

**STATE OF NEW HAMPSHIRE
PUBLIC UTILITIES COMMISSION
DW 20-184**

**DIRECT TESTIMONY
OF
DAVID M. FOX, SENIOR MANAGER
RAFTELIS FINANCIAL CONSULTANTS, INC.**

**IN THE MATTER OF THE
REVISION OF RATES
FILED BY
AQUARION WATER COMPANY**

March 2, 2022

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4 **PREFILED TESTIMONY OF**
5 **David M. Fox**

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7
8 **Q: Please state your name and business address?**

9 A: My name is David M. Fox and my business address is 24 Superior Drive, Suite 107, Natick,
10 MA 01760.

11
12 **Q: By whom are you employed and in what capacity?**

13 A: I am a Manager of Raftelis Financial Consultants, Inc. a nationwide consulting firm specializ-
14 ing in water and wastewater rate and financial planning studies.

15
16 **Q: Please describe your qualifications and experience.**

17 A: I have a bachelor's degree in Economics from Coastal Carolina University in Conway, SC and
18 a master's degree in Economics from Clemson University in Clemson, SC. After graduating
19 in 2009, I was employed by Raftelis Financial Consultants, Inc. (Raftelis). Over the course of
20 my career, I have worked on over 100 water and wastewater rate and financial studies within
21 the United States. I have also had the opportunity to work on numerous financial feasibility
22 studies in support of revenue bond issues, capital program financing support, customer rate
23 affordability analyses, utility valuations studies, and rate benchmarking surveys. I currently
24 lead Raftelis' New England efforts based out of our office in Natick, MA. My resume has
25 been submitted as part of this testimony as Attachment A.

26
27 **Q: Do you belong to any professional organizations or committees?**

A: Yes, I am a member of the American Water Works Association, the New England Water
Works Association, Massachusetts Water Works Association, and the Rhode Island Water
Works Association. I also sit on the Financial Management Committee of the New England
Water Works Association. For the American Water Works Association, I also contributed to

1 the most recent (7th edition) of the M1 Manual on rates – *Principles of Water Rates, Fees,*
2 *and Charges.*

3
4 **Q: Have you previously been involved in matters before state regulatory commissions on rate**
5 **related matters?**

6 A: Yes. I have submitted or prepared expert cost of service and cost recovery analyses in sup-
7 port of water rate filings at the Massachusetts Departments of Public Utilities, and Rhode
8 Island, New Hampshire, Maine, and California Public Utilities Commissions.

9
10 **Q: What is your role in this proceeding?**

11 A: The Towns of Hampton and North Hampton retained my services to review the cost of ser-
12 vice analysis relied upon as the basis for the Company's proposed rates as filed in DW 20-
13 184.

14
15 **Q: Do you agree with the Company's cost of service analysis?**

16 A: In general, the Company's cost of service analysis follows industry accepted guidance. How-
17 ever, I do take issue with two specific assumptions withing the cost of service framework.

18
19 **Q: Will you summarize the adjustments you would propose to the cost of service study as-**
20 **sumptions that you take issue with?**

21 A: Yes. In its cost of service analysis, the Company utilized a Base/Extra-Capacity methodology
22 to allocate utility plant, accumulated depreciation, operation and maintenance costs, and
23 depreciation expenses, associated with transmission and distribution mains, to Base and
24 Peak-Hour, but not Max-Day.

25
26 In my opinion, all allocations associated with transmission and distribution mains should be
27 allocated based on a three-factor allocation to Base, Peak-Hour and Max-Day. Using the

1 Base/Extra-Capacity methodology, the distribution of allocated Peak-Hour costs is accom-
2 plished based on the extra-capacity for assumed Peak-Hour demands above those assumed
3 for Max-Day. Therefore, any use of allocations to Peak-Hour, except for solely providing
4 storage, must in turn also allow for an allocation to Max-Day.

5
6 To put this another way, the same mains which are utilized to provide Peak-Hour demand
7 are also utilized to provide Max-Day demand. It is unreasonable to assume that mains are
8 not required to supply water for Max-Day demands and only Peak-Hour. As such, utility
9 plant, accumulated depreciation, operation and maintenance costs, and depreciation ex-
10 penses, associated with transmission and distribution mains should be allocated to Base,
11 Max-Day, and Peak-Hour, or allocation factor 4 as utilized in the Company's cost of service
12 model.

13
14 In addition to this modification, the allocation of Land and Land Rights (T&D) utility plant
15 should be allocated based on a composite allocation of other transmission and distribution
16 utility plant, or allocation factor 42 as utilized in the Company's cost of service model. As
17 initially filed, Land and Land Rights (T&D) utility plant was allocated exclusively to peak
18 hour, based on the assumption that all Land and Land Rights (T&D) is attributable to
19 providing storage.

20
21 **Q: Are there any other adjustments you would propose to the Company's cost of service study**
22 **assumptions?**

23 **A:** The Company's initial filing included an assumption of the required flow necessary to re-
24 spond to a four hour fire event of 4,500 gallons per minute (gpm). Based on industry-recog-
25 nized equations for estimating required fire flows, it is recommended that this assumption
26 be modified. These equations are mostly a function of population served and have been
27 relied upon at the Wisconsin Public Utilities Commission (PUC), which has historically been
28 at the forefront of establishing and testing methodologies for determining the true cost of

1 providing fire protection services. In addition to the Wisconsin PUC, the Maine PUC has at
2 times relied on the National Board of Fire Underwriters (NBFU) method for determining ap-
3 propriate fire flow. So much so that the NBFU method has been used as a basis for the
4 Maine PUC curve which rather than estimating flow, estimates the percent of revenue to
5 be collected from fire protection. Given that there is not an industry accepted methodol-
6 ogy for determining the appropriate assumed flow for a fire event, I recommended that the
7 following equations be considered in order to provide for a rational impetus for this im-
8 portant assumption in the cost of service analysis.

- 9
- 10 a. Freeman's Formula = $AVG\left(200 * \left(\left(\frac{population}{5000}\right) + 10\right), 200 * \left(\left(1.7 * \sqrt{\frac{Population}{1000}} + 0.03 * \left(\frac{population}{1000}\right)\right)\right)\right)$
- 11
- 12 b. NBFU Method = $1020 * \sqrt{\left(\frac{population}{1000}\right)} * 1 - 0.01 * \sqrt{\left(\frac{population}{1000}\right)}$
- 13
- 14 c. Kuickling Method = $700 * \frac{\sqrt{population}}{1000}$
- 15

16 The calculation of these formulas produce required fire flow assumptions of 2,729 gpm,
17 5,509 gpm, and 4,011 gpm respectively. Given the deviation in results, I recommend that
18 an average of the three results be used (which is also referred to as the Milwaukee
19 Method) to arrive at an assumed fire flow of 4,083. As such, I recommend that a fire flow
20 of 4,000 gpm over a four hour fire should be utilized within the cost of service analysis in-
21 stead of the original proposal of 4,500 gpm.

22

23 **Q: Are there other adjustments to the Company's cost of service analysis that you would pro-**
24 **pose?**

25 A: No, not at this time.

26

27 **Q: If the adjustments to the assumptions you outlined were utilized, would there be changes**
28 **to the outcome of the cost of service analysis, and subsequent rates?**

29 A: Yes.

1

2 **Q: Would you please describe those changes?**

3 A: In its original filing, the Company's cost of service analysis produced an increase in public fire
4 protection charges to the Towns of Hampton and North Hampton of 34.8% and 31.4%, re-
5 spectively. These increases represent annual cost increases of approximately \$165,000 and
6 \$81,000, respectively. Using the assumption modifications as outlined in this pre-filed testi-
7 mony, the Towns' increase in public fire protection charges are reduced to 13.3% and 10.5%,
8 respectively. Making these changes results in an annual cost increase to the Towns of
9 \$63,000 and \$27,000, respectively.

10

11 Given that the cost of service analysis assumes revenue neutrality, reducing the allocation
12 to public fire protection charges results in a cost shift to other customer classes. However,
13 the goal of rate-making is to ensure that the resulting rates are reasonable and fairly reflect
14 the cost to provide service to each customer class. Using the Company's proposed revenue
15 requirement, by way of example only, the adjustments to public fire protection recom-
16 mended herein would increase Aquarion's proposed increase to other customer classes by
17 approximately \$300,000 per year. For a single-family residential customer with a 5/8" me-
18 ter, using 6 Ccf per month, this would represent an increase of \$2.08 per month. However,
19 it is understood that significant reductions in Aquarion's proposed increase are likely which
20 will reduce Aquarion's proposed increases to all customer classes.

21

22 **Q: Have you reproduced the Company's cost of service analysis and subsequent schedules**
23 **reflecting your proposed changes?**

24 A: Yes, and have included the schedules as part of my testimony as Attachment B.

25

26 **Q: Does this conclude your testimony?**

27 A: Yes, it does.

ATTACHMENT A

Dave Fox

Senior Manager



PROFILE

Dave has over a decade of experience in water and wastewater utility financial and rate consulting. He has worked with water, wastewater, and stormwater utilities, both private and public, on a variety of studies including cost-of-service and rate setting, impact fees, financial planning, utility valuation, economic feasibility and modeling, bond feasibility and coverage certificates, utility and customer affordability, data analysis, as well as water and wastewater benchmarking and rate surveys. Dave has served as an expert witness at the Massachusetts Department of Public Utilities (MA DPU), Rhode Island Public Utilities Commission (RI PUC), Maine Public Utilities Commission (ME PUC), New Hampshire Public Utilities Commission (NH PUC), and California Public Utilities Commission (CPUC), as well as provided due diligence research and work papers for the Pennsylvania Public Utilities Commission (PA PUC). Dave leads Raftelis' New England Office based in Natick, MA.

KEY PROJECT EXPERIENCE

Whitinsville Water Company (MA)

Dave served as an expert witness for the Whitinsville Water Company's most recent rate application with the Massachusetts Department of Public Utilities (MA DPU). Dave worked closely with Company staff and its legal representation to develop a comprehensive water cost of service study and rate of return calculation, accompanied by supporting schedules, exhibits, and pre-filed testimony. This case involved a rate calculation for customers within and without the Company's service area, and as such, there were intervenors in the case. Dave worked closely with the Company's legal representation to respond to intervenor testimony through both written and oral arguments. Ultimately, the case was settled with MA DPU settlement staff, with the Company receiving all of its requested revenue requirement and rate related items intact.

East Northfield Water Company (MA)

Dave served as an expert witness for the East Northfield Water Company (ENWC or Company) for matters relating to the Company's most recent filing (D.P.U. 19-57) with the Massachusetts Department of Public Utilities (MA DPU). Dave prepared revenue deficiency, cost of service, and rate of return calculations, work papers, and pre-filed testimony in support of the Company's requested rate increase. Throughout the rate case, Dave worked closely with the Company and its legal representation to respond to data requests, attend hearings at the MA DPU, and review and argue against intervenor (mostly the Massachusetts Attorney General Office) testimony and exhibits. D.P.U. 19-57 was fully litigated, and the Company is awaiting its final order, expected to be delivered in March 2020.

Pennichuck Water Works (NH)

Dave served as project manager on a cost of service study and rate filing with Pennichuck Water Works for its Pennichuck East subsidiary, and provided schedules and testimony for filing with the New Hampshire Public Utilities Commission (NH PUC). Dave worked closely with Pennichuck staff to develop the cost of service study and present Raftelis' modeling, methodology, and findings at a technical review session with the NH PUC. The cost of service analysis and resulting rates were completely accepted and approved by the NH PUC.

Specialties

- Utility cost-of-service & rate studies
- Financial planning studies
- Coverage certificates & bond feasibility analyses
- Economic feasibility & forecast studies
- Affordability studies
- Customer demand & data analyses

Professional History

- Raftelis: Senior Manager (2021-present); Manager (2017-2020); Senior Consultant (2015-2016); Consultant (2013-2014); Associate (2011-2012)

Education

- Master of Arts in Economics - Clemson University (2010)
- Bachelor of Science in Economics - Coastal Carolina University (2009)

Professional Memberships

- AWWA
- New England Water Works Association: Member of Financial Management Committee
- Massachusetts Water Works Association
- Rhode Island Water Works Association

Narragansett Bay Commission (RI)

Dave served as project manager on a wastewater cost of service and rate filing project with the Narragansett Bay Commission (NBC). Dave worked closely with NBC staff to develop test and rate year revenue requirements to be utilized in the cost of service analysis. At the direction of Dave, Raftelis analysts developed a comprehensive wastewater cost of service model, which was used to calculate cost of service justified rates and charges for all NBC customers. In addition to user charges, Dave helped develop, calculate, and defend new charges for the NBC, including system development and connection charges.

Dave helped prepare schedules, and pre-filed expert testimony to be included in the NBC's filing with the Rhode Island Public Utilities Commission (RIPUC), in Docket No. 4890. Working with NBC and other Raftelis staff, as well as NBC's outside legal counsel, Dave helped respond to data requests, review and reply to intervenor testimony, and prepare settlement schedules.

Docket No. 4890 was settled with the RIPUC, with NBC receiving most of its initial filing requests.

SUEZ Rhode Island (RI)

Dave served as project manager on a project with SUEZ Rhode Island (SUEZ) to perform a comprehensive water cost of service study for its most recent rate filing (Docket No. 4800) with the Rhode Island Public Utilities Commission (RIPUC). Dave utilized rate year revenue requirements and rate base, provided by SUEZ staff, to functionalize, allocate, and distribute costs to SUEZ's customers based on cost of service principles. Dave worked with SUEZ management and staff to design new rates, designed for SUEZ's filing, for residential, commercial, bulk customer, tank truck, and public and private fire protection classifications. From there Dave prepared an impact analysis associated with the resulting rates compared to the existing rates and discussed with SUEZ staff. Adjustments were made in order to abide by the common rate setting principle of mitigating rate shock to customers or specific customer groups. Ultimately, Dave prepared final exhibits and pre-filed testimony explaining the cost of service and rate design process. The exhibits and pre-filed testimony were included in SUEZ's most recent filing with the RIPUC, which was ultimately settled.

City of East Providence (RI)

Dave served as project manager on a water and sewer rate study for the City of East Providence (City). Dave worked closely with City staff members to assess the appropriateness of the City's rate structures, as well as opine on miscellaneous rate structure options such as establishing a more fixed revenue stream, sewer rate assessment practices, and ensuring cost-of-service justified rates. The City currently allows for an allowance of sewer usage through its existing rate structure, which creates equity issues. Dave, along with his consulting staff, assessed the appropriateness and subsequent customer impacts from reducing or removing the sewer allowance. Raftelis also worked closely with City Staff to build a forecast of operating and capital expenditures over a 10-year planning horizon, and was able to use a mixture and balance of rate increases, debt financing, and reserve fund balances to create a smooth and affordable set of rates. Dave also performed an in-depth analysis of the City's water and sewer billing data. The City had just recently converted billing systems and thus Raftelis analyzed and compared the consumption and demand characteristics, as well as the validity of the data between the two datasets.

City of Richmond (VA)

Dave served as lead consultant on a project with the City of Richmond Department of Public Utilities (DPU) to provide cost-of-service and rate design services for the DPU's electric, gas, water, wastewater, and stormwater utilities. As part of the study, Dave developed a comprehensive cost-of-service model that was used in the redesign of DPU's rate structure. The model was developed with the ability to analyze the impact of various rate structures on both DPU's financial performance and customer base. Dave also aided in the preparation of final deliverables in the form of reports and presentations.

Dave has also been serving as the lead consultant on a project to develop and affordability plan for DPU. This has entailed compiling location specific economic and demographic data, combined with usage data, to determine the most effective affordability program, while at the same time allowing DPU to understand, specifically by locality, where to focus its marketing efforts most heavily, in order to bring the most amount of aid to those in need.

City of Northampton (MA)

Dave served as project manager on a water and sewer rate study for the City of Northampton (City). Dave worked closely with the City's Mayor, Director of Public Utilities, and other key staff members to review the City's current rate structure, determine the City's pricing objectives, and design and develop a revised rate structure to accomplish those pricing objectives. This analysis entailed analyzing seasonal rates, affordability programs, tiered rate structures, class-based rates, sewer charge methodologies, and the combined effects of each alternative on the City and its customers. Dave also worked closely with the City to determine a customer outreach programs to help convey the messages of a rate structure change to the customers of the City.

Boston Water and Sewer Commission (MA)

Dave is currently serving as the financial lead on a project with the Boston Water and Sewer Commission (BWSC) to assess the feasibility of implementing a stormwater utility. This entails a comprehensive cost allocation study between BWSC's current water and sewer utilities, as well as the potential stormwater utility. In doing so, Dave established short- and long-term forecasts of operating and capital costs, in order to design and develop an optimal financing plan to fund all necessary revenue requirements, maintain financial viability and compliance, and minimize impacts on customers.

City of Melrose (MA)

Dave served as project manager on a water and sewer rate study for the City of Melrose (City). Dave performed a comprehensive water and sewer cost-of-service study for the City, while adhering to the City's pricing objectives. Dave analyzed the impact of changes in customer classification, tier structure, fixed rate components, customer affordability programs, billing frequencies, and sewer rate setting methodologies. Ultimately, a plethora of viable options were presented to the City's Board of Aldermen based on their requests, and presented in a clear and concise manner so that the Board could make an informed decision for the City's most recent rate setting year.

City of Medford (MA)

Dave served as project manager on a water and sewer rate study for the City of Medford (City). Dave worked closely with the City to create a 5-year financial and rate plan to fund all necessary operating and capital requirements, while at the same time minimizing impacts on the City's customer base. Dave created a user-friendly spreadsheet model which was used to run multiple water and sewer rate structure scenarios. These scenarios were presented to the City real time during meetings for quick feedback on the effects of rate structure changes, both financially and in terms of impacts on the City's customers.

Erie County Water Authority (NY)

Dave served as project manager for a water cost-of-service and rate structure review study for the Erie County Water Authority (Authority) to better understand the cost of serving the Authority's various customer classes and to determine the most appropriate and equitable way to recover those costs. Raftelis' primary goal of the study was to maintain revenue sufficiency through rates that are equitable and reasonably recover costs for each service provided. Raftelis evaluated the appropriateness of modifications to the Authority's current rate structure to better meet these needs and to recognize a recent dynamic change in water consumption patterns. Further, Raftelis developed a rate structure that discouraged the wasteful use of water, especially when the wasteful use leads to an unnecessary need for additional resources to serve such wasteful demand. Raftelis also helped the Authority with current and future agreements related to the 35 municipalities it currently serves.

New York City (NY)

Dave served as the lead consultant on a project with the New York City Municipal Water Finance Authority (Authority) to develop an enhanced rate model for internal Authority use. Dave worked closely with Authority Staff to ensure necessary functionalities and data inputs were taken into consideration for a tailored modeling and scenario generating experience. The enhanced rate model combines detailed data inputs with a user friendly interface, including a dashboard, allowing for real time analysis of various combinations of rate, financing, and expense scenarios.

Dave also served as the lead consultant with the New York City Water Board and Department of Environmental Protection (DEP) to develop a surcharge rate in the event that its water supply were to diminish temporarily and residents needed to conserve. Dave analyzed hourly and daily billing data, and built an economic rate model, using a Monte Carlo method analysis for price elasticity of demand assumptions, that calculated multiple rate options which adequately reduced consumption through pricing signals.

City of Winston-Salem/Forsyth County Utilities (NC)

Dave served as project manager on a project with the City of Winston-Salem/Forsyth County Utilities (City/County) to provide water and sewer rate financial planning. As part of the study, Dave developed a rate and financial planning model to calculate revenue requirements using the City/County's budget, capital improvements plan, and debt service schedules. The model was developed with the ability to run sensitivity analyses over several years and monitor the impacts on financial performance and customer bill impacts. The model was also developed with a customized dashboard for a user-friendly interface. Raftelis continues to assist the City/County with periodic updates of the rate and financial planning model.

DC Water (DC)

Raftelis is working with the DC Water on a multi-year contract to provide cost-of-service, rate, and financial consulting services. Dave's core responsibilities have been developing a comprehensive water and sewer cost-of-service model and completing a customer segmentation study where a detailed billing analysis defined key characteristics among DC Water's customer categories.

During the most recent cost-of-service study, Dave helped prepare four major project deliverables: assuring the sufficiency of projected revenue to cover projected expenditures; calculating cost-of-service-based rates and comparing them to projected rates; reviewing miscellaneous fees and charges; and, recommending rate structure alternatives that enhance priority pricing objectives of DC Water.

Dave also helped develop a new fixed component, or infrastructure fee, for DC Water's rate structure aimed at recovering funds necessary to pay for the renewal and replacement of DC Water's aging water infrastructure. Results and recommendations from the COS study, along with a comprehensive report and revenue sufficiency/cost-of-service model, were presented to the Retail Rates Committee of the Board in 2015.

PROJECT LIST

- ACE Environmental Processing, LLC (AEP) - Market research; bond feasibility
- Auburn (NY) - Water and sewer rate study, cost-of-service study
- Augusta (GA) - Water and sewer rate study, cost-of-service study
- Belmont (MA) - Water and sewer rate study
- Bethel (CT) - Water and sewer rate study
- Birmingham (AL) - Monthly billing analysis, miscellaneous consulting services
- Burlington (VT) – Water, sewer, and stormwater financial planning and bond feasibility support
- Charleston (WV) - Sewer rate study

- Chicopee (MA) - Financial capability assessment and consent decree assistance
- Concord (NH) - Water and sewer rate study
- Creedmoor (NC) - Economic feasibility study
- Fayetteville (NC) - Cost-of-service study, rate study, investment fee study
- Gainesville (GA) - Outside city differential study
- Greenville (NC) - Water and sewer rate study
- Greenville (SC) - Financial planning and customer demand studies
- Groton Utilities (CT) - Sewer user charge feasibility study
- Hardin County Water District #1 - Financial planning assistance
- Hillsborough (NC) - Water and sewer rate study
- Kittery Water District - Water cost-of-service study
- Milford (NH) - Water and sewer rate study
- Nashville (TN) - Water and sewer cost-of-service study
- Northeast Ohio Regional Sewer District (OH) - Industry research
- North Smithfield (RI) - Sewer assessment fee study
- Oakboro (NC) - Wholesale rate study
- Philadelphia Water Department – Utility financial planning and modeling
- Pennichuck Water Company (NH) - Multiple wholesale rate studies
- Peoria (AZ) - Water and sewer rate study
- Portland Water District (ME) - Water cost-of-service study
- Rockdale County (GA) - Water and sewer rate study
- Rocky Mount (NC) - Development of a multi-enterprise fund financial planning model
- Seabrook (NH) - Water and sewer rate study
- Tucson (AZ) - Water and sewer rate study
- Water Infrastructure Finance Authority (AZ) - Water and wastewater residential rate survey
- Wayland (MA) - Water and sewer financial planning
- White House Utility District (TN)- Financial planning assistance
- Wilson (NC) - Development of a multi-enterprise fund financial planning model