

**OCC EXHIBIT NO. \_\_\_\_\_**

**BEFORE  
THE PUBLIC UTILITIES COMMISSION OF OHIO**

In the Matter of the Application of Aqua     )  
Ohio, Inc., for Authority to Increase its     ) Case No. 21-595-WW-AIR  
Rates and Charges for its Waterworks     )  
Service.     )

**DIRECT TESTIMONY  
OF  
DANIEL J. DUANN, Ph.D.**

**On Behalf of  
Office of the Ohio Consumers' Counsel**  
*65 East State Street, Suite 700  
Columbus, Ohio 43215*

**March 14, 2022**

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1    **I.        INTRODUCTION**

2

3    ***Q1.    PLEASE STATE YOUR NAME, BUSINESS ADDRESS AND POSITION.***

4    ***A1.***    My name is Daniel J. Duann. My business address is 65 East State Street, Suite  
5            700, Columbus, OH 43215. I am the Co-Director for Traditional Regulation in the  
6            Analytical Services Department within the Office of the Ohio Consumers'  
7            Counsel ("OCC").

8

9    ***Q2.    PLEASE DESCRIBE YOUR PROFESSIONAL EXPERIENCE AND***  
10    ***EDUCATIONAL BACKGROUND.***

11   ***A2.***    I joined OCC in January 2008 as a Senior Regulatory Analyst. I was promoted to  
12            the position of Principal Regulatory Analyst in 2011, and then to the position of  
13            Assistant Director in 2018. I began my current position in July 2021. My primary  
14            responsibility at OCC is to provide analytical support for OCC's participation in  
15            proceedings before the Public Utilities Commission of Ohio ("PUCO") and the  
16            Federal Energy Regulatory Commission ("FERC"). These proceedings include,  
17            among others, rate cases, cost of capital, fuel adjustment clause, standard service  
18            offer, and infrastructure replacement riders.

19

20            Prior to joining OCC, I was an independent consultant. Before that, I was a Senior  
21            Institute Economist at the National Regulatory Research Institute ("NRRI") at  
22            The Ohio State University. NRRI has been a policy research center funded by the  
23            National Association of Regulatory Utility Commissioners and state public

1 utilities commissions since 1976. NRRI is currently located in Washington, DC  
2 and no longer a part of The Ohio State University. My work at NRRI involved  
3 research, publishing, and public services in the areas of regulatory and energy  
4 policy. Before NRRI, I held various positions with the Forecasting Section of the  
5 Ohio Division of Energy (which was later transferred to the PUCO), the Center of  
6 Health Policy Research at the American Medical Association, and the Policy  
7 Analysis and Research Division of the Illinois Commerce Commission.

8  
9 I received my Ph.D. degree in Public Policy Analysis and M.S. degree in Energy  
10 Management and Policy from the University of Pennsylvania. I also have an M.A.  
11 degree in Economics from the University of Kansas. I completed my  
12 undergraduate study in Business Administration at the National Taiwan  
13 University, Taiwan, Republic of China. I have been a Certified Rate of Return  
14 Analyst by the Society of Utility and Regulatory Financial Analysts since 2011.

15

16 ***Q3. HAVE YOU PREVIOUSLY SUBMITTED TESTIMONY OR TESTIFIED***  
17 ***BEFORE THE PUBLIC UTILITIES COMMISSION OF OHIO AND OTHER***  
18 ***AGENCIES AND LEGISLATURES?***

19 ***A3.*** Yes. I have submitted expert testimony or testified on behalf of the OCC before  
20 the PUCO in many proceedings. A list of these cases is included in Attachment  
21 DJD-1. I have also testified before the Illinois Commerce Commission and the  
22 California Legislature (specifically, the Senate Committee on Energy and Public  
23 Utilities).

1 ***Q4. HAVE YOU PREVIOUSLY PUBLISHED OR PRESENTED IN ACADEMIC***  
2 ***JOURNALS, TRADE PUBLICATIONS, AND PROFESSIONAL***  
3 ***CONFERENCES?***

4 ***A4.*** Yes. I have published in several academic journals and trade publications. I have  
5 also presented in conferences on issues related to utility regulation, energy policy,  
6 and emerging energy technology. A selected list of these publications and  
7 presentations is included as Attachment DJD-2.

8

9 **II. PURPOSE AND RECOMMENDATION**

10

11 ***Q5. WHAT IS THE PURPOSE OF YOUR TESTIMONY?***

12 ***A5.*** The purpose of my testimony is to explain and support OCC's position regarding  
13 a reasonable rate of return and related issues in the Application for an increase in  
14 distribution rates by Aqua Ohio, Inc. ("Aqua" or the "Utility").<sup>1</sup> Specifically, I  
15 will explain and support four OCC Objections<sup>2</sup> (Objections 3 through 6) to the  
16 Staff Report.<sup>3</sup> Based on these Objections, I will propose a reasonable rate of  
17 return of 6.32% or lower for Aqua in this proceeding.

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<sup>1</sup> See *In the Matter of The Application of Aqua Ohio, Inc. for Authority to Increase its Rates and Charges for its Waterworks Service*, Case No. 21-595-EL-AIR, (June 28, 2021), (the "Application").

<sup>2</sup> Objections to the PUCO Staff's Report of Investigation by Office of the Ohio Consumers' Counsel (March 14, 2022) ("OCC Objections").

<sup>3</sup> A Report by the Staff of the Public Utilities Commission of Ohio (February 11, 2022), (the "Staff Report").

1    ***Q6. TO PROTECT CONSUMERS, WHAT ARE YOUR RECOMMENDATIONS***  
2                   ***REGARDING A REASONABLE RATE OF RETURN FOR AQUA IN THIS***  
3                   ***PROCEEDING?***

4    ***A6.*** I recommend, as more fully explained later in my testimony, the PUCO adopt  
5           OCC’s Objections 3 through 6 and my proposed three modifications to the rate of  
6           return included in the Staff Report. Specifically, I recommend that the PUCO:

- 7                   (1) Adopt OCC Objection 3 and use a risk-free rate of 1.83% (instead  
8                           of 2.12% proposed in the Staff Report) for its Capital Asset Pricing  
9                           Model.
- 10                  (2) Adopt OCC Objections 4 and exclude the Comparative Earnings  
11                       Review (“CE Review”) results in estimating Aqua’s cost of equity.
- 12                  (3) Adopt OCC Objection 5 and remove the added allowance for  
13                       generic equity issuance and other costs proposed in the Staff  
14                       Report.
- 15                  (4) Adopt OCC Objection 6 and reject the range of rate of return of  
16                       6.51% to 7.04% proposed in the Staff Report.
- 17                  (5) Reject the rate of return of 7.42% and cost of equity of 10.75%  
18                       proposed by Aqua.
- 19                  (6) Adopt a rate of return of no higher than 6.32% in setting the rates  
20                       and charges for waterworks service by Aqua.

***Q7. PLEASE SUMMARIZE THE RATE OF RETURN PROPOSED BY OCC, PUCO STAFF, AND AQUA.***

**A7.** A summary of the rate of return and its components (capital structure, cost of long-term debt, and cost of equity) proposed by OCC, the PUCO Staff, and Aqua is provided in Table 1.

Table 1  
A summary of Rate of Return Proposed by OCC, Staff and Aqua

	Staff Report	OCC	Aqua
Cost of Long-Term Debt	3.82%	3.82%	3.82%
Debt Ratio	0.479	0.479	0.479
Cost of Equity	8.99% - 10.00%	8.19% - 8.62%	10.75%
Equity Ratio	0.521	0.521	0.521
Rate of Return	6.51% - 7.04%	6.10% - 6.32%	7.43%

**III. OCC OBJECTIONS AND MODIFICATIONS TO THE RATE OF RETURN PROPOSED IN THE STAFF REPORT.**

***Q8. WHAT ARE THE REGULATORY PRINCIPLES COMMONLY USED IN SETTING A REASONABLE RATE OF RETURN FOR A REGULATED UTILITY SUCH AS AQUA?***

**A8.** The regulatory principles in setting a reasonable rate of return for a regulated utility in the United States are well-established and recognized. These regulatory principles can be summarized as the followings:

- (1) The resulting rates (as set based on the authorized rate of return) paid by customers of a regulated utility should be just and

- 1 reasonable and not excessive;<sup>4</sup>
- 2 (2) The regulated utility should have access to capital (both equity and
- 3 debt) at reasonable cost under current market conditions;<sup>5</sup>
- 4 (3) The regulated utility should have funds available to continue its
- 5 normal course of business to provide necessary and adequate
- 6 utility service to customers;<sup>6</sup> and
- 7 (4) The investors of the regulated utility should be provided the
- 8 opportunity (but not a guarantee) to earn a fair (but not excessive)
- 9 return on their invested capital in comparison to other investments
- 10 currently available.<sup>7</sup>

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<sup>4</sup> This is also referred as cost-based regulation. In other words, the rates of utility services that customers pay should be based on prudently incurred costs of providing these utility services to customers, which includes a reasonable and fair rate of return on the capital invested. An extensive discussion on this regulatory principle can be found in, for example, James C. Bonbright, *Principles of Public Utility Rates*, Columbia University Press, New York (1961) at 240-241. The Ohio Revised Code also has requirement that all rates for utility services be just and reasonable. *See* R.C. 4905.22.

<sup>5</sup> Specifically, in the case of *Bluefield Water Works v. Public Service Comm'n*, 262 U.S. 679 (1923), the U.S. Supreme Court ruled 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; but it has no constitutional right to profits such as are realized or anticipated in highly profitable enterprises or speculative ventures. The return should be reasonably sufficient to assure confidence in the financial soundness of the utility, and should be adequate, under efficient and economic management, to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties.”

<sup>6</sup> *Id.*

<sup>7</sup> *Id.*



1 ***Q9. PLEASE SUMMARIZE THE RATE OF RETURN ANALYSIS IN THE***  
2 ***STAFF REPORT.***

3 ***A9.*** The Staff Report adopts a capital structure of 47.9% debt and 52.1% equity, a cost  
4 of long-term debt of 3.82%, and a cost of equity (or a return on equity, “ROE”) in  
5 the range of 8.99% to 10.00%.<sup>8</sup> Based on these parameters, the Staff Report  
6 proposes a rate of return in the range of 6.51% to 7.04% for Aqua.<sup>9</sup> The capital  
7 structure and the cost of long-term debt proposed in the Staff Report are the same  
8 as those proposed in the Application.

9  
10 The Staff Report applies both the Capital Asset Pricing Model (“CAPM”) and  
11 Discounted Cash Flow (“DCF”) analysis to six water utilities companies in  
12 estimating the cost of equity of Aqua.<sup>10</sup> In addition, the Staff Report includes the  
13 results of the Comparative Earnings Review (“CE Review”) of two different  
14 groups of companies (All Industries and Utility Industries) in estimating the cost  
15 of equity.<sup>11</sup>

16  
17 The estimated cost of equity is 8.36% under CAPM, 8.30% under DCF, and  
18 11.51% under the CE Review. The cost of equity of Aqua, based on the average  
19 of the three methods, is 9.39%. Assumes a 100-basis-point (1.00%) range of

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<sup>8</sup> Staff Report at 6-9.

<sup>9</sup> Staff Report at 6.

<sup>10</sup> Staff Report at 6-8.

<sup>11</sup> *Id.*

1           uncertainty, the Staff Report proposes a range of 8.89% to 9.89% for Aqua's  
2           baseline cost of equity. An additional allowance or adjustment factor (0.01145 or  
3           1.145%) to account for some generic and hypothetical equity issuance costs is  
4           added for a final recommended range of cost of equity of 8.99% to 10.00%.<sup>12</sup>  
5

6   ***Q10. DO YOU OBJECT TO THE COST OF LONG-TERM DEBT AND CAPITAL***  
7   ***STRUCTURE PROPOSED IN THE STAFF REPORT?***

8   ***A10.*** No.  
9

10   ***Q11. DO YOU OBJECT TO THE COST OF EQUITY AND RATE OF RETURN***  
11   ***PROPOSED IN THE STAFF REPORT?***

12   ***A11.*** Yes. The cost of equity and the rate of return proposed in the Staff Report do not  
13           reflect current market conditions or the business and financial risks facing a  
14           regulated water utility such as Aqua. Furthermore, they are inconsistent with the  
15           analysis and approach used in the Staff Reports of many prior rate cases. The  
16           PUCO Staff has not provided any explanation for doing so.

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<sup>12</sup> Staff Report at 8-9.

1 ***Q12. PLEASE EXPLAIN OCC OBJECTION 3.***

2 ***A12.*** To protect Aqua’s consumers, OCC objects to the use of the average of the yields  
3 (interest rates) of the 20-year and 30-year U.S. Treasury Bonds as the risk-free  
4 rate for the CAPM analysis.<sup>13</sup>

$$\text{CAPM} = \text{Risk-Free Rate} + \text{Beta} * (\text{Equity Risk Premium})$$

6  
7 In the CAPM analysis, a risk-free rate is typically based on the current actual  
8 yields of long-term US government bonds with ten years or longer maturity. The  
9 use of the yields of the 10-year and 30-year government bonds in calculating the  
10 risk-free rate is well-established and widely used by many analysts when applying  
11 the CAPM. The U.S. Treasury sold more 10-year bonds than 20-year bonds. Also,  
12 a combination of 10-year bonds and 30-year bonds can better reflect the average  
13 maturity of long-term bonds issued by the U.S. Treasury. Not surprisingly, the  
14 PUCO Staff Reports of many prior rate cases have used the average of the yields  
15 of 10-year and 30-year US Treasury bonds as the risk-free rate.

16  
17 There is no explanation on why the yields of the 20-year bonds, and not the yields  
18 of the 10-year bonds, should be used in this proceeding. As the yields of the 20-  
19 year bonds (for example, 2.07% in 2021) tend to be much higher than the yields  
20 of the 10-year bonds (for example, 1.50% in 2021), the use of the yields of 20-  
21 year U.S. Treasury Bonds as the risk-free rate would overstate the estimated cost  
22 of equity of Aqua under the CAPM analysis.

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<sup>13</sup> Staff Report at 7.

1 ***Q13. WHAT IS YOUR RECOMMENDATION REGARDING THE RISK-FREE***  
2 ***RATE FOR THE CAPM ANALYSIS?***

3 ***A13.*** Based on my review of the yields of the 10-year U.S. Treasury Bonds, as  
4 compiled by the U.S. Department of the Treasury and other financial publications,  
5 I would recommend a risk-free rate of 1.83% for the CAPM. This risk-free rate is  
6 the average of the 10-year U.S. Treasury Bonds (1.50%) and the 30-year U.S.  
7 Treasury Bonds (2.16%) for the six-month period of March 1 to August 31,  
8 2021.<sup>14</sup> The daily yields of the various U.S. Treasury obligations are shown in  
9 Attachment DJD-3.

11 ***Q14. PLEASE EXPLAIN OCC OBJECTION 4.***

12 ***A14.*** To protect Aqua's consumers, OCC objects to the inclusion of the results of the  
13 Comparable Earnings Review ("CE Review"), such as the estimated ROE of  
14 13.53% earned by companies from various industries (Group 1), in calculating the  
15 cost of equity.<sup>15</sup> These companies are in various industries with vastly different  
16 business and financial risks from those associated with a regulated water utility  
17 such as Aqua. The average earned ROE of these companies should not be used in  
18 setting the cost of equity of Aqua. The inclusion of this unrelated earned ROE of  
19 13.53% from other industries would only unreasonably overstate the cost of  
20 equity of Aqua, a regulated water utility.

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<sup>14</sup> See [https://home.treasury.gov/resource-center/data-chart-center/interest-rates/TextView?type=daily\\_treasury\\_yield\\_curve&field\\_tdr\\_date\\_value=2021](https://home.treasury.gov/resource-center/data-chart-center/interest-rates/TextView?type=daily_treasury_yield_curve&field_tdr_date_value=2021).

<sup>15</sup> See Staff Report at 8.

1 Comparable Earnings has been used by a small number of analysts in estimating  
2 the cost of equity. It is not widely used because it relies on the return earned on  
3 *book equity investment* instead of *market value equity investment* in estimating the  
4 cost of equity. Many financial analysts do not view this average earned return on  
5 book equity (as measured by the CE Review) of one particular year as a valid  
6 measurement of investor's expected return from alternative investments with  
7 comparable risks.

8  
9 A more serious concern of using the CE Review in the Staff Report is the  
10 selection of a peer group that consists of many companies in various industries  
11 with totally different business and financial risks of a regulated water utility such  
12 as Aqua. The resulting ROE of 13.53% is clearly unreasonable and unreliable  
13 (much too high) as a proxy in estimating the cost of equity of Aqua when other  
14 accepted rate of return methodologies have generated a cost of equity of either  
15 8.36% (from CAPM) or 8.30% (from DCF).<sup>16</sup>

16  
17 In most the PUCO rate case Staff Reports I reviewed, the cost of equity was  
18 calculated by the average of the CAPM and DCF results. The results from the  
19 Comparative Earnings analysis were rarely used, if ever. The Staff Report has  
20 provided no explanation why it is reasonable to add the CE Review in estimating  
21 the cost of equity for Aqua in this proceeding. It was not reasonable to use the CE

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<sup>16</sup> See Staff Report at 8.

1 Review (at least the result from companies unrelated to a regulated utility) and my  
2 objection should be adopted to protect consumers.

3

4 ***Q15. PLEASE EXPLAIN OCC OBJECTION 5.***

5 ***A15.*** To protect Aqua's consumers, OCC objects to the inclusion of an allowance for  
6 generic and hypothetical issuance and other costs proposed in the Staff Report. By  
7 including this additional allowance, the Staff Report increased the recommended  
8 cost of equity from a range of 8.89% to 9.89% to a range of 8.99% to 10.00%.

9

10 This added allowance to the baseline cost of equity is unnecessary and  
11 unreasonable. First, even if an adjustment for equity issuance and other costs were  
12 allowed, there is no actual cost basis to support an added allowance factor of  
13 0.01145 to the estimated baseline return on equity. There is no evidence in the  
14 Staff Report that Aqua is likely to incur the equity issuance and other costs  
15 recently or in the future or the magnitude of these costs. Second, the equity  
16 issuance and other costs that might have occurred are already accounted and  
17 reflected in the market prices of common stock, per share earnings and dividend  
18 projections, and any other market factors of those water utilities selected in the  
19 peer group for estimating the cost of equity of Aqua.

20

21 ***Q16. PLEASE EXPLAIN OCC OBJECTION 6.***

22 ***A16.*** To protect Aqua's consumers, OCC objects to the recommended rate of return  
23 range of 6.51% to 7.04% in the Staff Report. The Staff Report's recommended

1 rate of return range of 6.51% to 7.04% is too high based on current market  
2 conditions and Aqua's business and financial risks. It is unjust and unreasonable  
3 for consumers to pay Aqua a water distribution charge based on this range of rate  
4 of return. The Staff Report's recommended return on equity range of 8.99% to  
5 10.00% is also too high and thus unjust and unreasonable for consumers to pay.

6

7 **IV. A REASONABLE RATE OF RETURN FOR AQUA SHOULD BE NO**  
8 **HIGHER THAN 6.32%**

9

10 ***Q17. IN ADDITION TO THE OBJECTIONS TO THE STAFF REPORT***  
11 ***DISCUSSED ABOVE, DO YOU HAVE OTHER CONCERNS IN***  
12 ***RECOMMENDING A REASONABLE RATE OF RETURN FOR AQUA IN***  
13 ***THIS PROCEEDING?***

14 ***A17.*** I do. I am particularly concerned about the costs of water services to the  
15 approximately 150,549 Ohio consumers served by Aqua. They have faced  
16 frequent and significant rate increases in the last five years. This rate increase by  
17 Aqua, if approved, would be the fifth increase in rates (including the three System  
18 Improvement Charges) granted by the PUCO since March 2017.<sup>17</sup> A summary of  
19 the approved rate increases since March 22, 2017, is provided in Table 2.

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<sup>17</sup> Staff Report at 1-3.

Table 2  
Recent Aqua Rate Increases Approved by PUCO

Case Number	Date	Increase in Revenue Requirement	Approved Total Revenue Requirement
16-907-WW-AIR	March 22, 2017	\$4,242,381	\$65,329,479
18-337-WW-SIC	February 6, 2019	\$2,271,885	
19-567-WW-SIC	October 23, 2019	\$2,313,201	
20-532-WW-SIC	September 23, 2020	\$2,167,752	

These frequent and significant rate increases by Aqua in recent years indicate the need to select a low but reasonable rate of return to restrain any further rate increase to consumers served by Aqua. At the same time, the frequent use of the System Improvement Charge (two in 2019 and one in 2020) by Aqua has reduced considerably the so-called regulatory lag and the business and financial risks of Aqua. This in turn should lead to a lower authorized rate of return for Aqua.

***Q18. WHAT IS YOUR RECOMMENDED COST OF EQUITY IF THE RESULT OF THE COMPARABLE EARNINGS REVIEW WERE EXCLUDED?***

***A18.*** For the CAPM analysis, I propose a risk-free rate of 1.83%. If using the same parameters used in the Staff Report, the CAPM cost of equity will be 8.07%.

$$8.07\% = 1.83\% + (0.81 * 7.7\%)$$

For the DCF analysis, I use the same DCF cost of equity of 8.30% proposed in the Staff Report. Then the cost of equity is 8.19%.

$$8.19\% = (8.07\% + 8.30\%) / 2$$



**Q19. WHAT IS YOUR RECOMMENDED COST OF EQUITY IF THE RESULT OF THE COMPARABLE EARNINGS REVIEW WERE INCLUDED?**

**A19.** If the result of the CE Review were included (which I do not think is necessary), I will only consider the average ROE of 9.49% calculated from a group of utility companies (Group 2) included in the Staff Report.<sup>18</sup> As discussed above, it is unreasonable to include the average earned ROE of those companies in industries with vastly different risk profile from that of Aqua in estimating the cost of equity of Aqua. Under this approach, the cost of equity will be the average (8.62%) of the three methods (CAPM, DCF, and CE Review).

$$8.62\% = (8.07\% + 8.36\% + 9.49\%) / 3$$

**Q20. WHAT IS YOUR RECOMMENDED RANGE OF AQUA'S COST OF EQUITY?**

**A20.** I recommend a range of 8.19% (if only CAPM and DCF results are included) to 8.62% (if the result of CE Review is also included) for the cost of equity of Aqua in this proceeding. A cost of equity within this range is reasonable.

**Q21. WHAT IS YOUR RECOMMENDED RATE OF RETURN FOR AQUA?**

**A21.** My recommended rate of return is in a range of 6.10% to 6.32%. This range of rate of return is calculated based on the capital structure, cost of long-term debt, and a range of cost of equity I described above. A comparison of the rate of return proposed in the Staff Report and by the OCC is shown in Table 3.

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<sup>18</sup> Staff Report at 8.

Table 3  
A Comparison of the Ranges of Rate of Return by Staff and OCC

Line No.		Staff Report	OCC 1	OCC 2
1	Cost of Long-Term Debt	3.82%	3.82%	3.82%
2	Debt Ratio	0.479	0.479	0.479
3	Weighted Cost of Debt	1.83%	1.83%	1.83%
4				
5	CAPM	8.36%	8.07%	8.07%
6	DCF	8.30%	8.30%	8.30%
7	CE Review	11.51%	N.A.	9.49%
8	Average	9.39%	8.19%	8.62%
9				
9	Baseline Cost of Equity	9.39%	8.19%	8.62%
10	Range of Baseline Cost of Equity	8.89% - 9.89%	8.19%	8.62%
11	Adjustment for Equity Issuance Costs	0.10% - 0.11%	N.A.	N.A.
12				
13	Recommended Cost of Equity	8.99% - 10.00%	8.19%	8.62%
14	Equity Ratio	0.521	0.521	0.521
15	Weighted Cost of Equity	4.68% - 5.21%	4.27%	4.49%
16				
17	Rate of Return	6.51% - 7.04%	6.10%	6.32%

***Q22. WILL YOUR RECOMMENDED RATE OF RETURN PROTECT AQUA'S CUSTOMERS FROM UNJUST AND UNREASONABLE RATES?***

***A22.*** Yes. My recommended rate of return in the range of 6.10% to 6.32% with a midpoint of 6.21% reflects proper and reasonable modifications to the rate of return analysis included in the Staff Report. This range of rate of return is also consistent with the well-established regulatory principles that (1) a rate of return should not result in unjust and unreasonable rates, (2) a rate of return should be based on current market conditions and returns available from alternative investments, (3) a rate of return should be based on providing sufficient fund for a

1 regulated utility to continue its normal course of business, and (4) a rate of return  
2 is not a guarantee for the regulated utility to receive excessive returns on its  
3 invested capital.

4

5 ***Q23. WHAT WOULD BE THE HARM TO CUSTOMERS IF THE MIDPOINT***  
6 ***RATE OF RETURN IN THE STAFF REPORT WERE ADOPTED?***

7 **A23.** Based on the rate base and other information included in Exhibit LA-1, Schedule  
8 A of the Audit Report<sup>19</sup>, I estimate that customers of Aqua would be required to  
9 pay approximately \$1.61 million (\$1,609,991) annually in additional charges to  
10 Aqua if the midpoint rate of return (6.78%) of the range in the Staff Report were  
11 adopted instead of the rate of return of 6.32% recommended by OCC. My  
12 estimation is based on the following:

13 Incremental Revenue Requirement =  
14 Rate Base \* Difference in Rate of Return \* Gross Conversion Factor  
15  
16  $\$1,609,991 = \$260,764,461 * (6.78\% - 6.32\%) * 1.3422$

17 My calculation here does not indicate my support or agreement with the  
18 calculation shown in Exhibit LA-1, Schedule A. My calculation here also does not  
19 represent OCC's overall revenue requirement recommendation. It is provided here  
20 to project the harm to customers caused solely from an unreasonable and  
21 excessive rate of return recommended in the Staff Report.

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<sup>19</sup> See PUCO Case No. 21-595-WW-AIR, Audit of the Application to Increase Rates of Aqua Ohio, Inc. for the Period January 1, 2021, through December 31, 2021 (February 11, 2022), (Audit Report).

1 ***Q24. WHAT WOULD BE THE HARM TO CUSTOMERS IF THE UPPER BOUND***  
2 ***RATE OF RETURN IN THE STAFF REPORT WERE ADOPTED?***

3 ***A24.*** If the upper bound rate of return recommended in the Staff Report (7.04%) were  
4 adopted, I estimate that Aqua would collect approximately \$2.52 million  
5 (\$2,519,986) annually in additional and unreasonable charges from its customers.

6 
$$\$2,519,986 = \$260,764,461 * (7.04\% - 6.32\%) * 1.3422$$

7  
8 ***Q25. WHAT IS THE RATE OF RETURN PROPOSED BY AQUA?***

9 ***A25.*** Aqua proposes a rate of return of 7.43% based on a capital structure of 47.90%  
10 debt and 52.103% equity, a cost of long-term debt of 3.82%, and a cost of equity  
11 of 10.75%.

12  
13 ***Q26. IS THIS RATE OF RETURN PROPOSED BY AQUA REASONABLE?***

14 ***A26.*** No. The cost of equity (10.75%) and rate of return (7.43%) proposed by Aqua are  
15 excessive and unreasonable because they are significantly higher than the top of  
16 the ranges (10.00% for the cost of equity and 7.04% for rate of return) proposed  
17 in the Staff Report. I have demonstrated that the rate of return and cost of equity  
18 included in the Staff Report are already excessive and unreasonable.  
19 Consequently, the even higher cost of equity and rate of return proposed by Aqua  
20 are clearly excessive and unreasonable.

1    **V.      CONCLUSION**

2

3    ***Q27.   DOES THIS CONCLUDE YOUR TESTIMONY?***

4    ***A27.***   Yes. But I reserve the right to supplement my testimony if additional testimony is  
5                filed, or if new information or data in connection with this proceeding becomes  
6                available.

## **CERTIFICATE OF SERVICE**

I hereby certify that a true copy of the foregoing *Direct Testimony of Daniel J. Duann, Ph.D. on Behalf of Office of the Ohio Consumers' Counsel* was served via electronic transmission to the persons listed below on this 14<sup>th</sup> day of March 2022.

/s/Amy Botschner O'Brien  
Assistant Consumers' Counsel

The PUCO's e-filing system will electronically serve notice of the filing of this document on the following parties:

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**Daniel J. Duann, Ph.D.**  
**List of Testimonies Filed Before PUCO**

1. *In the Matter of the Application of The Dayton Power and Light Company for Approval of Its Electric Security Plan*, Case No. 08-1094-EL-SSO (January 26, 2009).
2. *In the Matter of the Application of Ohio American Water Company to Increase Its Rates for Water and Sewer Service Provided to Its Entire Service Area*, Case No. 09-391-WS-AIR (January 4, 2010).
3. *In the Matter of the Application of Aqua Ohio, Inc. for Authority to Increase its Rates and Charges in its Masury Division*, Case No. 09-560-WW-AIR (February 22, 2010).
4. *In the Matter of the Application of Aqua Ohio, Inc. for Authority to increase its Rates and Charges in its Lake Erie Division*, Case No. 09-1044-WW-AIR (June 21, 2010).
5. *In the Matter of the Fuel Adjustment Clauses for Columbus Southern Power Company and Ohio Power Company*, Case Nos. 09-872-EL-FAC and 09-873-EL-FAC (August 16, 2010).
6. *In the Matter of the Application of Columbus Southern Power Company for Approval of an Electric Security Plan; an Amendment to its Corporate Separation Plan; and the Sale or Transfer of Certain Generating Asset (Remand)*, Case Nos. 08-917-EL-SSO et al (June 30, 2011).
7. *In the Matter of the Application of The East Ohio Gas Company d/b/a Dominion East Ohio for Approval of Tariffs to Modify and further Accelerate its Pipeline Infrastructure Replacement Program and to Recover the Associated Costs et al.*, Case Nos. 11-2401-GA-ALT and 08-169-GA-ALT (July 15, 2011).
8. *In the Matter of the Application of Columbus Southern Power Company and Ohio Power Company for Authority to Establish a Standard Service Offer Pursuant to 4928.143, Ohio Rev. Code in the Form of an Electric Security Plan (ESP)*, Case Nos. 11-346-EL-SSO, et al (July 25, 2011).
9. *In the Matter of the Application of Columbus Southern Power Company and Ohio Power Company for Authority to Merge and Related Approval (ESP Stipulation)*, Case Nos. 10-2376-EL-UNC, et al (September 27, 2011).
10. *In the Matter of the 2010 Annual Filing of Columbus Southern Power Company and Ohio Power Company Required by Rule 4901:1-35-10, Ohio Administrative Code*, Case Nos. 11-4571-EL-UNC, and 11-4572-EL-UNC (October 12, 2011).

11. *In the Matter of the Application of Ohio American Water Company to Increase Its Rates for Water and Sewer Service Provided to Its Entire Service Area*, Case No. 11-4161-WS-AIR (March 1, 2012).
12. *In the Matter of the Application of Columbus Southern Power Company and Ohio Power Company for Authority to Establish a Standard Service Offer Pursuant to 4928.143, Ohio Rev. Code in the Form of an Electric Security Plan (Modified ESP)*, Case Nos. 11-346-EL-SSO, et al. (May 4, 2012).
13. *In the Matter of the Application of Ohio Edison Company, The Cleveland Electric Illuminating Company, and The Toledo Edison Company for Authority to Establish a Standard Service Offer Pursuant to R.C. § 4928.143 in the Form of an Electric Security Plan*, Case No. 12-1230-EL-SSO (May 21, 2012).
14. *In the Matter of the Application of Duke Energy Ohio, Inc., for an Increase in Electric Distribution Rates, et al.* Case Nos. 12-1682-EL-AIR (February 19, 2013).
15. *In the Matter of the Application of Duke Energy Ohio, Inc., for an Increase in Gas Rates*, Case Nos. 12-1685-GA-AIR, et al. (February 25, 2013).
16. *In the Matter of the Application of Dayton Power & Light Company for Authority to Establish a Standard Service Offer in the Form of an Electric Security Plan Pursuant to R.C. 4928.143*, Case No. 12-426-EL-SSO et al. (March 1, 2013).
17. *In the Matter of the Application of The Dayton Power and Light Company for Authority to Recover of Certain Storm-related Service Restoration Costs*, Case Nos. 12-3062-EL-RDR, et al. (January 31, 2014).
18. *In the Matter of the Application of The Dayton Power and Light Company for Authority to Recover of Certain Storm-related Service Restoration Costs*, Case Nos. 12-3062-EL-RDR, et al. (May 23, 2014).
19. *In the Matter of the Application of Aqua Ohio, Inc. to Increase Its Rates and Charges for Its Waterworks Service*, Case No. 13-2124-WW-AIR (August 4, 2014).
20. *In the Matter of the Application Seeking Approval of Ohio Power Company's Proposal to Enter into an Affiliate Power Purchase Agreement for Inclusion in the Power Purchase Agreement Ride*, Case No. 14-1693-EL-RDR, et al. (September 11, 2015).
21. *In the matter of the Application of Duke Energy Ohio, Inc. for Approval of an Alternative Rate Plan Pursuant to R.C. 4929.05, Revised Code, for an Accelerated Service Line Replacement Program*, Case No. 14-1622-GA-ALT (November 6, 2015).



22. *In the Matter of the Application of Ohio Edison Company, The Cleveland Electric Illuminating Company, and The Toledo Edison Company for Authority to Establish a Standard Service Offer Pursuant to R.C. 4928.141 in the Form of an Electric Security Plan*, Case No. 14-1297-EL-SSO (June 22, 2016).
23. *In the Matter of the Application of Ohio Power Company for Administration of the Significantly Excessive Earnings Test for 2014 under Section 4928.143 (F), Revised Code, and Rule 4901:1-35-10, Ohio Administration Code*. 15-1022-EL-UNC et al. (August 15, 2016).
24. *In the Matter of the Application of Ohio Power Company for Administration of the Significantly Excessive Earnings Test for 2014 under Section 4928.143 (F), Revised Code, and Rule 4901:1-35-10, Ohio Administration Code*. 15-1022-EL-UNC et al. (September 19, 2016).
25. *In the Matter of the Commission Review of the Capacity Charges of Ohio Power Company and Columbus Southern Power Company*. 10-2929-EL-UNC et al. (October 18, 2016).
26. *In the Matter of the Application of Aqua Ohio, Inc. for Authority to Increase Its Rates and Charges for Its Waterworks Service*. 16-907-WW-AIR (December 19, 2016).
27. *In the Matter of the Application of Columbia Gas of Ohio, Inc. for Approval of an Alternative Form of Regulation*. 16-2422-GA-ALT (September 28, 2017).
28. *In the Matter of the Application of Ohio Power Company for Administration of the Significantly Excessive Earnings Test for 2016 Under Section 4928.143(F), Revised Code, and Rule 4901:1-35-10, Ohio Administrative Code*, Case No. 17-1230-EL-UNC (January 12, 2018).
29. *In the Matter of the Annual Application of Duke Energy Ohio, Inc., for an Adjustment to Rider AMRP Rates*. Case No. 17-2318-GA-AIR (April 5, 2018).
30. *In the Matter of the Application of the Dayton Power and Light Company for an Increase in Electric Distribution Rates*. Case No. 15-1380-EL-AIR (April 11, 2018).
31. *In the Matter of the Application of Duke Energy Ohio, Inc., for an Increase in Distribution Rates*. Case No. 17-0032-EL-AIR et al. (June 25, 2018).
32. *In the Matter of the Determination of the Existence of Significantly Excessive Earnings Test for 2017 Under the Electric Security Plan of Ohio Edison Company, The Cleveland Electric Illuminating Company, and The Toledo Edison Company*. Case No. 18-0857-EL-UNC (October 16, 2018).

33. *In the Matter of the Determination of the Existence of Significantly Excessive Earnings Test for 2017 Under the Electric Security Plan of Ohio Edison Company, The Cleveland Electric Illuminating Company, and The Toledo Edison Company.* Case No. 18-0857-EL-UNC, Testimony Opposing Stipulation (November 16, 2018).
34. *In the Matter of the Determination of the Existence of Significantly Excessive Earnings Test for 2017 Under the Electric Security Plan of Ohio Edison Company, The Cleveland Electric Illuminating Company, and The Toledo Edison Company.* Case No. 18-0857-EL-UNC et al., Remand Testimony (April 5, 2021).
35. *In the Matter of the Application of Suburban Natural Gas Company for an Increase in Gas Distribution Rates.* Case No. 18-1205-GA-AIR et al. (March 8, 2019).
36. *In the Matter of the Application of Suburban Natural Gas Company for an Increase in Gas Distribution Rates.* Case No. 18-1205-GA-AIR et al. (June 21, 2019).
37. *In the Matter of the Application of Northeast Ohio Gas Corp. for an Increase in Gas Distribution Rates.* Case No. 18-1720-GA-AIR et al. (July 25, 2019).
38. *In the Matter of the Application of Ohio Power Company for Administration of the Significantly Excessive Earnings Test for 2018 Under Section 4928.143(F), Revised Code, and Rule 4901:1-35-10, Ohio Administrative Code.* Case No. 19-1098-EL-UNC (August 30, 2019).
39. *In the Matter of the Application of Ohio Power Company for Administration of the Significantly Excessive Earnings Test for 2018 Under Section 4928.143(F), Revised Code, and Rule 4901:1-35-10, Ohio Administrative Code.* Case No. 19-1098-EL-UNC, Supplemental Testimony (November 5, 2019).
40. *In the Matter of the Application of Northeast Ohio Gas Corp. for an Increase in Gas Distribution Rates.* Case No. 18-1720-GA-AIR et al., (September 5, 2019).
41. *In the Matter of the Application of Dayton Power and Light Company for Administration of the Significantly Excessive Earnings Test under R.C. 4928.143(F) and Ohio Adm. Code 4901:1-35-10 for 2018.* Case No. 19-1121-EL-UNC, et al. (December 17, 2020).
42. *In the Matter of the Application of Dayton Power and Light Company for Administration of the Significantly Excessive Earnings Test under R.C. 4928.143(F) and Ohio Adm. Code 4901:1-35-10 for 2018.* Case No. 19-1121-EL-UNC, et al., Supplemental Testimony (January 11, 2021).
43. *In the Matter of the East Ohio Gas Company d/b/a Dominion Energy Ohio for Approval of an Alternative Form of Regulation.* Case No. 19-468-GA-ALT (September 11, 2020).

44. *In the Matter of the Duke Energy Ohio, Inc. for Approval of an Alternative Form of Regulation.* Case No. 19-791-GA-ALT (January 13, 2021).
45. *In the Matter of the East Ohio Gas Company d/b/a Dominion Energy Ohio for Authority to Adjust Its Capital Expenditure Program Rider Charges.* Case No. 21-619-GA-RDR (September 14, 2021).
46. *In the Matter of the Application of The East Ohio Gas Company d/b/a Dominion Energy Ohio for Approval of An Alternative Form of Regulation to Continue Its Pipeline Infrastructure Replacement Program.* Case No. 20-1634-GA-ALT (October 25, 2021).
47. *In the Matter of the Annual Application of Duke Energy Ohio, Inc. for An Adjustment to the Capital Expenditure Rider Rate.* Case No. 21-618-GA-RDR (January 25, 2022).

**Selected Publications of Daniel J. Duann, Ph.D.**

**Journal Articles**

*Regulation: The Cato Review of Business & Government*, "Turning up the Heat in the Natural Gas Industry," Vol. 19, 1996, (with Kenneth W. Costello).

*Managerial and Decision Economics*, "Designing a Preferred Bidding Procedure for Securing Electric Generating Capacity," Vol. 12, 1991.

*The Journal of Energy and Development*, "Direct Gas Purchases by Local Distribution Companies: Supply Reliability and Cost Implications," Vol. 14, 1989.

*Public Utilities Fortnightly*, "Alternative Searching and Maximum Benefit in Electric Least-Cost Planning," December 21, 1989.

**Research Reports and Presentations**

The National Regulatory Research Institute, **Pricing Local Distribution Services in A Competitive Market**, 1995.

Ninth NARUC Biennial Regulatory Information Conference, Ohio State University, **The Unbundling and Restructuring of Local Distribution Services in the Post-636 Gas Market**, 1994.

The National Regulatory Research Institute, **A Survey of Recent State Initiatives on EPACT and FERC Order 636**, 1994 (with Belle Chen).

The National Regulatory Research Institute, **Restructuring Local Distribution Services: Possibilities and Limitations**, 1994.

The National Regulatory Research Institute, **The FERC Restructuring Rule: Implications for Local Distribution Companies and State Public Utilities Commissions**, 1993.

The National Regulatory Research Institute, **A Synopsis of the Energy Policy Act of 1992: New Tasks for State Public Utility Commissions**, 1993.

International Symposium on Energy, Environment & Information Management, Argonne National Laboratory, **Natural Gas Vehicles: Barriers, Potentials, and Government Policies**, 1992.

The National Regulatory Research Institute, **Natural Gas Vehicles and the Role of State**

**Public Service Commissions**, 1992 (with Youssef Hegazy).

The National Regulatory Research Institute, **Incentive Regulation for Local Gas Distribution Companies under Changing Industry Structure**, 1991 (with Mohammad Harunuzzaman, Kenneth W. Costello, and Sung-Bong Cho).

The National Regulatory Research Institute, **Discussion Papers on Competitive Bidding And Transmission Access and Pricing issues in the Context of Integrated Resource Planning**, 1990 (with Robert E. Bums, Kenneth Rose, Kevin Kelly, and Narayan Rau).

The National Regulatory Research Institute, **Gas Storage: Strategy, Regulation, and Some Competitive Implications**, 1990 (with Peter A. Nagler, Mohammad Harunuzzaman, and Govindarajan Iyyuni).

The National Regulatory Research Institute, **State Gas Transportation Policies: An Evaluation of Approaches**, 1989 (with Robert E. Bums and Peter A. Nagler).

The National Regulatory Research Institute, **Direct Gas Purchases by Gas Distribution Companies: Supply Reliability and Cost Implications**, 1989, (with Robert E. Bums and Peter A. Nagler).

The National Regulatory Research Institute, **Competitive Bidding for Electric Generating Capacity: Application and Implementation**, 1988 (with Robert E. Bums, Douglas N. Jones, and Mark Eifert).

### Attachment DJD-3: Daily Treasury Par Yield Curve Rates (3/1/2021 - 8/31/2021)

Date	1 Mo	2 Mo	3 Mo	6 Mo	1 Yr	2 Yr	3 Yr	5 Yr	7 Yr	10 Yr	20 Yr	30 Yr
8/31/2021	0.03	0.05	0.04	0.06	0.07	0.2	0.4	0.77	1.08	1.3	1.85	1.92
8/30/2021	0.04	0.07	0.05	0.05	0.08	0.2	0.4	0.77	1.07	1.29	1.82	1.9
8/27/2021	0.04	0.06	0.05	0.05	0.07	0.22	0.41	0.79	1.09	1.31	1.84	1.91
8/26/2021	0.04	0.06	0.05	0.06	0.07	0.25	0.46	0.84	1.13	1.34	1.87	1.94
8/25/2021	0.04	0.05	0.06	0.06	0.07	0.23	0.47	0.84	1.13	1.35	1.88	1.96
8/24/2021	0.03	0.05	0.05	0.05	0.06	0.24	0.44	0.8	1.08	1.29	1.83	1.91
8/23/2021	0.04	0.05	0.05	0.06	0.07	0.23	0.43	0.78	1.05	1.25	1.79	1.87
8/20/2021	0.04	0.05	0.05	0.05	0.06	0.23	0.44	0.8	1.06	1.26	1.79	1.87
8/19/2021	0.04	0.05	0.06	0.05	0.06	0.22	0.44	0.78	1.04	1.24	1.8	1.88
8/18/2021	0.03	0.05	0.07	0.05	0.07	0.23	0.43	0.79	1.06	1.27	1.84	1.91
8/17/2021	0.03	0.05	0.07	0.06	0.07	0.23	0.43	0.77	1.05	1.26	1.82	1.92
8/16/2021	0.04	0.05	0.06	0.05	0.08	0.21	0.42	0.75	1.04	1.26	1.82	1.92
8/13/2021	0.04	0.05	0.06	0.05	0.08	0.23	0.44	0.79	1.08	1.29	1.85	1.94
8/12/2021	0.05	0.06	0.06	0.06	0.09	0.23	0.46	0.83	1.13	1.36	1.92	2.03
8/11/2021	0.05	0.05	0.05	0.06	0.08	0.23	0.45	0.81	1.11	1.35	1.9	1.99
8/10/2021	0.05	0.05	0.05	0.05	0.08	0.24	0.47	0.82	1.12	1.36	1.9	1.99
8/9/2021	0.04	0.05	0.06	0.06	0.08	0.23	0.43	0.79	1.09	1.33	1.87	1.96
8/6/2021	0.04	0.05	0.06	0.06	0.09	0.21	0.42	0.77	1.07	1.31	1.85	1.94
8/5/2021	0.05	0.05	0.05	0.06	0.08	0.21	0.38	0.72	1.01	1.23	1.77	1.86
8/4/2021	0.05	0.05	0.05	0.05	0.07	0.17	0.34	0.67	0.96	1.19	1.74	1.83
8/3/2021	0.05	0.05	0.05	0.06	0.07	0.17	0.33	0.65	0.95	1.19	1.76	1.85
8/2/2021	0.05	0.05	0.05	0.06	0.07	0.17	0.33	0.66	0.96	1.2	1.77	1.86
7/30/2021	0.05	0.05	0.06	0.05	0.07	0.19	0.35	0.69	1	1.24	1.81	1.89
7/29/2021	0.05	0.05	0.06	0.05	0.08	0.2	0.37	0.73	1.04	1.28	1.84	1.91
7/28/2021	0.04	0.05	0.05	0.05	0.07	0.2	0.38	0.72	1.01	1.26	1.83	1.9
7/27/2021	0.04	0.05	0.05	0.05	0.07	0.2	0.37	0.71	1.01	1.25	1.81	1.89
7/26/2021	0.05	0.05	0.05	0.06	0.08	0.22	0.38	0.73	1.04	1.29	1.85	1.93
7/23/2021	0.05	0.05	0.05	0.05	0.07	0.22	0.38	0.72	1.04	1.3	1.85	1.92
7/22/2021	0.04	0.04	0.05	0.05	0.07	0.2	0.37	0.71	1.02	1.27	1.82	1.9
7/21/2021	0.04	0.04	0.05	0.05	0.07	0.22	0.39	0.74	1.05	1.3	1.87	1.94
7/20/2021	0.05	0.05	0.05	0.06	0.08	0.2	0.37	0.69	0.98	1.23	1.79	1.88
7/19/2021	0.05	0.05	0.05	0.06	0.07	0.21	0.38	0.7	0.97	1.19	1.74	1.81
7/16/2021	0.05	0.05	0.05	0.05	0.08	0.25	0.43	0.79	1.08	1.31	1.86	1.93
7/15/2021	0.05	0.05	0.05	0.05	0.07	0.23	0.43	0.78	1.07	1.31	1.85	1.92
7/14/2021	0.06	0.05	0.06	0.05	0.08	0.23	0.44	0.8	1.11	1.37	1.91	1.98
7/13/2021	0.05	0.05	0.05	0.06	0.08	0.26	0.47	0.85	1.16	1.42	1.96	2.04
7/12/2021	0.05	0.05	0.05	0.06	0.08	0.23	0.43	0.81	1.13	1.38	1.93	2
7/9/2021	0.06	0.05	0.06	0.05	0.08	0.23	0.41	0.79	1.12	1.37	1.91	1.99
7/8/2021	0.06	0.05	0.06	0.06	0.07	0.19	0.37	0.74	1.06	1.3	1.84	1.91
7/7/2021	0.05	0.05	0.05	0.05	0.08	0.22	0.41	0.79	1.09	1.33	1.87	1.94
7/6/2021	0.05	0.05	0.05	0.06	0.07	0.22	0.42	0.81	1.13	1.37	1.92	2
7/2/2021	0.05	0.05	0.05	0.05	0.08	0.24	0.45	0.86	1.19	1.44	1.98	2.05

7/1/2021	0.05	0.05	0.05	0.05	0.09	0.25	0.47	0.89	1.24	1.48	2.01	2.07
6/30/2021	0.05	0.05	0.05	0.06	0.07	0.25	0.46	0.87	1.21	1.45	2	2.06
6/29/2021	0.04	0.04	0.04	0.06	0.08	0.27	0.47	0.89	1.24	1.49	2.03	2.1
6/28/2021	0.04	0.05	0.05	0.06	0.08	0.25	0.47	0.9	1.25	1.49	2.04	2.1
6/25/2021	0.05	0.05	0.06	0.06	0.09	0.28	0.48	0.92	1.29	1.54	2.09	2.16
6/24/2021	0.05	0.05	0.05	0.05	0.08	0.26	0.48	0.9	1.26	1.49	2.03	2.1
6/23/2021	0.04	0.04	0.05	0.05	0.08	0.26	0.47	0.9	1.25	1.5	2.04	2.11
6/22/2021	0.04	0.05	0.04	0.06	0.09	0.25	0.44	0.87	1.23	1.48	2.03	2.1
6/21/2021	0.04	0.04	0.05	0.06	0.09	0.27	0.48	0.9	1.25	1.5	2.05	2.11
6/18/2021	0.05	0.05	0.05	0.06	0.09	0.26	0.47	0.89	1.22	1.45	1.97	2.01
6/17/2021	0.05	0.04	0.04	0.06	0.08	0.23	0.43	0.9	1.27	1.52	2.05	2.11
6/16/2021	0.04	0.04	0.04	0.06	0.08	0.21	0.41	0.89	1.29	1.57	2.13	2.2
6/15/2021	0.02	0.02	0.03	0.05	0.08	0.16	0.34	0.79	1.21	1.51	2.12	2.2
6/14/2021	0.01	0.02	0.03	0.05	0.05	0.16	0.33	0.8	1.2	1.51	2.12	2.19
6/11/2021	0.01	0.02	0.03	0.04	0.05	0.16	0.31	0.76	1.16	1.47	2.08	2.15
6/10/2021	0.01	0.02	0.03	0.04	0.05	0.14	0.3	0.73	1.14	1.45	2.07	2.15
6/9/2021	0.01	0.02	0.03	0.04	0.05	0.16	0.31	0.75	1.17	1.5	2.1	2.17
6/8/2021	0.01	0.02	0.02	0.04	0.05	0.14	0.32	0.77	1.2	1.53	2.13	2.21
6/7/2021	0.01	0.02	0.02	0.04	0.05	0.16	0.33	0.79	1.24	1.57	2.17	2.25
6/4/2021	0.01	0.02	0.02	0.04	0.05	0.14	0.32	0.78	1.23	1.56	2.16	2.24
6/3/2021	0	0.01	0.02	0.04	0.04	0.16	0.34	0.84	1.3	1.63	2.22	2.3
6/2/2021	0.01	0.01	0.02	0.04	0.05	0.13	0.3	0.8	1.26	1.59	2.21	2.28
6/1/2021	0.01	0.01	0.02	0.04	0.04	0.16	0.31	0.81	1.28	1.62	2.22	2.3
5/28/2021	0.01	0.01	0.01	0.03	0.05	0.14	0.3	0.79	1.24	1.58	2.18	2.26
5/27/2021	0	0.01	0.02	0.04	0.04	0.14	0.31	0.81	1.28	1.61	2.2	2.29
5/26/2021	0	0	0.02	0.04	0.04	0.14	0.31	0.8	1.24	1.58	2.17	2.27
5/25/2021	0.01	0.01	0.02	0.04	0.04	0.15	0.3	0.79	1.23	1.56	2.16	2.26
5/24/2021	0.01	0.01	0.02	0.03	0.04	0.15	0.32	0.82	1.28	1.61	2.22	2.31
5/21/2021	0	0.01	0.01	0.02	0.04	0.17	0.34	0.84	1.29	1.63	2.24	2.33
5/20/2021	0.01	0.01	0.01	0.03	0.05	0.15	0.34	0.83	1.29	1.63	2.25	2.34
5/19/2021	0	0.01	0.01	0.03	0.05	0.16	0.35	0.87	1.34	1.68	2.3	2.38
5/18/2021	0	0.01	0.02	0.03	0.06	0.16	0.34	0.83	1.29	1.64	2.27	2.37
5/17/2021	0	0.01	0.02	0.04	0.06	0.16	0.34	0.84	1.3	1.64	2.27	2.36
5/14/2021	0.01	0.01	0.01	0.03	0.06	0.16	0.33	0.82	1.29	1.63	2.25	2.35
5/13/2021	0	0.01	0.02	0.03	0.05	0.16	0.33	0.84	1.31	1.66	2.28	2.39
5/12/2021	0.01	0.02	0.02	0.04	0.05	0.16	0.35	0.87	1.34	1.69	2.29	2.4
5/11/2021	0.01	0.01	0.01	0.04	0.05	0.16	0.31	0.8	1.28	1.64	2.23	2.35
5/10/2021	0.02	0.01	0.02	0.04	0.05	0.16	0.32	0.8	1.27	1.63	2.2	2.32
5/7/2021	0.01	0.01	0.02	0.04	0.05	0.14	0.29	0.77	1.24	1.6	2.17	2.28
5/6/2021	0.01	0.02	0.02	0.04	0.05	0.16	0.32	0.81	1.25	1.58	2.14	2.24
5/5/2021	0.01	0.01	0.02	0.04	0.06	0.16	0.32	0.8	1.25	1.59	2.14	2.25
5/4/2021	0.01	0.01	0.02	0.04	0.06	0.16	0.33	0.82	1.28	1.61	2.16	2.27
5/3/2021	0.02	0.02	0.04	0.04	0.06	0.16	0.33	0.84	1.29	1.63	2.18	2.3
4/30/2021	0.01	0.02	0.01	0.03	0.05	0.16	0.35	0.86	1.32	1.65	2.19	2.3
4/29/2021	0.01	0.01	0.01	0.04	0.05	0.16	0.35	0.86	1.32	1.65	2.2	2.31
4/28/2021	0.01	0.01	0.01	0.04	0.05	0.17	0.35	0.86	1.31	1.63	2.19	2.29

4/27/2021	0.01	0.02	0.01	0.04	0.06	0.17	0.36	0.88	1.32	1.63	2.18	2.29
4/26/2021	0.02	0.02	0.03	0.04	0.06	0.18	0.35	0.85	1.27	1.58	2.13	2.24
4/23/2021	0.01	0.02	0.03	0.03	0.07	0.16	0.34	0.83	1.26	1.58	2.14	2.25
4/22/2021	0.02	0.02	0.03	0.04	0.06	0.16	0.32	0.81	1.24	1.57	2.13	2.24
4/21/2021	0	0.02	0.03	0.04	0.07	0.15	0.32	0.81	1.24	1.57	2.16	2.26
4/20/2021	0.01	0.02	0.03	0.04	0.07	0.15	0.31	0.81	1.25	1.58	2.16	2.27
4/19/2021	0.01	0.02	0.02	0.04	0.08	0.16	0.34	0.85	1.28	1.61	2.18	2.29
4/16/2021	0.02	0.02	0.02	0.04	0.06	0.16	0.34	0.84	1.26	1.59	2.15	2.26
4/15/2021	0.02	0.01	0.02	0.04	0.06	0.16	0.32	0.81	1.24	1.56	2.13	2.23
4/14/2021	0.02	0.02	0.02	0.04	0.06	0.16	0.35	0.87	1.31	1.64	2.22	2.32
4/13/2021	0.03	0.02	0.03	0.05	0.06	0.16	0.35	0.85	1.29	1.64	2.21	2.32
4/12/2021	0.02	0.02	0.02	0.04	0.06	0.18	0.38	0.89	1.35	1.69	2.24	2.34
4/9/2021	0.02	0.01	0.02	0.03	0.06	0.16	0.35	0.87	1.33	1.67	2.23	2.34
4/8/2021	0.02	0.02	0.01	0.04	0.05	0.14	0.33	0.85	1.3	1.64	2.22	2.32
4/7/2021	0.01	0.02	0.02	0.04	0.06	0.16	0.34	0.87	1.34	1.68	2.26	2.35
4/6/2021	0.02	0.02	0.02	0.04	0.06	0.16	0.35	0.88	1.34	1.67	2.24	2.32
4/5/2021	0.03	0.02	0.03	0.04	0.06	0.17	0.37	0.94	1.4	1.73	2.28	2.36
4/2/2021	0.02	0.02	0.02	0.04	0.07	0.19	0.39	0.97	1.42	1.72	2.27	2.35
4/1/2021	0.02	0.02	0.02	0.04	0.06	0.17	0.35	0.9	1.37	1.69	2.24	2.34
3/31/2021	0.01	0.01	0.03	0.05	0.07	0.16	0.35	0.92	1.4	1.74	2.31	2.41
3/30/2021	0.01	0.01	0.02	0.04	0.06	0.16	0.33	0.9	1.39	1.73	2.29	2.38
3/29/2021	0.02	0.03	0.03	0.04	0.06	0.14	0.32	0.89	1.37	1.73	2.32	2.43
3/26/2021	0.02	0.02	0.02	0.04	0.06	0.14	0.31	0.85	1.32	1.67	2.27	2.37
3/25/2021	0.02	0.03	0.02	0.04	0.07	0.14	0.3	0.82	1.29	1.63	2.24	2.34
3/24/2021	0.02	0.02	0.02	0.04	0.07	0.14	0.31	0.83	1.27	1.62	2.21	2.31
3/23/2021	0.02	0.02	0.01	0.04	0.08	0.15	0.31	0.83	1.29	1.63	2.24	2.34
3/22/2021	0.02	0.02	0.03	0.05	0.06	0.15	0.32	0.87	1.34	1.69	2.29	2.38
3/19/2021	0.01	0.01	0.01	0.03	0.07	0.16	0.33	0.9	1.38	1.74	2.36	2.45
3/18/2021	0.01	0.01	0.01	0.03	0.08	0.16	0.33	0.86	1.35	1.71	2.36	2.45
3/17/2021	0.01	0.02	0.02	0.05	0.07	0.13	0.29	0.8	1.27	1.63	2.32	2.42
3/16/2021	0.01	0.02	0.02	0.06	0.07	0.15	0.33	0.83	1.28	1.62	2.3	2.38
3/15/2021	0.02	0.02	0.04	0.06	0.08	0.14	0.33	0.84	1.28	1.62	2.27	2.37
3/12/2021	0.03	0.03	0.04	0.06	0.09	0.14	0.34	0.85	1.3	1.64	2.31	2.4
3/11/2021	0.04	0.04	0.04	0.05	0.08	0.14	0.31	0.78	1.2	1.54	2.18	2.29
3/10/2021	0.03	0.03	0.04	0.06	0.08	0.16	0.32	0.8	1.2	1.53	2.15	2.24
3/9/2021	0.04	0.04	0.05	0.07	0.1	0.17	0.35	0.83	1.23	1.55	2.16	2.26
3/8/2021	0.04	0.04	0.05	0.06	0.09	0.17	0.34	0.86	1.28	1.59	2.2	2.31
3/5/2021	0.04	0.04	0.04	0.07	0.08	0.14	0.32	0.79	1.23	1.56	2.18	2.28
3/4/2021	0.03	0.05	0.04	0.07	0.08	0.14	0.32	0.77	1.21	1.54	2.18	2.3
3/3/2021	0.04	0.04	0.05	0.07	0.08	0.14	0.29	0.73	1.14	1.47	2.12	2.25
3/2/2021	0.04	0.04	0.04	0.06	0.08	0.13	0.26	0.67	1.08	1.42	2.09	2.21
3/1/2021	0.03	0.03	0.05	0.07	0.08	0.13	0.27	0.71	1.12	1.45	2.11	2.23
<b>Average</b>									<b>1.5</b>	<b>2.07</b>	<b>2.16</b>	

Source: U. S. Treasury. See [https://home.treasury.gov/resource-center/data-chart-center/interest-rates/TextView?type=daily\\_treasury\\_yield\\_curve&field\\_tdr\\_date\\_value=2021](https://home.treasury.gov/resource-center/data-chart-center/interest-rates/TextView?type=daily_treasury_yield_curve&field_tdr_date_value=2021).



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**Case No(s). 21-0595-WW-AIR**

Summary: Testimony Direct Testimony of Daniel J. Duann, Ph.D. on Behalf of  
Office of the Ohio Consumers' Counsel electronically filed by Ms. Alana M. Noward  
on behalf of Botschner O'Brien, Amy