Premium
s	Represents the new common shares expected to be issued by a firm
s x v	Represents external growth
S&P	Standard & Poor's
SDWA	Safe Drinking Water Act Amendments of 1996
v	Represents the value that accrues to existing shareholders from selling stock at a price different from book value.

INTRODUCTION AND SUMMARY OF RECOMMENDATIONS

1. Q. PLEASE STATE YOUR NAME, OCCUPATION AND BUSINESS ADDRESS.

A. My name is Paul Ronald Moul. My business address is 251 Hopkins Road, Haddonfield, New Jersey 08033-3062. I am Managing Consultant at the firm P. Moul & Associates, an independent financial and regulatory consulting firm. My educational background, business experience and qualifications are provided in Appendix A that follows my direct testimony.

2. Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. My testimony presents evidence, analysis and a recommendation concerning the appropriate cost of equity and overall rate of return that the Pennsylvania Public Utility Commission ("PPUC" or the "Commission") should recognize in the determination of the revenues that Aqua Pennsylvania, Inc. and Aqua Pennsylvania Wastewater, Inc. (collectively "AP" or the "Company") should realize as a result of this proceeding. My analysis and recommendation are supported by the detailed financial data contained in AP Exhibit 4-A, which is a multi-page document divided into fourteen (14) schedules.

3. Q. BASED UPON YOUR ANALYSIS, WHAT IS YOUR CONCLUSION CONCERNING THE APPROPRIATE RATE OF RETURN FOR THE COMPANY?

A. Based upon my independent analysis, my conclusion is that the Company should be afforded an opportunity to earn a rate of return on common equity of at least 10.95%. The 10.95% rate of return on common equity that the Company employed to develop its proposed revenue requirement in this case is within the range of returns indicated by the various models I used to determine the Company's cost of equity. However, the Company determined that it would select an equity return rate within the lower end of my range. The Company has

indicated that it selected its proposed equity return rate to moderate the customer impact of its proposed rate increase. Although the Company needs a material increase in rates, and it has been approximately three years since it filed its last base rate case, the Company believes that its proposed equity return rate will support its ability to continue to furnish its customers with high-quality water and wastewater service and enable it to continue to make substantial investments in water and wastewater infrastructure while also mitigating the impact of its proposed increase.

My cost of equity determination should be viewed in the context of the need for supportive regulation at a time of increased infrastructure improvements now underway for the Company. As shown on page 1 of Schedule 1, I have presented the weighted average cost of capital for the Company, which is calculated with the December 31, 2025 Fully Projected Future Test Year ("FPFTY"). The Company's proposed rate of return is shown below:

Type of Capital	Ratios	Cost Rate	Weighted Cost Rate
Long-Term Debt	46.05%	4.32%	1.99%
Common Equity	53.95%	10.95%	5.91%
Total	100.00%		7.90%

The resulting overall cost of capital, which is the product of weighting the individual capital costs by the proportion of each respective type of capital, should establish a compensatory level of return for the use of capital and, if achieved, will provide the Company with the ability to attract capital on reasonable terms.

4. Q. WHAT NOTEWORTHY FACTORS HAVE INFLUENCED YOUR COST OF EQUITY ANALYSIS?

A. My cost of equity analysis reflects the impact of high levels of inflation, which have not been seen for four decades. Indeed, the rate of inflation spiked upward to 9.1% in June 2022, and by March 2024 it had fallen to 3.5%, yet above recent historical levels. High levels of inflation, i.e., those above the Federal Open Market Committee ("FOMC") policy goal of 2%, have an impact on the level of economic activity, the cost of capital – particularly the interest cost of debt, and the need for more cautious financial practices, such as a prudent level of borrowing. While short-term interest rates were at historically low levels during much of the Pandemic, longer-term interest rates began to rise in February 2021 and have continued at higher levels to date. Following the Pandemic, the accommodative policy by the FOMC ended, and higher interest rates have occurred. The FOMC uses its open market operations to control the Fed Funds rate as a means of implementing its dual mandate of healthy employment and price stability. This was revealed by the Fed Funds rate, which increased 525 basis points since the beginning of 2022 through 11 increases in 24 months. The FOMC paused its rate increases and held rates steady at its meeting on June 14, 2023. Thereafter, another rate increase occurred on July 26, 2023. The FOMC paused again at its meetings on September 20, November 1, and December 13, 2023, and January 31, and March 20, 2024. It appears that we are at the end of the current interest rate tightening cycle. Modest reductions in the Fed Funds rate in the future, however, would not reduce the rate to Pandemic or pre-Pandemic levels, which were very low after the financial crisis of 2007-08.

5. Q. WHAT BACKGROUND INFORMATION CONCERNING THE COMPANY HAVE YOU CONSIDERED AS PART OF YOUR TESTIMONY?

A. AP provides water service to approximately 450,000 customers in the five counties that comprise the Philadelphia suburbs, as well as in twenty-seven (27)

additional counties in the northwestern, central, and Pocono Mountains regions of Pennsylvania. The Company meets its customers' needs from surface and ground water supplies and from purchases. The Company also furnishes wastewater service to approximately 53,000 wastewater customers located throughout Pennsylvania. Its service areas are concentrated in Southeastern, Northeastern, and Western areas of the Commonwealth; however, most are not contiguous and are operated independently.

AP has been a leader in implementing the Commission's policy of consolidating separate water utility systems throughout Pennsylvania. The Company's first major acquisition occurred in 1985 with the purchase of the assets of Great Valley Water Company. AP has completed over 200 acquisitions since 1995. Some of these acquisitions included multiple systems.

The benefits of regionalization accrue to all of the Company's constituencies. New customers benefit from the Company's management expertise and access to capital needed for system improvements, which enhances service reliability and water quality of the acquired systems; existing customers benefit from the economies of scale derived from adding new customers; the Company's employees benefit from a wider scope of responsibilities and opportunities for professional development; and investors benefit from the additional growth obtained by Essential Utilities, Inc. ("EU"), the parent company of AP.

6. Q. IN YOUR OPINION, WHAT FACTORS SHOULD THE COMMISSION CONSIDER WHEN DETERMINING THE COMPANY'S COST OF CAPITAL IN THIS PROCEEDING?

A. The Commission's rate of return allowance must be set to cover the Company's interest and dividend payments, provide a reasonable level of earnings retention,

produce an adequate level of internally-generated funds to meet capital requirements, be commensurate with the risk to which the Company's capital is exposed, assure confidence in the financial integrity of the Company, support reasonable credit quality, and allow the Company to raise capital on reasonable terms. The return the Company has selected fulfills these established standards of a fair rate of return set forth by the landmark Bluefield and Hope cases.[1] That is to say, the proposed rate of return is commensurate with returns available on investments having corresponding risks.

7. **Q. HOW HAVE YOU DETERMINED THE COST OF EQUITY FOR THE COMPANY?**

A. My cost of equity recommendation was developed using capital market and financial data relied upon by investors when assessing the relative risk, and hence cost of equity, for a water utility, such as AP. In analyzing the Company's cost of equity, I have relied on four well-recognized measures: the Discounted Cash Flow ("DCF") model, the Risk Premium ("RP") analysis, the Capital Asset Pricing Model ("CAPM"), and the Comparable Earnings ("CE") approach. By considering the results of a variety of approaches, my analysis is consistent with well-recognized principles for determining a fair rate of return. I have measured the cost of equity for the Company using data from a proxy group of eight (8) water companies that are identified on page 2 of Schedule 3. I will refer to my proxy group of eight water companies as the "Water Group."

8. Q. HOW HAVE YOU PERFORMED YOUR COST OF EQUITY ANALYSIS WITH THE MARKET DATA FOR THE WATER GROUP?

A. I have applied the models/methods for estimating the cost of equity using the

[1] Bluefield Water Works & Improvement Co. v. P.S.C. of West Virginia, 262 U.S. 679 (1923) and F.P.C. v. Hope Natural Gas Co., 320 U.S. 591 (1944).

average data for the Water Group. I have not measured separately the cost of equity for the individual companies within the Water Group, because the determination of the cost of equity for an individual company has become increasingly problematic. By employing group average data, rather than individual company analysis, I have helped to minimize the effect of extraneous influences on the market data for an individual company.

9. Q. PLEASE SUMMARIZE THE BASIS FOR YOUR COST OF EQUITY RECOMMENDATION IN THIS PROCEEDING.

A. My recommendation is derived from the results of the four methods/models previously identified. In general, the use of more than one approach provides a superior foundation to arrive at the cost of equity. At any point in time, a single method can provide an incomplete measure of the cost of equity depending upon extraneous factors which may influence market sentiment. The specific application of these methods/models will be described later in my testimony.

The following table provides a summary of the indicated costs of equity using each of these approaches.

	Water Group
DCF	10.58%
Risk Premium	11.50%
CAPM	13.80%
Comparable Earnings	12.90%
Average	12.20%
Median	12.20%
Mid-point	12.19%

As shown above, the market models of the cost of equity (*i.e.*, DCF, RP and CAPM) provide a range of equity returns of 10.58% to 13.80%. Focusing more narrowly on the DCF and RP, the equity return is within the range of 10.58% to 11.50%. It is noteworthy that the Commission has determined in a prior AP base rate cases that the Company's cost of equity should reflect the exemplary performance of its management, including AP's efforts to help the Commission deal with the problems created by small and non-viable water and wastewater systems throughout the Commonwealth. In this regard, I have not made an independent evaluation of the Company's management effectiveness. The Company's excellent management performance once again has been exhibited since its last base rate case, as Mr. Packer and Mr. Duerr explain in their direct testimony (AP Statement No. 1 and No. 11). Witnesses Packer and Duerr have shown that the Company ranks high in customer service and management efficiency. Because of the Company's decision to employ an equity return rate closer to the low end of my recommended range in order to moderate its proposed rate increase, I have not quantified the increment to recognize the Company's superior management performance. The superior performance of AP's management and the increments that the Commission has added to recognize excellent management performance in prior cases, including AP's, are factors the Commission should consider in assessing all of the evidence presented on the issue of cost of capital in this case. That is to say, if the Commission were to select an equity return that is less than the 10.95% that I recommend in this case, then the Commission should make an explicit provision for the Company's superior management performance.

My cost of equity recommendation of 10.95% makes no provision for the prospect that the rate of return may not be achieved due to unforeseen events.

Furthermore, general inflationary pressures can produce cost increases that will negatively impact the Company's return unless provision for them is recognized in the ratesetting process.

10. Q. WHAT INCREMENTS HAS THE COMMISSION RECOGNIZED IN THE PAST FOR SUPERIOR PERFORMANCE OF UTILITY MANAGEMENT?

A. Increments for recognition of superior management performance granted by the Commission have ranged from 0.05% to 0.25%, and the Commission granted AP an increment for superior management performance of 0.25% in its 2021 base rate case at Docket No. R-2021-30277385. The Company's excellent management performance has continued since its last base rate case, as Mr. Packer and Mr. Duerr explain in their direct testimony (AP Statement No. 1 and No. 11). The superior performance of AP's management and the increments that the Commission has added to recognize excellent management performance in prior cases, including AP's, are factors the Commission should consider in assessing all of the evidence presented on the issue of cost of capital in this case.

WATER UTILITY RISK FACTORS

11. Q. PLEASE IDENTIFY SOME OF THE RISK FACTORS WHICH IMPACT THE WATER UTILITY INDUSTRY.

A. The business risk of water utilities has been, and continues to be, strongly influenced by water quality concerns. The Safe Drinking Water Act Amendments of 1996 ("SDWA"), which re-authorized the SDWA for the second time since its original passage in 1974, instituted more rigorous policies and procedures governing water quality. Significant aspects of the 1996 Act provide that the federal Environmental Protection Agency ("EPA"), in conjunction with other interested parties, will develop a list of contaminants for possible regulation that

must be updated every 5 years. From that list, EPA must select at least five contaminants and determine whether to regulate them. This process must be repeated every five years. The EPA may bypass this process and adopt interim regulations for contaminants which pose an urgent health threat.

EPA's current priorities include regulations directed to: microbial, disinfectants and disinfection byproducts, perchlorate, and other contaminants, such as pharmaceuticals, lead and copper, and radionuclides. The regulations EPA issues concerning potentially hazardous substances, such as those noted above, together with the requirements imposed by the Federal Clean Water Act and the Resource Conservation and Recovery Act, contribute directly to the total business risk faced by water utilities. Moreover, most of these regulations affect the entire water industry in contrast with the disparate impact on electric utilities of regulations issued under the Clean Air Act, which may affect only a subset of the individual companies in that industry. Investors are also increasingly sensitive to the business risk water suppliers would face from the range of possible adverse effects of global climate change. All of these business risk factors, together with the inherent importance of maintaining sound and reliable water and wastewater infrastructure capable of meeting customers' current and future needs, has focused increasing public policy attention on the unique challenges faced by water and wastewater utilities.

One of the challenges water utilities face is the legacy of utility-owned and customer-owned lead service lines that remain in service. This issue achieved national prominence after lead pipes and service lines were identified as a source of possible lead contamination in the drinking water of the municipally-owned Flint, Michigan, water system. However, even before the events in Flint – and certainly thereafter – investors have had a heightened awareness of the

implications for public health of exposure to lead and of the steps that water utilities would need to take to deal with this issue, including possible government mandates to remove and replace lead service lines. Significantly, water utilities deliver a product that is ingested by the public and, therefore, they are the only type of utility that faces public health issues related to a product intended for human consumption. As Mr. Packer and Mr. Duerr explains (AP Statement No. 1 and 11), the Company has been vigilant in dealing with the potential risks posed by the presence of lead in both service lines and customers' interior plumbing. AP's efforts have included the use of sound water-treatment processes to prevent the lead from leaching into the water it delivers. For that reason, the Company has consistently complied with the Lead and Copper Rule[2] imposed by the EPA and the Pennsylvania Department of Environmental Protection. Nonetheless, because of the increasing concerns about the need to eliminate the risk of lead in drinking water, the Company is taking proactive steps to remove and replace the lead service lines, both Company-owned and customer-owned, that remain in service.

12. Q. ARE THERE EMERGING WATER QUALITY ISSUES THAT WILL AFFECT THE COMPANY'S RISK PROFILE?

A. Yes. On April 10, 2024, the EPA issued new primary drinking water regulations to deal with Pre- and Polyfluoroalkyl Substances ("PFAS"), commonly known as "forever" chemicals. These regulations will require additional treatment of the Company's drinking water within the next five years. Essential Utilities estimates that system-wide, $450 million of additional capital expenditures will be necessary to comply with these regulations, of which $304 million will be required in

[2] 25 Pa. Code §§ 109.1101 through 109.1108.

Pennsylvania. This will add additional pressure to the Company's capital attraction ability, and could impact the Company's credit quality depending upon the timeliness of rate recovery of these investments.

13. Q. HOW DO THESE ISSUES IMPACT THE WATER UTILITY INDUSTRY?

A. The Company must conform its operations to the requirements of the SDWA, and comply with the Lead and Copper Rule, the Disinfectants/Disinfection By-Products rule, "forever" chemicals, and other contaminant standards. Managers of water utilities have in the past, and will in the future, focus increased attention on environmental and related regulatory issues. Drinking water quality has also received heightened attention out of concern over the integrity of the source of supply, which is often threatened by changing land use and the permissible level of discharged contaminants established by state and federal agencies, and now potential threats from terrorists. Moreover, water companies have experienced increased water treatment and monitoring requirements and escalating costs in order to comply with the increasingly stringent regulatory requirements noted above. Water utilities may also be required to expend resources to undertake research and employ technological innovations to comply with potential regulatory requirements. These factors are symptomatic of the changing business risk faced by water utilities.

14. Q. ARE THERE OTHER FACTORS THAT INFLUENCE THE BUSINESS RISK OF WATER UTILITIES?

A. Yes. Being the sole purveyor of potable water from an established infrastructure does not insulate a water utility's operations from general business conditions, regulatory policy, the influence of weather, and customers' usage habits. It is also important to recognize that water companies face higher degrees of capital intensity than other utilities, more costly waste disposal requirements, and threats

to their sources of supply. Notably, the Company's investment in net plant is 7.85 times its revenue, as compared to the Water Group's investment in net plant which is 4.27 times its revenue. This shows that AP is among the most capital intensive utilities.

15. Q. ARE THERE OTHER STRUCTURAL ISSUES THAT AFFECT THE BUSINESS RISK OF WATER UTILITIES?

A. Yes. As noted above, the high fixed costs of water utilities make earnings vulnerable to significant variations when usage fluctuates with weather, the economy, and customer conservation efforts. Conservation efforts can take the form of low water-use clothes washers, toilets and shower heads, and other reductions due to changes in usage. While the wise use of water is always the objective, the business risk of the water utility industry can be affected by increased customer awareness of conservation. Moreover, current building standards have mandated the use of fixtures which must comply with more stringent water use requirements.

16. Q. HOW IS THE COMPANY'S RISK PROFILE AFFECTED BY ITS CONSTRUCTION PROGRAM?

A. The Company is engaged in a continuing capital expenditure program necessary to meet the needs of its customers and to comply with various regulations. For the future, the Company expects its capital expenditures to be:

Year	Capital Expenditures
2024	$ 333,289,236
2025	$ 362,690,497
2026	$ 438,879,695
2027	$ 441,707,241
2028	$ 377,646,128
Total	$ 1,954,212,797

The Company's total capital expenditures over the next five years will represent approximately 40% ($1,954,212,797 ÷ $4,947,003,706) of its net utility plant in service at December 31, 2023. As previously noted, a fair rate of return for the Company represents a key to a financial profile that will provide the Company the ability to raise the capital necessary to meet its capital needs on reasonable terms.

17. Q. HOW SHOULD THE COMMISSION RESPOND TO THE INCREASED BUSINESS RISK FACING THE COMPANY?

A. The Company faces the need to continue to invest in new facilities and to maintain and upgrade existing facilities in its service territory. Where substantial ongoing capital investment is required to continue to furnish the high-quality service that customers demand, supportive regulation is absolutely essential.

FUNDAMENTAL RISK ANALYSIS

18. Q. IS IT NECESSARY TO CONDUCT A FUNDAMENTAL RISK ANALYSIS TO PROVIDE A FRAMEWORK FOR DETERMINATING A UTILITY'S COST OF EQUITY?

A. Yes. It is necessary to establish a company's relative risk position within its industry through a fundamental analysis of various quantitative and qualitative factors that bear upon investors' assessment of overall risk. The qualitative factors have already been discussed. The quantitative risk analysis follows. For

this purpose, I have compared the Company to the Standard & Poor's Corporation's ("S&P") Public Utilities Index ("S&P Public Utilities") and the Water Group.

19. Q. WHAT ARE THE COMPONENTS OF THE S&P PUBLIC UTILITIES?

A. The S&P Public Utilities is a widely recognized index that is comprised of electric power and natural gas companies contained in the S&P 500 Index. It is recognized as a reasonable proxy for the gas and electric utility industry overall. The companies in the S&P Public Utilities are identified on page 3 of Schedule 4.

20. Q. WHAT CRITERIA HAVE YOU EMPLOYED TO ASSEMBLE YOUR WATER GROUP?

A. The companies in the Water Group have the following common characteristics: (i) they are listed in the "Water Utility Industry" section (basic and expanded) of The Value Line Investment Survey and (ii) their stock is publicly traded. The members of my Water Group are: American States Water, American Water Works Co., Artesian Resources Corp., California Water Serv. Grp., Essential Utilities, Inc., Middlesex Water Company, SJW Corporation, and The York Water Company.

21. Q. IS KNOWLEDGE OF A UTILITY'S CREDIT-QUALITY RATING AN IMPORTANT FACTOR IN ASSESSING ITS RISK AND COST OF CAPITAL?

A. Yes. It is important to know a company's credit quality rating because the cost of each type of capital is directly related to the associated risk of the firm. Therefore, although the yield on a company's bonds and the ratings assigned to those instruments by credit rating agencies measure a company's credit-quality risk, these relative credit risk assessments are also relevant to its cost of equity. This is because a firm's cost of equity is represented by its borrowing cost plus the additional compensation to equity investors that is necessary to recognize the higher risk of owning an equity investment as compared to a debt instrument in

the same company.

22. Q. HOW DO THE CREDIT-QUALITY RATINGS COMPARE FOR AP, THE WATER GROUP, AND THE S&P PUBLIC UTILITIES?

A. S&P provides a corporate credit-quality rating ("CCR"), while Moody's provides a Long-Term ("LT") issuer rating. Both ratings focus upon the credit quality of the issuer of the debt, rather than upon the debt obligation itself. The CCR assigned to AP by S&P is A. For the Water Group, the average CCR assigned by S&P is A, and the average Long Term ("LT") issuer rating assigned by Moody's is A3. For the S&P Public Utilities, the average composite rating is BBB+ by S&P and A3 by Moody's. Many of the financial indicators that I will subsequently discuss are considered during the rating process.

23. Q. HOW DO THE FINANCIAL DATA COMPARE FOR AP, THE WATER GROUP, AND THE S&P PUBLIC UTILITIES?

A. The broad categories of financial data that I will discuss are shown on Schedules 2, 3, and 4. The data cover the five-year period 2018-2022. The important categories of relative risk may be summarized as follows:

Size. In terms of capitalization, the Company is fairly similar to the average size of the Water Group. The average size of the S&P Public Utilities is, however, many times larger than the Water Group and AP. All other things being equal, a smaller company is riskier than a larger company because a given change in revenue and expense has a proportionately greater impact on a small firm. As I will demonstrate later, the size of a firm can impact its cost of equity.

Market Ratios. Market-based financial ratios, such as earnings/price ratios and dividend yields, provide a partial measure of the investor-required cost of equity. If all other factors are equal, investors will require a higher return on equity for companies that exhibit greater risk as compensation for that risk. That

is to say, a firm that investors perceive to have higher risks will experience a lower price per share in relation to expected earnings.

There are no market ratios available for AP because its stock is owned by EU. The five-year average price-earnings multiple for the Water Group was higher than that of the S&P Public Utilities. The five-year average dividend yield was lower for the Water Group than for the S&P Public Utilities. On average, the historical market-to-book ratios were higher for the Water Group than the S&P Public Utilities.

Common Equity Ratio. The level of financial risk is measured by the proportion of long-term debt and other senior capital that is contained in a company's capitalization. Financial risk is also analyzed by comparing common equity ratios (the complement of the ratio of debt and other senior capital). That is to say, a firm with a high common equity ratio has lower financial risk, while a firm with a low common equity ratio has higher financial risk. The five-year average common equity ratios, based on permanent capital, were 53.3% for the Company, 51.1% for the Water Group, and 40.5% for the S&P Public Utilities. The financial risk of AP and the Water Group is similar.

Return on Book Equity. Greater variability (*i.e.*, uncertainty) of a firm's earned returns signifies relative levels of risk, as shown by the coefficient of variation (standard deviation ÷ mean) of the rate of return on book common equity. The higher the coefficient of variation, the greater the degree of variability. For the five-year period, the coefficients of variation were 0.067 (0.7% ÷ 10.5%) for the Company, 0.059 (0.6% ÷ 10.1%) for the Water Group, and 0.040 (0.4% ÷ 10.0%) for the S&P Public Utilities. The earnings variability for the Company was higher than the Water Group and S&P Public Utilities, indicating that the Company has higher risk.

Operating Ratios. I have also compared operating ratios (the percentage of revenues consumed by operating expense, depreciation and taxes other than income).[3] The five-year average operating ratios were 50.1% for the Company, 71.1% for the Water Group, and 81.0% for the S&P Public Utilities. The Company's lower operating ratio (and correspondingly higher operating margin) is a function of its high capital intensity. Because the Company is more capital intensive, a larger percentage of each dollar of revenue is attributed to return and income taxes on that return.

Coverage. The level of fixed charge coverage (*i.e.*, the multiple by which available earnings cover fixed charges, such as interest expense and preferred stock dividends) provides an indication of the earnings protection for creditors. Higher levels of coverage, and hence earnings protection for fixed charges, are usually associated with superior grades of creditworthiness. The five-year average pre-tax interest coverage (excluding AFUDC) was 3.64 times for the Company, 3.76 times for the Water Group, and 2.94 times for the S&P Public Utilities. The credit risk for AP is higher than the Water Group and less than the S&P Public Utilities.

Quality of Earnings. Measures of earnings quality are usually revealed by the percentage of Allowance for Funds Used During Construction ("AFUDC") related to income available for common equity, the effective income tax rate, and other cost deferrals. These measures of earnings quality usually influence a firm's internally generated funds because poor quality of earnings would not generate high levels of cash flow. The Company's low historical effective income tax rate reflects a tax accounting method that permits the expensing of qualifying utility

[3] The complement of the operating ratio is the operating margin, which provides a measure of profitability. The higher the operating ratio, the lower the operating margin.

asset improvement costs that were previously being capitalized and depreciated for book and tax purposes. This accounting provides for flow-through treatment of qualifying income tax benefits, generating a reduction in income tax expense and reducing the amount of taxes currently payable. On balance, AP, the Water Group and the S&P Public Utilities all have similar quality of earnings.

Internally Generated Funds. Internally generated funds ("IGF") provide an important source of new investment capital for a utility and represent a key measure of credit strength. Historically, the five-year average percentage of IGF to capital expenditures was 75.3% for the Company, 49.4% for the Water Group, and 62.3% for the S&P Public Utilities. The Company expects that it will continue to require external capital to finance construction expenditures. Historically, the Company's cash flow to construction has been better than the Water Group and the S&P Public Utilities. The improvement in the IGF to construction in the years 2021 and 2022, shown on Schedule 2, page 1 can be traced to a lack of dividend payments by AP in those years.

Betas. The financial data I have been discussing relate primarily to company-specific risks. Market risk for firms with traded stock is measured by beta coefficients. Beta coefficients attempt to identify systematic risk, *i.e.*, the risk associated with changes in the overall market for common equities. Value Line publishes such a statistical measure of a stock's relative historical volatility to the rest of the market.[4] A comparison of market risk is shown by the average betas of 0.82 for the Water Group (see page 2 of Schedule 3) and 0.90 for the S&P Public Utilities (see page 3 of Schedule 4). The systematic risk is lower for the

[4] The procedure used to calculate the beta coefficient published by Value Line is described on page 3 of Schedule 14. A common stock that has a beta less than 1.0 is considered to have less systematic risk than the market as a whole and would be expected to rise and fall more slowly than the rest of the market. A stock with a beta above 1.0 would have more systematic risk.

Water Group than the S&P Public Utilities.

24. Q. PLEASE SUMMARIZE YOUR RISK EVALUATION OF THE COMPANY AND THE WATER GROUP.

A. The risk of the Company parallels that of the Water Group in certain respects. The Company's size and financial risk are fairly similar to the Water Group. The Company's IGF to construction has been stronger than the Water Group. The Company's operating ratio is lower than the Water Group, but this is the product of much higher capital intensity. The Company's earnings variability is higher, and its interest coverage is weaker, thus pointing to higher risk compared to the Water Group. For the future, the risk of the water industry will be strongly influenced by the regulatory requirements associated with the SDWA, the need to maintain adequate supply, the need to rehabilitate infrastructure, high capital intensity, a low rate of capital recovery, and relatively low percentages of IGF to construction. As such, the Water Group provides a reasonable basis for measuring the Company's cost of equity.

CAPITAL STRUCTURE RATIOS

25. Q. PLEASE EXPLAIN THE SELECTION OF CAPITAL STRUCTURE RATIOS FOR AP.

A. If a public utility raises its own debt directly in the capital markets, as is the case for the Company, it is proper to employ the capital structure ratios and senior capital cost rates of the regulated public utility for rate of return purposes. Furthermore, consistency requires that the embedded cost rate of the Company's senior securities also be employed. This procedure is consistent with the ratesetting procedures used by the Commission in numerous prior rate cases for AP.

26. Q. DOES SCHEDULE 5 PROVIDE THE CAPITALIZATION AND CAPITAL

STRUCTURE RATIOS YOU HAVE CONSIDERED?

A. Yes. Schedule 5 presents the Company's capitalization and related capital structure ratios based upon investor-provided capital. The December 31, 2023 capitalization corresponds with the end of the historic test year ("HTY") and December 31, 2024 is the end of the future test year ("FTY"). The December 31, 2025 capitalization is an estimate of the Company's capitalization as of the end of the FPFTY. The forecast of the Company's December 31, 2025 capital structure reflects redemptions and maturities of $31.680 million of existing debt ($13.897 million in the FTY and $17.784 million in the FPFTY) and the issuance of $125 million of new First Mortgage Bonds in the FPFTY. The Company is also projecting a $77 million equity contribution in the FTY. Retained earnings as of December 31, 2025 are forecasted to increase based upon net income of $482.765 million less common stock dividend payments of $206 million for the next two fiscal years.

27. Q. WHAT CAPITAL STRUCTURE RATIOS DO YOU RECOMMEND BE ADOPTED FOR RATE OF RETURN PURPOSES IN THIS PROCEEDING?

A. Since ratesetting is prospective, the rate of return should, at a minimum, reflect known or reasonably foreseeable changes that will occur during the course of the FTY and FPFTY. As a result, I will adopt the Company's FPFTY-ending (December 31, 2025) capital structure ratios of 46.05% long-term debt and 53.95% common equity. The common equity ratio of 53.95% that I propose in this case is well within the range of the actual capital structure ratios of the Water Group, which provides common equity ratios of 40.8% to 60.2%. It is also compatible with the 53.95% common equity ratio accepted by the Commission in the Company's last case.

These capital structure ratios are the best approximation of the mix of

capital the Company will employ to finance its rate base during the period new rates are in effect. I have excluded short-term debt from these ratios because the amount is less than the balance of construction work in progress ("CWIP"). Short-term debt provides bridge financing for CWIP, until the magnitude of short-term debt reaches a point where a permanent financing with long-term debt and equity is economic. That is to say, short-term debt is temporary financing pending the issuance of long-term debt and equity in the desired proportions that support the Company's capital structure goals. The Company uses a formula for computing AFUDC that assigns short-term debt first to the AFUDC rate and additional amounts, if any, above the CWIP balance are assigned the overall rate of return. Given the Company's procedure of calculating its AFUDC, it has been the Commission's policy to exclude short-term debt from the capital structure.

COST OF SENIOR CAPITAL

28. Q. WHAT COST RATE HAVE YOU ASSIGNED TO THE LONG-TERM DEBT PORTION OF AP'S CAPITAL STRUCTURE?

A. Consistent with the capital structure ratios of the Company, the embedded cost of AP's senior securities must also be employed. As I previously explained, this procedure is consistent with the ratesetting procedures used by the Commission in numerous prior AP rate cases. The determination of the cost of debt is essentially an arithmetic exercise. This is due to the fact that the Company has contracted for the use of this capital for a specific period of time at a specified cost rate. As shown on page 1 of Schedule 6, the actual embedded cost rate of long-term debt was 4.24% on December 31, 2023. By December 31, 2025, the embedded debt cost rate is estimated to be 4.32%, as shown on page 3 of Schedule 6. The Company's FPFTY embedded cost of debt reflects new issuances of First Mortgage Bonds. For the 2025 debt issue of $125 million of

new First Mortgage Bonds to be issued in the FPFTY, the nominal coupon rate is 6.05%. The forecast interest rate is based on a 4.75% yield on 30-year Treasury bonds plus a spread of 1.30%. The details leading to the development of the individual effective cost rates for each series of long-term debt, using the cost rate to maturity technique, are shown on pages 4 of Schedule 6. The cost rate, or yield to maturity, is the rate of discount that equates the present value of all future interest and principal payments with the net proceeds of the bond.

I will use the 4.32% prospective embedded cost of long-term debt for rate of return purposes. The 4.32% long-term debt cost rate is related to the amount of long-term debt shown on Schedule 5 that provides the basis for the 46.05% long-term debt ratio at December 31, 2025.

COST OF EQUITY – GENERAL APPROACH

29. Q. PLEASE DESCRIBE HOW YOU DETERMINED THE COST OF EQUITY FOR THE COMPANY.

A. Although my fundamental financial analysis provides the required framework to establish the risk relationships among AP, the Water Group and the S&P Public Utilities, the cost of equity must be measured by standard financial models I identified above. Differences in risk traits, such as size, business diversification, geographical diversity, regulatory policy, financial leverage and bond ratings, must be considered when analyzing the cost of equity.

It is also important to reiterate that no one method or model of the cost of equity can be applied in an isolated manner. Rather, informed judgment must be used to take into consideration the relative risk traits of the firm. It is for this reason that I have used more than one method to measure the Company's cost of equity. As I describe below, each of the methods used to measure the cost of equity contains certain incomplete and/or overly restrictive assumptions and

constraints that are not optimal. Therefore, I favor considering the results from a variety of methods. In this regard, I applied each of the methods with data taken from the Water Group and arrived at a cost of equity of at least 10.95% for AP, excluding an increment for management performance.

DISCOUNTED CASH FLOW

30. Q. Please describe the DCF model.

A. The DCF model seeks to explain the value of an asset as the present value of future expected cash flows discounted at the appropriate risk-adjusted rate of return. In its simplest form, the DCF-determined return on common stock consists of a current cash (dividend) yield and future price appreciation (growth) of the investment. The dividend discount equation is the familiar DCF valuation model, which assumes that future dividends are systematically related to one another by a constant growth rate. The DCF formula is derived from the standard valuation model: P = D/(k-g), where P = price, D = dividend, k = the cost of equity, and g = growth in cash flows. By rearranging the terms, we obtain the familiar DCF equation: k= D/P + g. All of the terms in the DCF equation represent investors' assessment of expected future cash flows that they will receive in relation to the value that they set for a share of stock (P). The DCF equation is sometimes referred to as the "Gordon" model.[5] My DCF results are provided on page 2 of Schedule1 for the Water Group. The DCF return is 10.58% with the leverage adjustment and 9.38% without the leverage adjustment for the Water Group. The leverage adjustment is discussed more fully below.

Among the limitations of the model, there is a certain element of

[5] Although the popular application of the DCF model is often attributed to the work of Myron J. Gordon in the mid-1950s, J.B. Williams exposited the DCF model in its present form nearly two decades earlier.

circularity in the DCF method when applied in rate cases. This is because investors' expectations for the future depend upon regulatory decisions. In turn, when regulators depend upon the DCF model to set the cost of equity, they rely upon investor expectations that include an assessment of how regulators will decide rate cases. Due to this circularity, the DCF model may not fully reflect the true risk of a utility. Other limitations of the DCF include the constant P-E multiple assertion that does not conform with actual stock market performance. And, indeed, the FERC has moved to using multiple methods for measuring the cost of equity due to the limitations of the DCF.

31. Q. WHAT IS THE DIVIDEND YIELD COMPONENT OF A DCF ANALYSIS?

A. The dividend yield reveals the portion of investors' cash flow that is generated by the return provided by the dividends an investor receives. It is measured by the dividends per share relative to the price per share. The DCF methodology requires the use of an expected dividend yield to establish the investor-required cost of equity. For the 12 months ended March 2024, the monthly dividend yields are shown on Schedule 7. The month-end prices were adjusted to reflect the buildup of the dividend in the price that has occurred since the last ex-dividend date (i.e., the date by which a shareholder must own the shares to be entitled to the dividend payment – usually about two to three weeks prior to the actual payment).

For the 12 months ended March 2024, the average dividend yield was 2.35% for the Water Group based upon a calculation using annualized dividend payments and adjusted month-end stock prices. The dividend yields for the more recent six-month and three-month periods were 2.55% and 2.66%, respectively. In applying the DCF model, I have used the six-month average dividend yield of 2.55% for the Water Group. The use of this dividend yield will reflect current

capital costs while avoiding spot yields. For the purpose of a DCF calculation, the average dividend yield must be adjusted to reflect the prospective nature of the dividend payments, i.e., the higher expected dividends for the future. Recall that the DCF is an expectational model that must reflect investors' anticipated cash flows. I have adjusted the six-month average dividend yield in three different but generally accepted manners and used the average of the three adjusted values as calculated in the lower panel of data presented on Schedule 7.[6] This adjustment adds 8 basis points to the six-month average historical yield, thus producing the 2.63% adjusted dividend yield for the Water Group.

32. Q. WHAT FACTORS INFLUENCE INVESTORS' GROWTH EXPECTATIONS?

A. As noted previously, investors are interested principally in the dividend yield and future growth of their investment (i.e., the price per share of the stock). Future growth in earnings per share is the DCF model's primary focus because, under the model's assumption that the P-E multiple remains constant, the price per share of stock will grow at the same rate as earnings per share. A growth rate analysis considers a variety of variables to reach a consensus on prospective growth, including historical data and widely available analysts' forecasts of earnings, dividends, book value and cash flow (all stated on a per-share basis). A fundamental growth rate analysis is frequently based upon internal growth ("b x

[6] These adjustments are the 1/2 growth approach, the discrete approach, and the quarterly approach. Under the 1/2 approach, the procedure to adjust the average dividend yield for the expectation of a dividend increase during the initial investment period will be at a rate of one-half the growth component, which assumes that half of the dividend payments will be at the expected higher rate during the initial investment period. Under the discrete approach, the "*g*" in the DCF model reflects the discrete growth in the quarterly dividend, which is required for the periodic form of the DCF to properly recognize that dividends are expected to grow on a discrete basis. The quarterly approach takes into account that investors have the opportunity to reinvest quarterly dividend receipts. Recognizing the compounding of the periodic quarterly dividend payments (D_0) results in this third DCF formulation. This DCF equation provides no further recognition of growth in the quarterly dividend. A compounding of the quarterly dividend yield recognizes the necessity for an adjusted dividend yield.

r"), where "r" is the expected rate of return on common equity and "b" is the retention rate (a fraction representing the proportion of earnings not paid out as dividends). To be complete, the internal growth rate should be modified to account for sales of new common stock (external growth), which is represented by the formula s x v, where "s" is the number of new common shares that the firm expects to issue and "v" is the value that accrues to existing shareholders from selling stock at a price above book value. Fundamental growth, which combines internal and external growth, encompasses the factors that cause book value per share to grow over time.

Growth also can be expressed in multiple stages. This expression of growth consists of an initial "growth" stage during which a firm enjoys rapidly expanding markets, high profit margins and abnormally high growth in earnings per share. Thereafter, a firm enters a "transition" stage during which fewer technological advances and increased product saturation begin to reduce the growth rate and profit margins come under pressure. During the "transition" stage, investment opportunities begin to mature, capital requirements decline and a firm begins to pay out a larger percentage of earnings to shareholders. Finally, the mature or "steady-state" stage is reached when a firm's earnings growth, payout ratio and return on equity stabilize at levels where they remain for the life of a firm. The three stages of growth assume a step-down of high initial growth to lower sustainable growth. Even if these three stages of growth can be envisioned for a firm, the third "steady-state" growth stage, which is assumed to remain fixed in perpetuity, represents an unrealistic expectation because the three stages of growth can be repeated. That is to say, the stages can be repeated where growth for a firm ramps up and ramps down in cycles over time. For these reasons, there

is no need to analyze growth rates individually for each cycle but rather to rely upon analysts' growth forecasts used by investors when pricing common stocks.

33. Q. WHAT FACTOR SHOULD BE CONSIDERED IN THE DETERMINATION OF AN APPROPRIATE GROWTH RATE?

A. The growth rate used in a DCF calculation should measure investor expectations. Investors consider both company-specific variables and overall market sentiment (i.e., level of inflation rates, interest rates, economic conditions, etc.) when balancing their capital gains expectations with their dividend yield requirements. Investors are not influenced solely by a single set of company-specific variables weighted in a formulaic manner. Therefore, all relevant growth rate indicators should be evaluated using a variety of techniques when formulating a judgment of investor-expected growth.

34. Q. WHAT DATA FOR THE WATER GROUP HAVE YOU CONSIDERED IN YOUR GROWTH RATE ANALYSIS?

A. I considered the growth in the financial variables shown on Schedule 8 and Schedule 9, which reflect historical (Schedule 8) and projected (Schedule 9) rates of growth in earnings per share, dividends per share, book value per share and cash flow per share for the Water Group. While analysts will review all measures of growth, as I have done, earnings per share growth directly influences the expectations of investors for the future performance of utility stocks. Forecasts of earnings growth are required because the DCF model is forward-looking, and with the constant P-E multiple and constant payout ratio that the DCF model assumes, all other measures of growth will mirror earnings growth. The historical growth rates, which were also reviewed to gain a perspective on the industry, were obtained from the Value Line publication that provides this data. While historical data cannot be ignored, they are much less significant when applying the DCF

model than projections of future growth. Investors cannot purchase the past earnings of a utility. To the contrary, they are only entitled to future earnings, which are the focus of growth projections. Furthermore, if significant weight is assigned to historical performance, the historical data are double-counted because they are already factored into analysts' forecasts of earnings growth.

35. Q. IS A FIVE-YEAR INVESTMENT HORIZON ASSOCIATED WITH THE ANALYSTS' FORECASTS CONSISTENT WITH THE TRADITIONAL DCF MODEL?

A. Yes, it is. Although the constant form of the DCF model assumes an infinite stream of cash flows, investors do not expect to hold an investment indefinitely. Rather than viewing the DCF in the context of an endless stream of growing dividends (e.g., a century of cash flows), the growth in the share value (i.e., capital appreciation or capital gains yield) is most relevant to investors' total return expectations. Hence, the sale price of a stock can be viewed as a liquidating dividend that can be discounted along with the annual dividend receipts during the investment-holding period to arrive at the investors' expected return. The growth in the price per share will equal the growth in earnings per share if, as the DCF model assumes, there is no change in the P-E multiple. As such, my company-specific growth analysis, which focuses principally on five-year forecasts of earnings per share growth, conforms with the type of analysis that influences investors' expectations of their actual total return. Moreover, academic research also focuses on five-year growth rates specifically because market outcomes occurring over that investment horizon are what influence stock prices. Indeed, if investors required forecasts beyond five years in order to properly value common stocks, then it would be reasonable to expect that some investment advisory service would begin publishing that information for individual stocks to

meet the demands of the marketplace. The absence of such a publication suggests that there is no market for this information because investors do not require forecasts for an infinite series of future data points to make informed decisions to purchase and sell stocks.

36. Q. WHAT ARE THE ANALYSTS' FORECASTS OF FUTURE GROWTH THAT YOU CONSIDERED?

A. Schedule 9 provides projected earnings per share growth rates taken from analysts' five-year forecasts compiled by IBES/First Call, Zacks, and Value Line. These are all reliable authorities of projected growth that investors use to make buy, sell and hold decisions. The IBES/First Call and Zacks estimates are obtained from the Internet and are widely available to investors. The growth rates reported by IBES/First Call and Zacks are consensus forecasts taken from a survey of analysts that make growth projections for these companies. Notably, First Call's earnings forecasts are frequently quoted in the financial press. The Value Line forecasts are also widely available to investors and can be obtained by subscription or free of charge at most public and collegiate libraries. The IBES/First Call and Zacks forecasts are limited to earnings per share growth, while Value Line makes projections of other financial variables. The Value Line forecasts of dividends per share, book value per share, and cash flow per share for the Water Group are also included on Schedule 9.

37. Q. WHAT ARE THE PROJECTED GROWTH RATES PUBLISHED BY THE SOURCES YOU DISCUSSED?

A. Schedule 9 shows the prospective five-year earnings per share growth rates projected for the Water Group by IBES/First Call (5.88%), Zacks (6.80%) and Value Line (6.58%).

38. Q. ARE CERTAIN GROWTH RATE FORECASTS ENTITLED TO GREATER WEIGHT IN DEVELOPING A GROWTH RATE FOR USE IN THE DCF MODEL?

A. Yes. While various factors should be examined to reach a reasonable conclusion on the DCF growth rate, growth in earnings per share should receive the greatest emphasis. Growth in earnings per share is the primary determinant of investors' expectations of the total returns they will obtain from stocks because the capital gains yield (i.e., price appreciation) will track earnings growth if the P-E multiple remains constant, as the DCF model assumes. Moreover, earnings per share (derived from net income) are the source of dividend payments and are the primary driver of retention growth and its surrogate, i.e., book value per share growth. As such, under these circumstances, greater emphasis must be placed upon projected earnings per share growth. In fact, Professor Gordon, the foremost proponent of the use of the DCF model in setting utility rates, concluded that the best measure of growth for use in the DCF model is a forecast of earnings per-share growth.[7] Consistent with Professor Gordon's findings, projections of earnings per share growth, such as those published by IBES/First Call, Zacks and Value Line, provide the best indication of investor expectations.

39. Q. WHAT GROWTH RATE DO YOU USE IN YOUR DCF MODEL?

A. The forecasts shown on Schedule 9 for the Water Group exhibit a range of average earnings per share growth rates from 5.88% to 6.80%. DCF growth rates should not be established by mathematical formulation, and I have not done so. In my opinion, a growth rate of 6.75% is a reasonable estimate of investor-expected growth for the Water Group. This value is within the array of analysts' forecasts of five-year earnings per share growth rates. The reasonableness of

[7] Gordon, Gordon & Gould, "Choice Among Methods of Estimating Share Yield," The Journal of Portfolio Management (Spring 1989).

this growth rate is also supported by the expected continuation of water utility infrastructure spending.

40. Q. ARE THE DIVIDEND YIELD AND GROWTH COMPONENTS OF THE DCF ADEQUATE TO ACCURATELY DEPICT THE RATE OF RETURN ON COMMON EQUITY WHEN IT IS USED TO CALCULATE A UTILITY'S WEIGHTED AVERAGE OVERALL COST OF CAPITAL?

A. The components of the DCF model are adequate for that purpose only if the capital structure ratios are measured by the market value of debt and equity. In the case of the Water Group, average capital structure ratios are 27.88% long-term debt, 0.02 preferred stock, and 72.10% common equity, as shown on Schedule 10. If book values are used to compute the capital structure ratios, then a leverage adjustment is required.

41. Q. WHAT IS A LEVERAGE ADJUSTMENT?

A. If a firm's capitalization, as measured by its stock price, diverges from its capitalization, measured at book value, the potential exists for a financial risk difference. Such a risk difference arises because a market-valued capitalization contains more equity and less debt than a book-value capitalization and, therefore, has less risk than the book-value capitalization. A leverage adjustment properly accounts for the risk differential between market-value and book-value capital structures.

42. Q. WHY IS A LEVERAGE ADJUSTMENT NECESSARY?

A. In order to make the DCF results relevant to the capitalization measured at book value (as is done for rate-setting purposes), the market-derived cost rate must be adjusted to account for this difference in financial risk. The only perspective that is important to investors is the return they can realize on the market value of their investment. As I have measured the DCF, the simple yield (D/P) plus growth (g)

provides a return applicable strictly to the price (P) that an investor is willing to pay for a share of stock. The need for the leverage adjustment arises when the results of the DCF model (k) are to be applied to a capital structure that is different from the capital structure indicated by the market price (P). From the market perspective, the financial risk of the Water Group is accurately measured by the capital structure ratios calculated from the market-valued capitalization of a firm. If the ratemaking process utilized the market capitalization ratios, then no additional analysis or adjustment would be required, and the simple yield (D/P) plus growth (g) components of the DCF would satisfy the financial risk associated with the market value of the equity capitalization. Because the ratemaking process uses ratios calculated from a firm's book value capitalization, further analysis is required to synchronize the financial risk of the book capitalization with the required return on the book value of the firm's equity. This adjustment is developed through precise mathematical calculations using well-recognized analytical procedures that are widely accepted in the financial literature. To arrive at that return, the rate of return on common equity is the unleveraged cost of capital (or equity return at 100% equity) plus one or more terms reflecting the increase in financial risk resulting from the use of leverage in the capital structure. The calculations presented in the lower panel of data shown on Schedule 10, under the heading "M&M,"[8] provide a return of 8.53% when applicable to a capital structure with 100% common equity.

[8] Franco Modigliani and Merton H. Miller, "The Cost of Capital, Corporation Finance, and the Theory of Investments," American Economic Review, June 1958, at 261-97. Franco Modigliani and Merton H. Miller, "Taxes and the Cost of Capital: A Correction," American Economic Review, June 1963, at 433-43.

43. Q. ARE THERE SPECIFIC FACTORS THAT INFLUENCE MARKET-TO-BOOK RATIOS THAT DETERMINE WHETHER THE LEVERAGE ADJUSTMENT SHOULD BE MADE?

A. No. The leverage adjustment is not intended, nor was it designed, to address the reasons that stock prices vary from book value. Hence, any observations concerning market prices relative to book value are not on point. The leverage adjustment deals with the issue of financial risk and does not transform the DCF result to a book value return through a market-to-book adjustment. Again, the leverage adjustment that I propose is based on the fundamental financial precept that the cost of equity is equal to the rate of return for an unleveraged firm (i.e., where the overall rate of return equates to the cost of equity with a capital structure that contains 100% equity) plus the additional return required for introducing debt and/or preferred stock leverage into the capital structure.

Further, as noted previously, the relatively high market prices of utility stocks cannot be attributed solely to the notion that these companies are expected to earn a return on the book value of equity that differs from their cost of equity determined from stock market prices. Stock prices above book value are common for utility stocks, and indeed, the stock prices of non-regulated companies exceed book values by even greater margins. It is difficult to accept that the vast majority of all firms operating in our economy are generating returns far in excess of their cost of capital. Certainly, in our free-market economy, competition should contain such “excesses” if they actually exist.

Finally, the leverage adjustment adds stability to the final DCF cost rate. That is to say, as the market capitalization increases relative to its book value, the leverage adjustment increases while the simple yield (D/P) plus growth (g) result declines. The reverse is also true: when the market capitalization declines, the

leverage adjustment also declines as the simple yield (D/P) plus growth (g) result increases.

44. Q. IS THE LEVERAGE ADJUSTMENT THAT YOU PROPOSE DESIGNED TO TRANSFORM THE MARKET RETURN INTO ONE THAT IS DESIGNED TO PRODUCE A PARTICULAR MARKET-TO-BOOK RATIO?

A. No, it is not. What I label a "leverage adjustment" is merely a convenient way of showing the amount that must be added to (or subtracted from) the result of the simple DCF model (i.e., D/P + g) when the DCF return applies to a capital structure used for ratemaking that is computed with book-value weighting rather than market-value weighting. Although I specify a separate factor, which I call the leverage adjustment, there is no need to do so other than to identify this factor. If I were to express my return solely in the context of the book value weighting that we use to calculate the weighted average cost of capital and ignore the familiar D/P + g expression entirely, then a separate element in the DCF cost of equity determination would not be needed to reflect the differential in financial leverage between a market-value and book-value capitalization. As shown in the bottom panel of data on Schedule 10, the equity return applicable to the book value common equity ratio is equal to 8.53%, which is the return for the Water Group appropriate for a capital structure with no debt (i.e., a 100% equity ratio) plus 2.07% to compensate investors for the risk of 48.27% debt ratio and 0.00% for a 0.03% preferred stock ratio. These are the book-value ratios that differ markedly from the market-value based ratios I discussed previously. Under this approach, the parts add up to 10.58% (8.53% + 2.07% + 0.00%), and there is no need to even address the cost of equity in terms of D/P + g. To express this same return in the context of the familiar DCF model, I added the 2.63% dividend yield, the 6.75% growth rate, and 1.20% for the leverage adjustment to arrive at the same

10.58% return computed directly with the M&M formula. I know of no means to mathematically solve for the 1.20% leverage adjustment by expressing it in the terms of any particular relationship of market price to book value. The 1.20% adjustment is merely a convenient way to compare the 10.58% return computed using the Modigliani & Miller formulas to the 9.38% return generated by the DCF model (i.e., D_1/P_0 + g, or the traditional form of the DCF shown on Schedule 7) based on a market-value capital structure. A 9.38% return assigned to anything other than the market value of equity cannot equate to a reasonable return on book value that has higher financial risk. My point is that when we use a market-determined cost of equity developed from the DCF model, it reflects a level of financial risk that is different (in this case, lower) from the capital structure stated at book value. This process has nothing to do with targeting any particular market-to-book ratio.

45. Q. PLEASE PROVIDE THE DCF RETURN BASED UPON YOUR PRECEDING DISCUSSION OF DIVIDEND YIELD, GROWTH, AND LEVERAGE.

A. As explained previously, I have utilized a six-month average dividend yield (D_1/P_0) adjusted in a forward-looking manner for my DCF calculation. This dividend yield is used in conjunction with the growth rate (g) previously developed. The DCF also includes the leverage modification (Lev.) required when the book value equity ratio is used in determining the weighted average cost of capital in the ratemaking process rather than the market value equity ratio related to the price of stock. The resulting DCF cost rate is 10.58%, computed as follows:

	D_1/P_0	+	g	+	*lev.*	=	k
Water Group	2.63%	+	6.75%	+	1.20%	=	10.58%

The DCF result shown above represents the simplified (i.e., Gordon) form of the model that contains a constant-growth assumption. I should reiterate, however, that the DCF-indicated cost rate provides an explanation of the rate of return on common stock market prices without regard to the prospect of a change in the P-E multiple. An assumption that there will be no change in the P-E multiple is not supported by the realities of the equity market because P-E multiples do not remain constant. This is one of the constraints of this model that makes it important to consider the results of other models when determining a company's cost of equity.

RISK PREMIUM ANALYSIS

46. Q. PLEASE DESCRIBE YOUR USE OF THE RISK PREMIUM APPROACH TO DETERMINE THE COST OF EQUITY.

A. With the Risk Premium approach, the cost of equity capital is determined by corporate bond yields plus a premium to account for the fact that common equity is exposed to greater investment risk than debt capital. The result of my Risk Premium study is shown on page 2 of Schedule1. That result is 11.50%.

47. Q. WHAT LONG-TERM PUBLIC UTILITY DEBT COST RATE DID YOU USE IN YOUR RISK PREMIUM ANALYSIS?

A. In my opinion, and as I will explain in more detail further in my testimony, a 5.00% yield represents a reasonable estimate of the prospective yield on long-term, public utility bonds. The 5.00% public utility bond yield I used in the Risk Premium method is very conservative given current interest rates.

48. Q. WHAT HISTORICAL DATA ARE SHOWN BY THE MOODY'S DATA?

A. I have analyzed the historical yields on the Moody's index of long-term public utility debt as shown on Schedule 11, page 1. For the 12 months ended March 2024 the average monthly yield on Moody's index A-rated public utility bonds was

5.60%. For the six- and three-month periods ended March 2024, the yields were 5.72% and 5.53%, respectively. During the 12 months ended March 2024, the range of the yields on A-rated public utility bonds were 5.13% to 6.34%. Page 2 of Schedule11 shows the long-run spread in yields between A-rated public utility bonds and long-term Treasury bonds. As shown on page 3 of Schedule 11, the yields on A-rated public utility bonds have exceeded those on Treasury bonds by 1.36% on a twelve-month average basis, 1.26% on a six-month average basis, and 1.20% on a three-month average basis. With these data, 1.25% represents a reasonable, albeit conservative, spread for the yield on A-rated public utility bonds over Treasury bonds.

49. Q. WHAT FORECASTS OF INTEREST RATES HAVE YOU CONSIDERED IN YOUR ANALYSIS?

A. I have determined the prospective yield on A-rated public utility debt by using the Blue Chip Financial Forecasts ("Blue Chip") along with the spread in the yields that I describe above. Blue Chip is a reliable authority and contains consensus forecasts of various interest rates compiled from a panel of banking, brokerage and investment advisory services. In early 1999, Blue Chip stopped publishing forecasts of yields on A-rated public utility bonds because the Federal Reserve deleted these yields from its Statistical Release H.15. To independently project a forecast of the yields on A-rated public utility bonds, I have combined the forecast yields on long-term Treasury bonds published on April 1, 2024, and a yield spread of 1.25%, derived from recent historical data.

50. Q. HOW HAVE YOU USED THESE DATA TO PROJECT THE YIELD ON A-RATED PUBLIC UTILITY BONDS FOR THE PURPOSE OF YOUR RISK PREMIUM ANALYSES?

A. Shown below is my calculation of the prospective yield on A-rated public utility

bonds using the building blocks discussed above, i.e., the Blue Chip forecast of Treasury bond yields and the public utility bond yield spread. For comparative purposes, I have also shown the Blue Chip forecasts of Aaa-rated and Baa-rated corporate bonds. These forecasts are:

		Blue Chip Financial Forecasts				
		Corporate		30-Year	A-rated Public Utility	
Year	Quarter	Aaa-rated	Baa-rated	Treasury	Spread	Yield
2024	Second	5.0%	5.9%	4.3%	1.25%	5.55%
2024	Third	4.9%	5.8%	4.2%	1.25%	5.45%
2024	Fourth	4.9%	5.8%	4.2%	1.25%	5.45%
2025	First	4.8%	5.8%	4.1%	1.25%	5.35%
2025	Second	4.8%	5.8%	4.1%	1.25%	5.35%
2025	Third	4.8%	5.7%	4.0%	1.25%	5.25%

51. Q. ARE THERE ADDITIONAL FORECASTS OF INTEREST RATES THAT EXTEND BEYOND THOSE SHOWN ABOVE?

A. Yes. Twice yearly, Blue Chip provides long-term forecasts of interest rates. In its December 1, 2023 publication, Blue Chip published longer-term forecasts of interest rates, which were reported to be:

	Blue Chip Financial Forecasts		
	Corporate		30-Year
Averages	Aaa-rated	Baa-rated	Treasury
2025-2029	4.9%	6.0%	4.1%
2030-2034	5.0%	6.0%	4.2%

The longer-term forecasts by Blue Chip suggest that interest rates will continue to be above pre-Pandemic levels. A 5.00% yield on A-rated public utility bonds represents a reasonably conservative benchmark for measuring the cost of equity in this case. All the data I used to formulate my conclusion as to a prospective yield on A-rated public utility debt are available to investors, who regularly rely upon such data to make investment decisions.

52. Q. WHAT EQUITY RISK PREMIUM HAVE YOU DETERMINED FOR PUBLIC UTILITIES?

A. To develop an appropriate equity risk premium, I analyzed the results from 2022 SBBI Yearbook, Stocks, Bonds, Bills and Inflation. My investigation reveals that the equity risk premium varies according to the level of interest rates. That is to say, the equity risk premium increases as interest rates decline, and it declines as interest rates increase. This inverse relationship is revealed by the summary data presented below and shown on Schedule12, page 1.

Common Equity Risk Premiums

Low Interest Rates	7.13%
Average Across All Interest Rates	5.96%
High Interest Rates	4.76%

Based on my analysis of the historical data, the equity risk premium was 7.13% when the marginal cost of long-term government bonds was low (i.e., 2.83%, which was the average yield during periods of low rates). Conversely, when the yield on long-term government bonds was high (i.e., 7.03% on average during periods of high interest rates), the spread narrowed to 4.76%. Over the entire spectrum of interest rates, the equity risk premium was 5.96% when the average government bond yield was 4.91%. From these data, I have utilized a 6.50% equity risk premium. The equity risk premium of 6.50% is between the premiums associated with low interest rates (i.e., 7.13%) and average for the entire historical period interest rates (i.e., 5.96%).

53. Q. WHAT COMMON EQUITY COST RATE DID YOU DETERMINE BASED ON YOUR RISK PREMIUM ANALYSIS?

A. The cost of equity (i.e., “k”) is represented by the sum of the prospective yield for

long-term public utility debt (i.e., "i") and the equity risk premium (i.e., "RP"). The Risk Premium approach provides a cost of equity of:

	i		***RP***		***k***
Water Group	5.00%	+	6.50%	=	11.50%

CAPITAL ASSET PRICING MODEL

54. Q. HOW IS THE CAPM USED TO MEASURE THE COST OF EQUITY?

A. The CAPM uses the yield on a risk-free interest-bearing obligation plus a rate of return premium that is proportional to the systematic risk of an investment. As shown on page 2 of Schedule 1, the result of the CAPM is 13.80% for the Water Group with the leverage adjustment. Without the leverage adjustment, the CAPM result is 11.50% (13.80% - (0.28 x 8.21%)) through use of the Value Line beta excluding the leverage adjustment (i.e., 1.10 - 0.82 = 0.28). Further excluding the size adjustment, the CAPM result would be 10.48%. To compute the cost of equity with the CAPM, three components are necessary: a risk-free rate of return ("Rf"), the beta measure of systematic risk ("β") and the market risk premium ("Rm-Rf") derived from the total return on the market of equities reduced by the risk-free rate of return. The CAPM specifically accounts for differences in systematic risk (i.e., market risk as measured by the beta) between an individual firm or group of firms and the entire market of equities.

55. Q. WHAT BETAS HAVE YOU CONSIDERED IN THE CAPM?

A. For my CAPM analysis, I initially considered the Value Line betas. As shown on page 2 of Schedule 3, the average beta is 0.82 for the Water Group.

56. Q. DID YOU USE THE VALUE LINE BETAS IN THE CAPM DETERMINED COST OF EQUITY?

A. I used the Value Line betas as a foundation for the leverage-adjusted betas that I used in the CAPM. The Value Line betas are measured over a five-year period. The betas must be reflective of the financial risk associated with the ratemaking capital structure that is measured at book value. Therefore, Value Line betas cannot be used directly in the CAPM, unless the cost rate developed using those betas is applied to a capital structure measured with market values. Since we used book values in this case, the Value Line betas must be adjusted for the higher financial risk associated with the book value capital structure. To develop a CAPM cost rate applicable to a book-value capital structure, the Value Line (market value) betas have been unleveraged and re-leveraged for the book value common equity ratios using the Hamada formula,[9] as follows:

$$\beta l = \beta u \, [1 + (1 - t) \, D/E + P/E]$$

ßl = the leveraged beta, ßu = the unleveraged beta, t = income tax rate, D = debt ratio, P = preferred stock ratio, and E = common equity ratio. The betas published by Value Line have been calculated with the market price of stock and are related to the market value capitalization. By using the formula shown above and the capital structure ratios measured at market value, the beta would become 0.63 for the Water Group if it employed no leverage and was 100% equity financed. Those calculations are shown on Schedule 10 under the section labeled "Hamada," who is credited with developing those formulas. With the unleveraged

[9] Robert S. Hamada, "The Effects of the Firm's Capital Structure on the Systematic Risk of Common Stocks;" The Journal of Finance, Vol. 27, No. 2; Papers and Proceedings of the Thirtieth Annual Meeting of the American Finance Association, New Orleans, Louisiana, Dec. 27-29, 1971. (May 1972), pp. 435-52.

beta as a base, I calculated the leveraged beta of 1.10 for the book value capital structure of the Water Group.

57. Q. WHAT RISK-FREE RATE HAVE YOU USED IN THE CAPM?

A. As shown on page 1 of Schedule 13, I provided the historical yields on Treasury notes and bonds. For the 12 months ended March 2024, the average yield on 30-year Treasury bonds was 4.24%. For the six- and three-months ended March 2024, the yields on 30-year Treasury bonds were 4.46% and 4.33%, respectively. During the 12 months ended March 2024, the range of the yields on 30-year Treasury bonds was 3.68% to 4.95%.

Due to high inflation rates above the policy goal of the FOMC, the accommodative policy was ended by the FOMC in the first quarter of 2022. A tighter monetary policy exists today and has caused higher interest rates that have already occurred. After the FOMC ended its bond-buying program (i.e., quantitative easing) in March 2022, it is in the process of running off its $9 trillion asset portfolio, which will keep interest rates at elevated levels.

Following the extraordinary events associated with the Pandemic that jolted the capital markets, a tighter monetary policy was put in place and resulted in higher interest rates. High interest rates clearly point to high capital costs, as indicated by recent bond yields. The yield on 10-year Treasury bonds moved above the 3% level on May 2, 2022, for the first time since late 2018. By December 2023, the yield on 30-year Treasury bonds moved to 4.14%, or an increase of 2.47% (or 148%) since December 2020.

As shown on page 2 of Schedule 13, forecasts published by Blue Chip on April 1, 2024, indicate that the yields on long-term Treasury bonds are expected to be in the range of 4.0% to 4.3% during the next six quarters. This means that elevated interest rates will continue near current levels. The longer-

term forecasts show that the yields on 30-year Treasury bonds will average 4.1% from 2025 through 2029 and 4.2% from 2030 to 2034. Hence, I have used a conservative 3.75% risk-free rate of return for CAPM purposes, which considers the possibility of some moderation of rates prospectively.

58. Q. WHAT MARKET PREMIUM HAVE YOU USED IN THE CAPM?

A. As shown in the lower panel of data presented on page 2 of Schedule 13, the market premium is derived from historical data and the forecast returns. For the historically based market premium, I have used the arithmetic mean obtained from the data presented on page 1 of Schedule 13. On that schedule, the market return was 12.21% (12.40% + 12.02% = 24.42% ÷ 2) as the midpoint of the "low" and "average" interest rate environments. During those periods, the yield on long-term government bonds was 3.87% (2.83% + 4.91% = 7.74% ÷ 2). The resulting market premium is 8.34% (12.21% - 3.87%) based on historical data, as shown on page 2 of Schedule 13. As also shown on page 2 of Schedule 13, I calculated the forecast returns, which show a 11.83% total market return based on the Value Line forecasts. With these data, I calculated a market premium of 8.08% (11.83% - 3.75%) using the forecast data by Value Line. The resulting market premium applicable to the CAPM derived from these sources equals 8.21% (8.08% + 8.34% = 16.42% ÷ 2).

59. Q. ARE THERE ADJUSTMENTS TO THE CAPM THAT ARE NECESSARY TO FULLY REFLECT THE RATE OF RETURN ON COMMON EQUITY?

A. Yes. The technical literature supports an adjustment relating to the size of the company or portfolio for which the calculation is performed. As the size of a firm decreases, its risk and required return increases. Moreover, in his discussion of the cost of capital, Professor Eugene F. Brigham has indicated that smaller firms have higher capital costs than otherwise similar larger firms. Also, the

Fama/French study (see "The Cross-Section of Expected Stock Returns"; The Journal of Finance, June 1992) established that the size of a firm helps explain stock returns. In an October 15, 1995 article in Public Utility Fortnightly, entitled "Equity and the Small-Stock Effect," it was demonstrated that the CAPM could significantly understate the cost of equity according to a company's size. Indeed, it was demonstrated in the SBBI Yearbook that the returns for stocks in lower deciles (i.e., smaller stocks) had returns in excess of those shown by the simple CAPM. To recognize this fact, I used the mid-cap adjustment of 1.02%, as revealed on page 3 of Schedule 13, for the CAPM calculation. The adjustment here is related to the size of the Water Group.

60. Q. WHAT DOES YOUR CAPM ANALYSIS SHOW?

A. Using the 3.75% risk-free rate of return, the leverage adjusted beta of 1.10 for the Water Group, the 8.21% market premium, and the 1.02% size adjustment, the following result is indicated.

	Rf	**+**	***ß***	***x (Rm-Rf)***	**+**	***size***	**=**	***k***
Water Group	3.75%	+	1.10	x (8.21%)	+	1.02%	=	13.80%

COMPARABLE EARNINGS APPROACH

61. Q. WHAT IS THE COMPARABLE EARNINGS APPROACH?

A. The Comparable Earnings approach estimates a fair return on equity by comparing returns realized by non-regulated companies to returns that a public utility with similar risk characteristics would need to realize to compete for capital. Because regulation is a substitute for competitively determined prices, the returns realized by non-regulated firms with comparable risks to a public utility provide useful insight into investor expectations for public utility returns. The firms selected for the Comparable Earnings approach should be companies whose

prices are not subject to cost-based price ceilings (i.e., non-regulated firms) so that circularity is avoided.

There are two avenues available to implement the Comparable Earnings approach. One method involves the selection of another industry (or industries) with comparable risks to the public utility in question, and the results for all companies within that industry serve as a benchmark. The second approach requires the selection of parameters that represent similar risk traits for the public utility and the comparable risk companies. Using this approach, the business lines of the comparable companies become unimportant. The latter approach is preferable with the further qualification that the comparable risk companies exclude regulated firms in order to avoid the circular reasoning implicit in the use of the achieved earnings/book ratios of other regulated firms. The United States Supreme Court has held that:

> A public utility is entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public equal to that generally being made at the same time and in the same general part of the country on investments in other business undertakings which are attended by corresponding risks and uncertainties. The return should be reasonably sufficient to assure confidence in the financial soundness of the utility and should be adequate, under efficient and economical management, to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties. Bluefield Water Works v. Public Service Commission, 262 U.S. 668 (1923).

It is important to identify the returns earned by firms that compete for capital with a public utility. This can be accomplished by analyzing the returns of non-regulated firms that are subject to the competitive forces of the marketplace.

62. Q. DID YOU COMPARE THE RESULTS OF YOUR DCF AND CAPM ANALYSES TO THE RESULTS INDICATED BY A COMPARABLE EARNINGS APPROACH?

A. Yes. I selected companies from The Value Line Investment Survey for Windows that have six categories of comparability designed to reflect the risk of the Water Group. These screening criteria were based upon the range as defined by the rankings of the companies in the Water Group. The items considered were Timeliness Rank, Safety Rank, Financial Strength, Price Stability, Value Line betas, and Technical Rank. The definition for these parameters is provided on page 3 of Schedule 14. The identities of the companies comprising the Comparable Earnings group and their associated rankings within the ranges are identified on Schedule 14, page 1.

I relied upon Value Line data because it provides a comprehensive basis for evaluating the risks of the comparable firms. As to the returns calculated by Value Line for these companies, there is some downward bias in the figures shown on page 2 of Schedule 14, because Value Line computes the returns on year-end rather than average book value. If average book values had been employed, the rates of return would have been slightly higher. Nevertheless, these are the returns considered by investors when taking positions in these stocks. Because many of the comparability factors, as well as the published returns, are used by investors in selecting stocks, and the fact that investors rely on the Value Line service to gauge returns, it is an appropriate database for measuring comparable return opportunities.

63. Q. WHAT DATA DID YOU CONSIDER IN YOUR COMPARABLE EARNINGS ANALYSIS?

A. I used both historical realized returns and forecasted returns for non-utility companies. As noted previously, I have not used returns for utility companies to avoid the circularity that arises from using regulatory-influenced returns to determine a regulated return. It is appropriate to consider a relatively long measurement period in the Comparable Earnings approach to cover conditions over an entire business cycle. A ten-year period (five historical years and five projected years) is sufficient to cover an average business cycle. Unlike the DCF and CAPM, the results of the Comparable Earnings method can be applied directly to the book value capitalization. In other words, the Comparable Earnings approach does not contain the potential misspecification contained in market models when the market capitalization and book value capitalization diverge significantly. A point of demarcation was chosen to eliminate the results of highly profitable enterprises, which the Bluefield case stated were not the type of returns that a utility was entitled to earn. For this purpose, I used 20% as the point where those returns could be viewed as highly profitable and should be excluded from the Comparable Earnings approach. The average historical rate of return on book common equity was 12.7% using only the returns that were less than 20%, as shown on page 2 of Schedule 14. The average forecasted rate of return, as published by Value Line, is 13.1% also using values less than 20%, as provided on page 2 of Schedule 14. Using the average of these data, my Comparable Earnings result is 12.90%, as shown on page 2 of Schedule1.

CONCLUSION ON COST OF EQUITY

64. Q. WHAT IS YOUR CONCLUSION REGARDING THE COMPANY'S COST OF COMMON EQUITY?

A. Based upon the application of a variety of methods and models described previously, it is my opinion that the return rate on common equity of 10.95% being employed in this case is within – in fact, nearer the low end – of the range of reasonable equity return rates for AP. The rate of return on common equity used by AP to develop its proposed revenue requirement in this case should be considered in the context of AP's risk characteristics, as well as the general condition of the capital markets. It is essential that the Commission employ a variety of techniques to measure AP's cost of equity because of the limitations/infirmities that are inherent in each method. It is also important that the Commission consider the exemplary performance of the Company's management when making a final determination on the equity return in this case.

65. Q. DOES THIS COMPLETE YOUR DIRECT TESTIMONY?

A. Yes. However, I reserve the right to supplement my testimony, if necessary, and to respond to witnesses presented by other parties.

EDUCATIONAL BACKGROUND, BUSINESS EXPERIENCE AND QUALIFICATIONS

I was awarded a degree of Bachelor of Science in Business Administration by Drexel University in 1971. While at Drexel, I participated in the Cooperative Education Program which included employment, for one year, with American Water Works Service Company, Inc., as an internal auditor, where I was involved in the audits of several operating water companies of the American Water Works System and participated in the preparation of annual reports to regulatory agencies and assisted in other general accounting matters.

Upon graduation from Drexel University, I was employed by American Water Works Service Company, Inc., in the Eastern Regional Treasury Department where my duties included preparation of rate case exhibits for submission to regulatory agencies, as well as responsibility for various treasury functions of the thirteen New England operating subsidiaries.

In 1973, I joined the Municipal Financial Services Department of Betz Environmental Engineers, a consulting engineering firm, where I specialized in financial studies for municipal water and wastewater systems.

In 1974, I joined Associated Utility Services, Inc., now known as AUS Consultants. I held various positions with the Utility Services Group of AUS Consultants, concluding my employment there as a Senior Vice President.

In 1994, I formed P. Moul & Associates, an independent financial and regulatory consulting firm. In my capacity as Managing Consultant and for the past forty-two years, I have continuously studied the rate of return requirements for cost of service-regulated firms. In this regard, I have supervised the preparation of rate of return studies, which were employed, in connection with my testimony and in the past for other individuals. I have presented direct testimony on the subject of fair rate of return, evaluated rate of return testimony of other witnesses, and presented rebuttal testimony.

My studies and prepared direct testimony have been presented before thirty-seven (37) federal, state and municipal regulatory commissions, consisting of: the Federal Energy Regulatory Commission; state public utility commissions in Alabama, Alaska, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Virginia, West Virginia, Wisconsin, and the Philadelphia Gas Commission, and the Texas Commission on Environmental Quality. My testimony has been offered in over 300 rate cases involving electric power, natural gas distribution and transmission, resource recovery, solid waste collection and disposal, telephone, wastewater, and water service utility companies. While my testimony has involved principally fair rate of return and financial matters, I have also testified on capital allocations, capital recovery, cash working capital, income taxes, factoring of accounts receivable, and take-or-pay expense recovery. My testimony has been offered on behalf of municipal and investor-owned public utilities and for the staff of a regulatory commission. I have also testified at an Executive Session of the State of New Jersey Commission of Investigation concerning the BPU regulation of solid waste collection and disposal.

I was a co-author of a verified statement submitted to the Interstate Commerce Commission concerning the 1983 Railroad Cost of Capital (Ex Parte No. 452). I was also co-author of comments submitted to the Federal Energy Regulatory Commission regarding the Generic Determination of Rate of Return on Common Equity for Public Utilities in 1985, 1986 and 1987 (Docket Nos. RM85-19-000, RM86-12-000, RM87-35-000 and RM88-25-000). Further, I have been the consultant to the New York Chapter of the National Association of Water Companies, which represented the water utility group in the Proceeding on Motion of the Commission to Consider Financial Regulatory Policies for New York Utilities (Case 91-M-0509). I have also submitted comments to the Federal Energy Regulatory Commission in

its Notice of Proposed Rulemaking (Docket No. RM99-2-000) concerning Regional Transmission Organizations and on behalf of the Edison Electric Institute in its intervention in the case of Southern California Edison Company (Docket No. ER97-2355-000). Also, I was a member of the panel of participants at the Technical Conference in Docket No. PL07-2 on the Composition of Proxy Groups for Determining Gas and Oil Pipeline Return on Equity.

In late 1978, I arranged for the private placement of bonds on behalf of an investor-owned public utility. I have assisted in the preparation of a report to the Delaware Public Service Commission relative to the operations of the Lincoln and Ellendale Electric Company. I was also engaged by the Delaware P.S.C. to review and report on the proposed financing and disposition of certain assets of Sussex Shores Water Company (P.S.C. Docket Nos. 24-79 and 47-79). I was a co-author of a Report on Proposed Mandatory Solid Waste Collection Ordinance prepared for the Board of County Commissioners of Collier County, Florida.

I have been a consultant to the Bucks County Water and Sewer Authority concerning rates and charges for wholesale contract service with the City of Philadelphia. My municipal consulting experience also included an assignment for Baltimore County, Maryland, regarding the City/County Water Agreement for Metropolitan District customers (Circuit Court for Baltimore County in Case 34/153/87-CSP-2636).