BEFORE THE
STATE OF NEW JERSEY
BOARD OF PUBLIC UTILITIES

IN THE MATTER OF THE PETITION OF
NEW JERSEY-AMERICAN WATER COMPANY, INC.
FOR APPROVAL OF INCREASED TARIFF RATES AND
CHARGES FOR WATER AND WASTEWATER SERVICE,
CHANGE IN DEPRECIATION RATES, AND
OTHER TARIFF MODFICATIONS

BPU Docket No. WR2401____

Direct Testimony of

Charles B. Rea

Exhibit P-9

NEW JERSEY-AMERICAN WATER COMPANY, INC.

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NEW JERSEY-AMERICAN WATER COMPANY, INC.

I. INTRODUCTION

1. Q. Please state your name and business address.

A. My name is Charles B. Rea. My business address is 3409 Research Parkway, Davenport, IA 52806.

2. Q. By whom are you employed and in what capacity?

A. I am employed by the American Water Works Service Company, Inc. ("AWWSC"). My title is Senior Director, Enterprise-Wide Regulatory Pricing and Affordability.

3. Q. What are your responsibilities in this position?

A. My primary responsibility in my role as Senior Director, Rates and Regulatory is to serve as a subject matter expert on cost of service, rate design, revenue, and affordability of service issues for AWWSC's operating company affiliates, including New Jersey-American Water Company, Inc. ("New-Jersey American Water", NJAWC", or "Company"). I am responsible for the development and preparation of cost of service and rate design analyses and filings, as well as rate design proposals to our internal and external stakeholders. I am also responsible for projections of revenues for rate case purposes, and I am responsible for developing and presenting information on the affordability of our water and wastewater service to our customers.

4. Q. Please describe your educational background and business experience.

A. Please refer to Appendix A for a summary of my educational background and business experience.

5. Q. Have you previously testified in regulatory proceedings?

A. Yes. I provided testimony regarding cost of service and rate design proposals for New Jersey-American Water in two of its previous base rate cases, before the Board of Public Utilities ("Board" or the "BPU") in BPU Docket Nos. WR19121516 and WR22010019. I have also provided testimony on behalf of Virginia-American Water Company, Maryland-American Water Company, West Virginia-American Water Company, Iowa-American Water Company, Illinois-American Water Company, Indiana-American Water Company, Kentucky-American Water Company and Missouri-American Water Company. Additionally, I have testified on numerous occasions in Iowa, Illinois, and South Dakota on issues regarding energy efficiency and electric and natural gas cost of service and rate design.

6. Q. What is the purpose of your testimony in this proceeding?

A. In this proceeding, I am sponsoring an analysis of the affordability of New Jersey-American Water's water and wastewater services to its customers in this rate proceeding. Consistent with my affordability analysis, I will explain and propose the Universal Affordability Tariff ("UAT") by which New Jersey-American Water seeks to enhance the affordability of service to all of its customers. I am also sponsoring New Jersey-American Water's calculations and analyses for adjustments in this proceeding for residential, commercial, and public authorities'

usage that feeds into the development of revenues in this case. Finally, I will describe the Company's proposed Revenue Decoupling Mechanism ("RDM") and explain why it is in the best interest of the Company and its customers.

7. Q. Are you sponsoring any schedules and/or exhibits in this proceeding.

A. I am sponsoring the following schedules with my Direct Testimony:

- Schedule CBR-1: Water Affordability Analysis
- Schedule CBR-2: Wastewater Affordability Analysis
- Schedule CBR-3: Residential Usage Analysis
- Schedule CBR-4: Commercial Usage Analysis
- Schedule CBR-5: Public Authorities Usage Analysis
- Schedule CBR-6: Revenue Decoupling Mechanism Calculation
- Schedule CBR-7: NARUC Resolution

8. Q. Were each of these Schedules prepared by you or under your direction and supervision?

A. Yes.

9. Q. How is your Direct Testimony organized?

A. My Direct Testimony is organized in the following sections:

- Affordability of Service
- Universal Affordability
- Statistical Analysis of NJAWC Usage
- Revenue Decoupling

II. AFFORDABILITY OF SERVICE

A. Introduction

10. Q. Please describe the concept of affordability.

A. The concept of affordability for water and wastewater service is based on the idea that everyone should have access to drinking water and wastewater service that is: (1) safe, meaning it complies with the U.S. Safe Drinking Water Act and regulations promulgated by the U.S. Environmental Protection Agency ("EPA"); (2) reliable, so that it is resilient in the face of floods, droughts, and other climate risks; and (3) affordable

11. Q. Why is affordability of water and wastewater service an important issue to the Company?

A. The Company knows that its water and wastewater service is essential, and we know how important it is for that service to remain affordable. Maintaining affordability of service is an important objective for NJAWC as discussed in the direct testimony of Company President Mark McDonough.

12. Q. How does the Company assess the affordability of its water and wastewater service?

A. The Company assesses the affordability of its water and wastewater service by comparing annual bills for water and wastewater service to household income in the communities that we serve. Such an assessment requires at least two data points – the average monthly or annual bill for water service and some measure of household income for the customer population. For the broader residential

customer base, commonly available household income measures are measures of income at different percentiles. Median Household Income ("MHI"), which is household income at a 50th percentile level (50% of households in a given population have incomes greater than the median and 50% of households have incomes lower than the median), can be measured at a statewide or community level and can be paired with a data set that provides the number of customers served in each community to arrive at a weighted number that represents MHI for the Company's entire service territory

At a more detailed level, individual household income is considered, and affordability can then be assessed, across a full range of households based on their various income levels and bills for water and/or wastewater service. A variety of household income data is readily and publicly available from the U.S. Census Bureau through the American Community Survey ("ACS") at the state, county, and community levels.

13. Q. What types of affordability analyses does the Company conduct?

A. The Company conducts two different types of affordability analysis for its water and wastewater service. The first analysis is an Enterprise-Level analysis of affordability which considers affordability of service at a high level over a multi-year period. The second analysis is a Community-Level analysis of affordability which takes a deep dive into the affordability of service at the individual customer level under current or proposed rates and current economic conditions.

14. Q. Has the Company provided an affordability analysis of its water and wastewater service for the proposed rates in this case?

A. Yes. The Company's affordability study for water service is provided in Schedule CBR-1 and the affordability study for wastewater service is provided in Schedule CBR-2. Each Schedule contains both the Enterprise-Level Analysis and a Community-Level Analysis for the applicable service.

B. Enterprise-Level Analysis

15. Q. Please describe the Company's Enterprise-Level Analysis of affordability of service.

A. The Enterprise-Level Analysis of affordability for water and wastewater service is a historical comparison of average monthly bills for NJAWC residential customers to household income for the Company's residential customers. The metric used to describe affordability is the Bill-to-Income ("BTI") Ratio, which is defined as annual water bills divided by estimated annual household income. This view looks at average residential monthly bills for all customers over time compared to MHI for the Company's residential customer base.

16. Q. What is the purpose of this Enterprise-Level Analysis?

A. The purpose of the Enterprise-Level analysis is to provide a high-level perspective on how the affordability of service has been trending over time and how it is expected to continue to trend under proposed rates. Although the Company is proposing to increase customer rates in this proceeding, the important metric to consider is the impact that proposed rates and bills have on customer finances and

how those impacts have trended over time and are expected to trend going forward. This metric must consider not only trends in rates and bills but trends in household income. The BTI Ratio proposed by the Company considers all of these factors. The Company's BTI Ratio as presented in the Company's affordability analyses is the appropriate metric to use when looking at the impact of the Company's rates for water and wastewater service on customers.

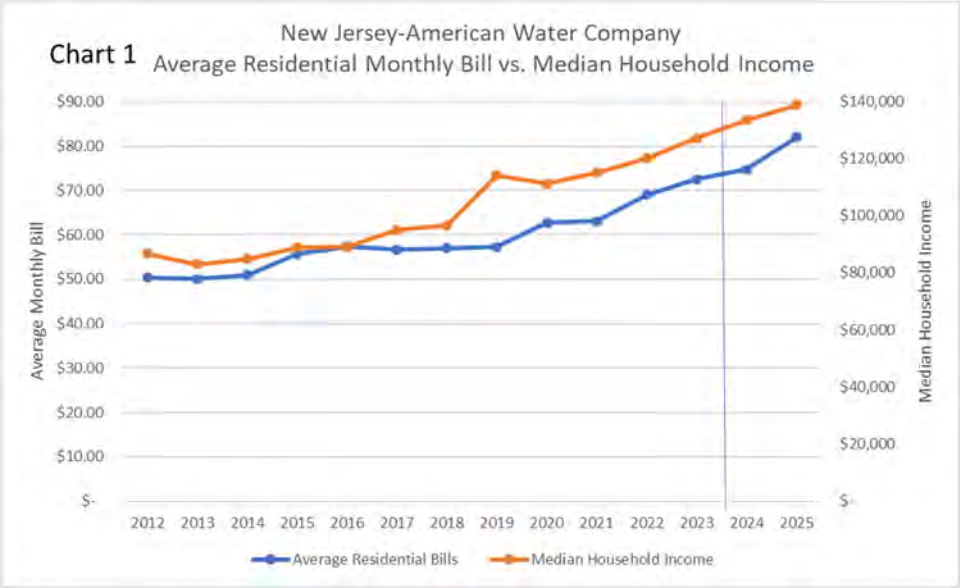
17. Q. How do you determine MHI for the customers in the Company's service territory?

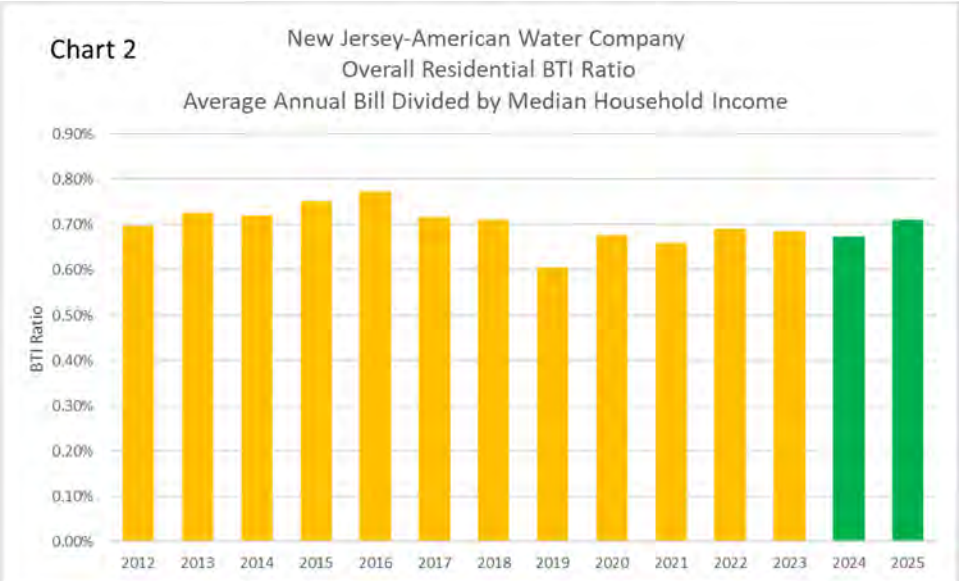
A. The MHI for the Company's service territory is a weighted average of the number of customers the Company serves in each community in the service territory and the median household income in each of those communities for owner-occupied and single-unit renter occupied homes as reported by data in the ACS based on the most recent year's available data (2022 in this proceeding). The relationship between this service territory specific figure and the MHI for the State of New Jersey for 2022 (also provided at the community level through the ACS) is then applied to historical MHI data for the State of New Jersey to arrive at historical MHI data for the NJAWC service territory.

18. Q. What are the results of your Enterprise-Level analysis of affordability for water service?

A. The charts below compare historical average monthly water bills to MHI for New Jersey-American Water customers from 2012 through 2023 stated in absolute terms and stated in terms of BTI Ratio, along with estimated average monthly bills under

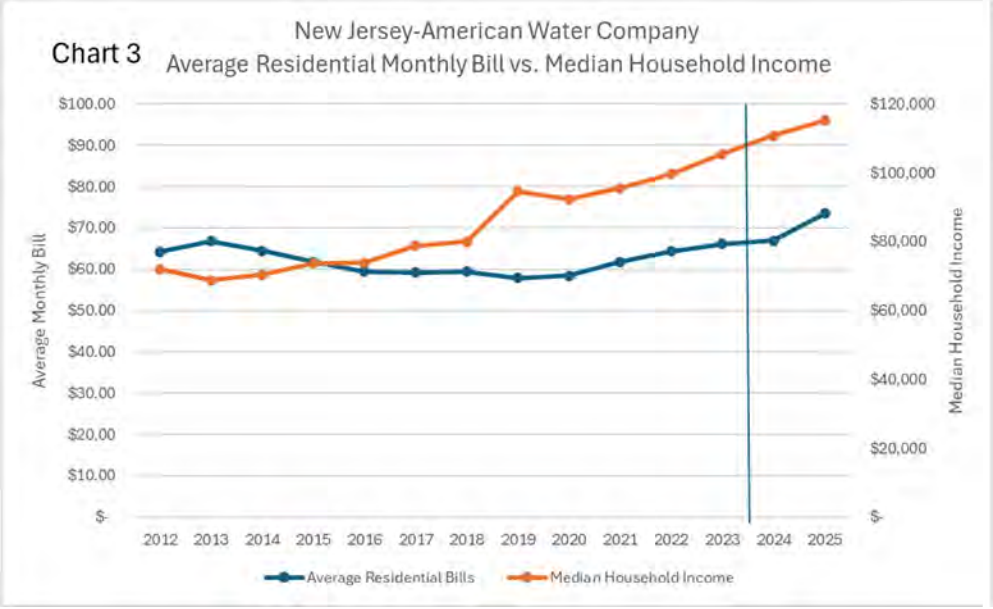
the Company's proposed rates in this case and estimated MHI for New Jersey-American Water customers during the forecasted test year. The data shows that the BTI Ratios for water service for New Jersey-American Water customers have held steady from 2012 to 2023 between 0.6% and 0.8% of MHI. The BTI Ratio at the median income level is expected to be 0.71% under the Company's proposed rates in this case.





19. Q. What are the results of your Enterprise-Level analysis of affordability for wastewater service?

A. The charts below compare historical average monthly wastewater bills to MHI for New Jersey-American Water customers from 2012 through 2023 stated in absolute terms and stated in terms of BTI Ratio, along with estimated average monthly bills under the Company's proposed rates in this case and estimated MHI for New Jersey-American Watter customers during the forecasted test year. The data shows that the BTI Ratios for wastewater service for New Jersey-American Water customers have come down from 2021 levels and have held steady from 2019 to 2023 between 0.7% and 0.8% of MHI. The BTI Ratio at the median income level is expected to be 0.77% under the Company's proposed rates in this case.



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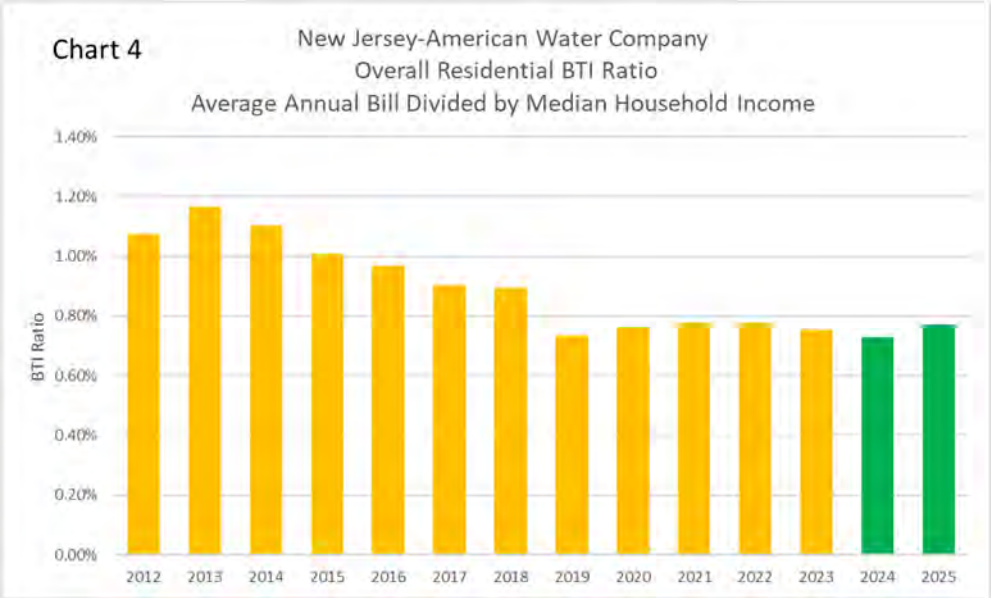


20. Q. Is there a generally accepted standard for the affordability of water and wastewater service expressed as a percentage of MHI?

A. There is no definitive standard for affordability as a percentage of MHI. Benchmarks for affordability expressed as a total bill's percentage of MHI is a policy decision. However, bills that are less than 2.0% or 2.5% of MHI for water and 4.0% to 4.5% of MHI for combined water/wastewater are considered "affordable" by some.[1]

21. Q. In your opinion can the assessment of affordability of service be reduced to basically a yes or no answer?

A. No, the affordability of water or wastewater service will never be that simple. One can generally measure average water bills against any given benchmark and come

[1] Teodoro, Manuel P. "Measuring Household Affordability for Water and Sewer Utilities." Journal AWWA, 2018, doi:10.5942/jawwa.2018.110.0002.

up with a yes or no answer, but affordability of service is a continuum, and that is what the Company's Community-Level analysis, which I describe next in my Direct Testimony, shows. There will always be customers for whom water service is more affordable than for others depending on demographics and income levels. This is true across all of the communities that NJAWC serves, including even among the wealthiest communities.

C. Community-Level Analysis

22. Q. Please describe the Company's Community-Level Analysis of affordability of service.

A. The Community-Level Analysis takes a deeper dive into the affordability of water and wastewater service at a local level across different customer demographics and proposed rates for each community that the Company serves. For larger communities, the analysis is done at a zip-code level.

23. Q. What is the purpose of this Community-Level Analysis?

A. The purpose of the Community-Level Analysis is to identify, at an individual customer level, the percentages of household income that bills for water and wastewater service are expected to take up under the Company's proposed rates, and to identify demographic trends either by geographic location or by income level for customers where affordability of service may be an issue based on BTI Ratios measured at the individual customer level.

24. Q. How is this analysis different from the Enterprise-Level Analysis you previously presented?

A. The Enterprise-Level Analysis and the Community-Level Analysis are two different but complementary views of affordability. As previously stated, the purpose of the Enterprise-Level analysis is to provide a high-level historical perspective on how the affordability of service has been trending over time and how it is expected to continue to trend under proposed rates. The Community-Level analysis takes a deeper dive into the affordability of service at the individual customer level under current or proposed rates and current economic conditions.

25. Q. Is there academic research that supports the Company's approach to assessing affordability of service at this detailed level?

A. Yes. Cardoso and Wichman[2] outline a framework for assessing affordability of water service that uses the full distribution of household income at the local level rather than MHI or some other static representative level of income and uses varying levels of water usage at the individual household level instead of a static representative level of water usage. While my methodology differs from Cardoso and Wichman in certain areas, the goal remains the same, which is to analyze affordability at the individual customer level and identify customer groups where affordability of service may be an issue.

[2] Cardoso, Diego S. and Wichman, Casey J. "Water Affordability in the United States", Water Resources Research, 2020. Volume 58, Issue 12.

26. Q. What information is needed to conduct an analysis of the affordability of service at this detailed level?

A. The following information is used to assess affordability of service at the community and individual customer level:

- The number of customers served in each community.
- The distribution of owner-occupied households and renter-occupied households by income level in each community.
- The percentage of occupied housing units that are owner-occupied households or renter-occupied households that are not in multi-dwelling buildings in each community.
- The average number of persons per household in each community for both owner-occupied and renter-occupied households.
- The distribution of the size of households (one-person, two-person, etc,) for households of different income levels.
- The standard definition of Basic Water Service.
- Current or proposed rate structures.

I will return to the Community-Level Analysis after I discuss the concept of Basic Water Service.

27. Q. Please describe the concept of Basic Water Service.

A. Basic Water Service is a water usage level that reflects the level of water consumption for basic human services (cooking, cleaning, sanitation, and general health requirements), which is then assumed to be constant from month-to-month

and not subject to significant seasonality or weather conditions. This standard can be expressed in terms of gallons per resident per day. This service is different from discretionary seasonal water usage for filling swimming pools, lawn irrigation, etc. This definition of Basic Water Service can be used to customize a level of usage that accurately reflects water service for different sizes of households.

28. Q. How do you define Basic Water Service for the purposes of your customer-level affordability analysis?

A. For the purpose of the Company's affordability analyses, Basic Water Service is defined to be 40 gallons of water per household member per day. This figure is based on the review of relevant literature on the subject and a review of Company billing data for residential customers in months with minimum levels of discretionary water usage, all of which supports the definition of 40 gallons of water per household member per day.

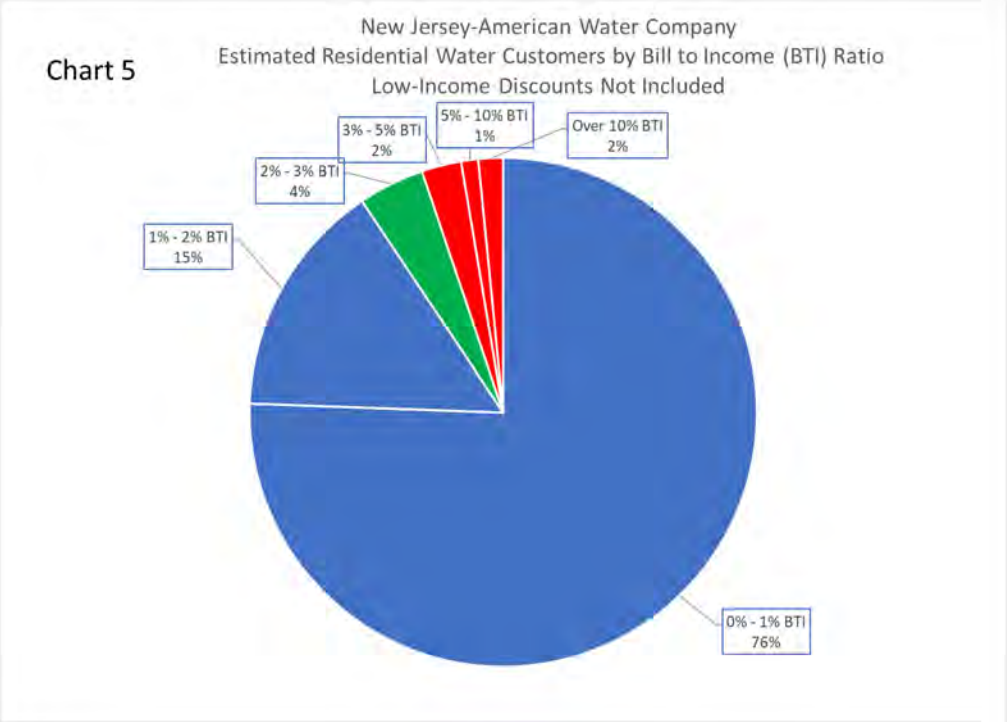
29. Q. What demographic information does your Community-Level Analysis provide?

A. The demographic information provided by this analysis is primarily economic in nature, although the analysis can be expanded to provide information on various identifiers such as race, languages spoken, etc. The primary demographic (economic) information provided by the analysis is the estimated number of customers at different levels of Federal Poverty Level ("FPL") and at different levels of household income. FPL is a measurement set by the U.S. Department of Health and Human Services of the minimum amount of annual income that is

needed for individuals and families to pay for essentials, such as room and board, clothes, and transportation. The FPL takes into account the number of people in a household, their income, and the state in which they live. For New Jersey, the FPL guidelines for 2024 are set at $14,580 for a household size of one and $5,140 per year for each additional household member.

30. Q. What information does your Community-Level Analysis show?

A. Charts 5 and 6 below show, for both water and wastewater service, the relationship between residential customers' bills for Basic Water Service under the Company's proposed rates and level of household income.



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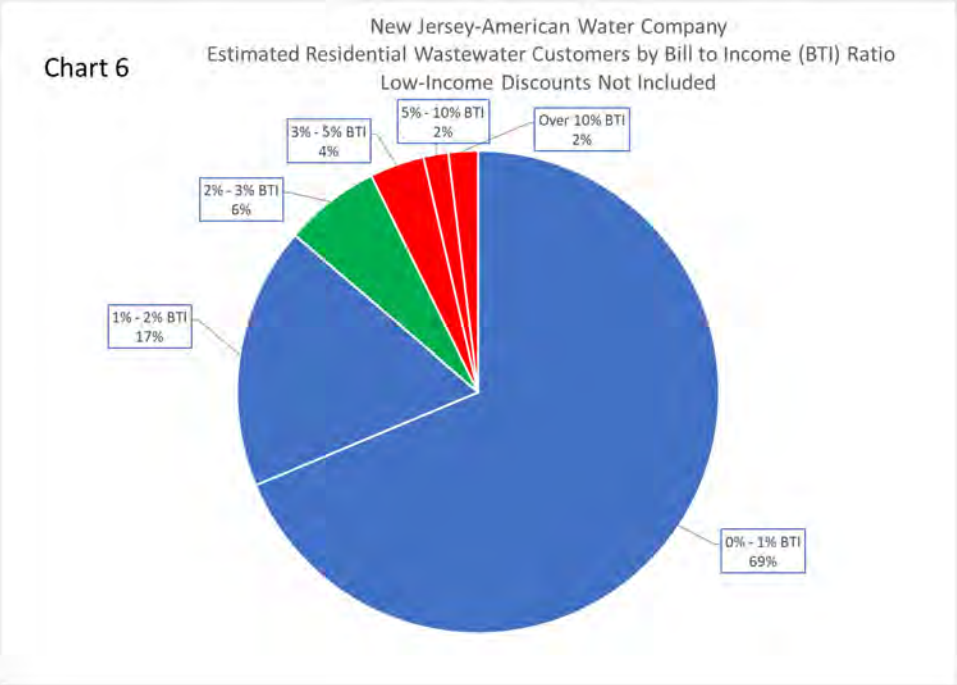

These charts show that under the Company's proposed rate structure, the Affordability Index metric (discussed below) for the Company's service territory in total is 91% under proposed rates for water service and 86% under proposed rates for wastewater service, meaning that 91% of our residential water customers and 86% of our residential wastewater customers can expect to see bills for Basic Water Service to be less than 2% of their household income. The Company estimates that there are approximately 57,000 residential water customers and 9,000 wastewater customers that will see bills for Basic Water Service above 2% of their household income, which is approximately 9% and 14% of the total customer population for water and wastewater service respectively.

31. Q. Please describe the Affordability Index.

A. The Affordability Index ("AI") is a metric that reflects the percentage of a group of customers for whom Basic Water Service is expected to be less than a given percentage of annual household income. Consistent with my previous discussion in testimony regarding standards for affordability, the Company uses 2% of household income as the benchmark for this metric, which is at the conservative end of the range of affordability often cited. As an example, if, for a certain group of customers, it is estimated that 80% of those customers will have bills for Basic Water Service less than 2% of annual household income, the AI value for that group of customers is 80%.

The AI metric is designed to reflect the percentage of residential customers in a state, community, or demographic group for whom Basic Water Service is expected to cost 2% or less of annual household income. An AI value of 100% means that all customers within a selected group can expect Basic Water Service at less than 2% of household income. An AI value of 70% means that approximately 70% of customers within a selected group can expect Basic Water Service at less than 2% of household income, and 30% of customers in that group can expect Basic Water Service to cost more than 2% of household income. The AI value is calculated based on modeling of proposed rates and community-level demographic information I previously described in my testimony, which assesses affordability across the entire range of customer demographics in each community we serve.

32. Q. Why do you use 2% of household income as your benchmark for affordability of service?

A. The 2% benchmark is generally consistent with industry standards for affordability at the individual household level and is slightly lower than the 4.5% benchmark for combined water and wastewater service used by Cardoso and Wichman.[3]

33. Q. Is affordability of service uniform across the Company's service territory?

A. No, it is not. While the Company's water rates are virtually the same for the vast majority of our customers and wastewater rates result in bills that are generally comparable across the Company's wastewater territory, household income can vary significantly across the Company's service territory. NJAWC has a very diverse service territory and serves customers in urban, suburban, and rural communities with household incomes that vary widely. The Company's affordability analyses provided in Schedules CBR-1 and CBR-2 provide information on the number of customers served in each community, the MHI for each community, and the BTI Ratios for Basic Water Service in each community.

34. Q. Do you have information on the Affordability Indices of service by income group?

A. Table 1 below shows AI values for the Company's residential customers by income level for water and wastewater service.

[3] Cardoso, Diego S. and Wichman, Casey J. "Water Affordability in the United States", Water Resources Research, 2020. Volume 58, Issue 12.

NEW JERSEY-AMERICAN WATER COMPANY, INC.

TABLE 1 ***Affordability Index by Income Level***	**Water Affordability Index**	**Wastewater Affordability Index**
Above $150k	100%	100%
$100k - $150k	100%	100%
$75k - $100k	100%	100%
$50k - $75k	98%	95%
$35k - $50k	84%	74%
$25k - $35k	61%	55%
$20k - $25k	37%	33%
$15k - $20k	0%	18%
$10k - $15k	0%	29%
$5k - $10k	0%	17%
$0k - $5k	0%	1%

35. Q. Does your analysis consider customers who rent in multi-family buildings without individual meters?

A. No. The Company's Community-Level Analysis only considers customers that are assumed to be direct customers of the Company, meaning that they are directly responsible for payment of services to the Company. Direct customers are assumed to be owner-occupied households and single-family renter occupied households as reported by ACS data.

36. Q. Why does your Community-Level Analysis only concentrate on customers that are direct customers of the Company?

A. The Company's affordability analysis concentrates on customers that are direct customers of the Company for two reasons:

- The use of an MHI statistic, which best estimates household income for direct customers of the Company, is consistent with the calculation of the average bill, which is also based on direct customers.
- For indirect customers of the Company (e.g., renters in multi-family buildings), it is impossible to know definitively what these households pay in rent for water or wastewater service. Presumably, building owners that receive water and/or wastewater service from NJAWC are recovering those costs through rents, but there is no way to know if owners are overcharging or undercharging renters or if they are also charging renters for building water or wastewater service that renters are themselves not actually using.

37. Q. Will the Company's proposed change in rates impact people who use the Company's service but are not direct customers of the Company?

A. It is impossible to know what the impact of the Company's proposed rates will be on indirect customers of the Company. Rents may increase in part to recover increases in water service costs, but rents increase for many reasons, and the extent to which any increases can be attributable to the Company's proposed rates and the timing of such increases cannot be determined.

D. Conclusions

38. Q. How is all of this affordability information useful?

A. Assessing affordability information of water and wastewater service for the entire residential customer population can demonstrate whether customers, in general, are having or would have difficulty paying their water bills under the Company's

current or proposed tariff structure. Assessing affordability information of water and wastewater service for lower-income customers can indicate the number of customers that may be having trouble paying their utility bills, where the customers are in the Company's service territory, and the extent to which those bills may pose challenges for certain customers. This can, in turn, inform decision-makers about the size and scope of efforts that may be needed to help these vulnerable customers better afford water and wastewater service, both in terms of general rate design proposals that can reduce the cost of Basic Water Service for all customers, including lower-income customers, and customer assistance programs that may include customer grants, tariff discounts, levelized billing, and outreach programs.

39. Q. What conclusions do you draw based on the Company's Community-Level Affordability study?

A. There are three conclusions that can be drawn from Company's affordability study:

- The affordability of the Company's water and wastewater service from 2012 through the forecast test period indicates that the way the Company has invested in and managed its water and wastewater systems has indeed been for the long-term benefit of our customers.
- The Company's water and wastewater service has been, is, and is expected to continue to be affordable for the vast majority of its residential customers, including under the rates proposed in this case.
- There are, however, groups of customers for whom affordability of water and wastewater service may be challenging.

40. Q. How do the Company's affordability analyses and mitigation strategies enhance the value of the Company's water and wastewater service?

A. All stakeholders (regulators, customers, consumer advocates, community leaders, employees, shareholders, etc.) benefit from a financially sound utility providing safe, reliable, and affordable service to its customers. The Company's analyses provide important insights into the affordability of its services and can help inform all stakeholders on strategies for improving affordability for customer groups that may be struggling financially.

III. UNIVERSAL AFFORDABILITY

A. Introduction

41. Q. Does the Company currently have a low-income discount program available for customers?

A. Yes. The Company currently has a low-income discount for water and wastewater service. Through this program, the Company provides a discount off of the customer's monthly bill which is set equal to the customer's applicable water Fixed Service Charge (not greater than a 1" meter charge). If the customer is also provided wastewater service by the Company, the customer is also eligible for a wastewater service discount equal to the water service discount amount, in an amount not to exceed the wastewater service charge. Additionally, residential customers who receive Social Security benefits or Medicare coverage can qualify for a credit equal to the current DSIC surcharge rate per Rate Schedule K on their

monthly bill (not greater than the current 1" meter DSIC surcharge).[4] Eligible customers for these programs are customers whose household incomes are less than 300% of FPL.

42. Q. Is the Company proposing a new low-income tariff in this proceeding?

A. Yes. The Company is proposing a new low-income tariff in this proceeding called the Universal Affordability Tariff ("UAT") to better address the affordability of water and wastewater service for lower income customers.

B. Description Of Proposal

43. Q. Please describe the Company's proposed Universal Affordability Tariff.

A. The Company's proposed Universal Affordability Tariff for water service includes multiple tiers of discounts based on different levels of household income stated as multiples of FPL. The tariff offers discounts on both the monthly meter charge and the volumetric charges for water service and would offer discounts on both fixed service charge and volumetric charges for wastewater service. The Company's proposed discount schedule is as follows:

TABLE 2 ***Household Income***	**Water Fixed Charge Discount**	**Water Volumetric Discount**	**Wastewater Fixed Charge Discount**	**Wastewater Volumetric Discount**
0% - 50% FPL	80%	80%	80%	80%
51% - 100% FPL	60%	60%	60%	60%
101% - 150% FPL	40%	40%	40%	40%
151% - 200% FPL	20%	20%	20%	20%

[4] Fifth Revised Sheet; No. 11.

44. Q. What is the driving principle behind the Company's new Universal Affordability tariff?

A. The driving principle behind the Company's proposed Universal Affordability tariff is to provide all participating customers discounts such that the expected bill for Basic Water Service (40 gallons of water per household member per day) will be no more than 2% of their annual household income

45. Q. Why is the Company proposing this new Universal Affordability Tariff?

A. As I stated previously, the Company is proposing this UAT to better address affordability of waste of water and wastewater service for lower income customers. The charts below show water bills for Basic Water Service as a percentage of household income for customers whose household incomes are at different levels of FPL based on proposed rates in this case before and after application of the current low-income discount tariff:

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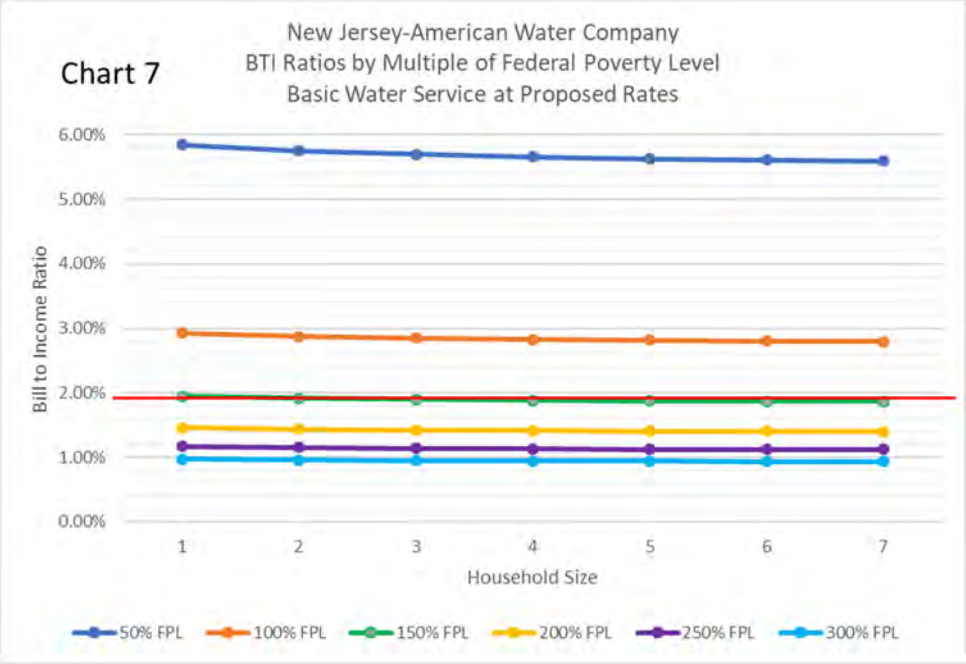
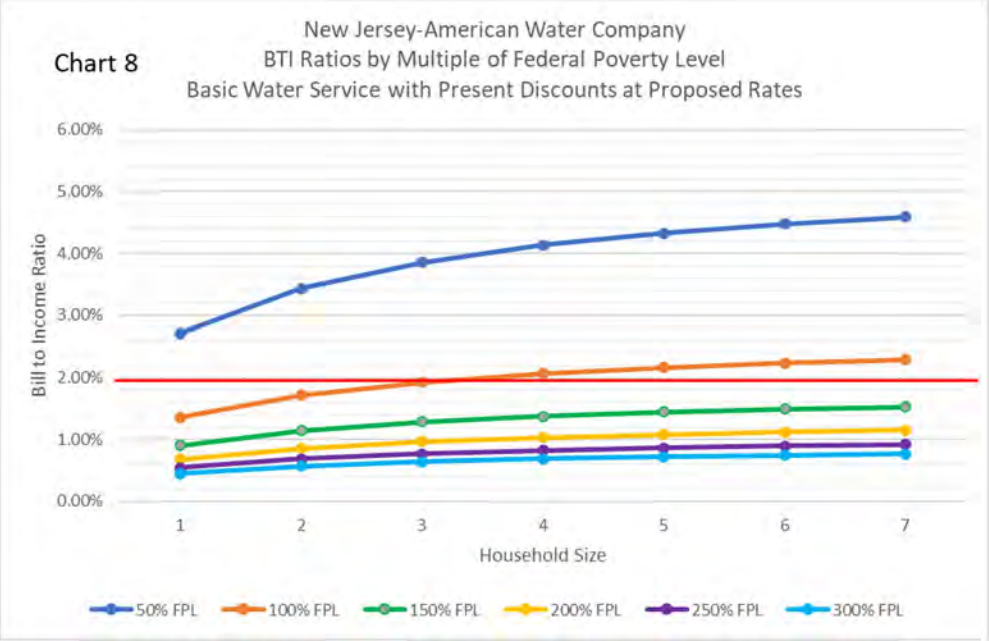




The charts show that under proposed rates, customers with household incomes above 150% of FPL will likely see bills for Basic Water Service at or below 2% of household income. Customers at 100% of FPL or below will likely see bills for Basic Water Service above 2% of household income before discounts. Under the

current discount program, bills will be reduced in each income group, but customers whose household incomes are less than 100% of FPL could still see bills above 2% of household income.

46. Q. What is the total number of customers that would be eligible for discounts under the Company's proposed tariff?

A. Table 3 below shows the estimated number of customers from the Company's water and wastewater affordability analyses by household income level that would be eligible for the Company's proposed UAT.

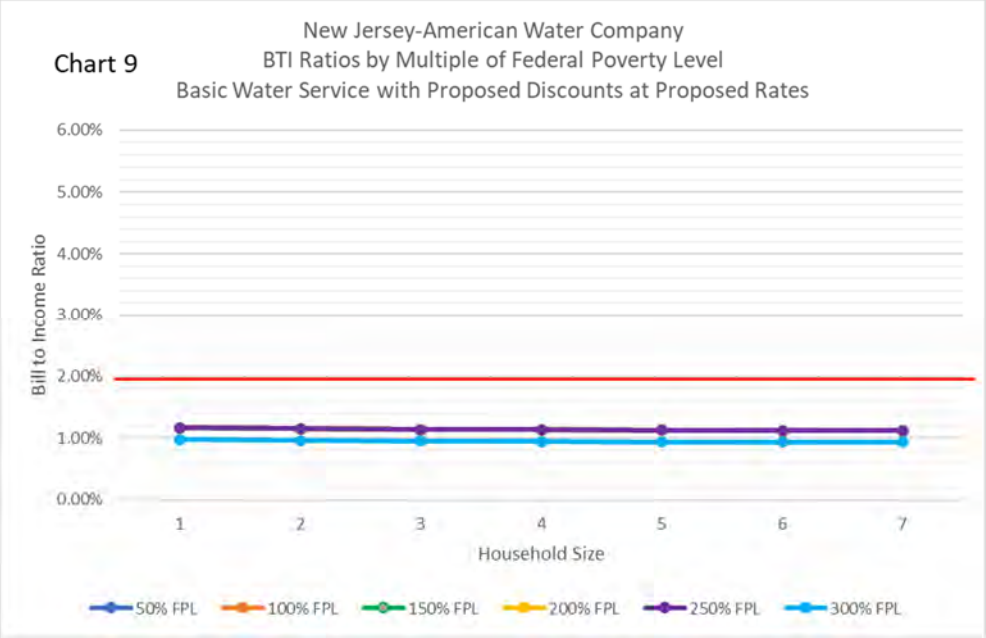
TABLE 3 ***Eligible Customers***	**Water Customers**	**Wastewater Customers**
0% - 50% FPL	14,047	2,223
50% - 100% FPL	17,854	3,407
100% - 150% FPL	27,361	4,800
150% - 200% FPL	28,832	4,439

C. Customer Impact

47. Q. What impact will this proposed tariff have on the affordability of water service for lower-income customers?

A. The chart below shows water bills for Basic Water Service as a percentage of household income for customers whose household incomes are at different levels of FPL based on proposed rates in this case before and after application of the Company's proposed UAT.

NEW JERSEY-AMERICAN WATER COMPANY, INC.



This chart shows that under the Company's proposed rates and the proposed discounts offered under the UAT, all participating customers will have Basic Water Service at approximately 1% of household income. Comparing this chart to Charts 7 and 8, the proposed UAT discounts are clearly more effective at improving the affordability of service for lower income customer groups than the current fixed charge discount.

48. Q. Is the Company proposing to roll an assumed level of discounts offered under this tariff into base rates to be paid for by other water service customers?

A. Yes. The Company has calculated an estimated level of discounts to be offered through this proposed UAT tariff based on participation levels in the current low-income discount program and is proposing to roll that level of discounts into base rates in lieu of the current level of discounts under the current program.

49. Q. How is the Company proposing to spread the costs of the assumed discounts across the different volumetric rates in the Company's proposed rate design that you testified to previously?

A. The Company is proposing to spread the costs of the discounts in the same manner as the costs of the current low-income program, which reallocates the assumed level of discounts directly back to the GMS volumetric rate.

D. Justification

50. Q. What is the justification for offering a Universal Affordability Tariff?

A. The justification for offering this UAT is simply that the proposed UAT will be more effective at improving affordability of service for customers that need it the most than the current discount program and at a lower total cost. The current discount program offers discounts to customers between 200% and 300% of FPL where Basic Water Service is already well under 2% of household income. The Company's proposed UAT eliminates discounts in that household income bracket but targets much higher levels of discounts to customers at lower income levels thus improving overall affordability of service across all residential customers at potentially a much lower cost.

IV. ANALYSIS OF NJAWC CUSTOMER USAGE

A. Introduction

51. Q. Are there revenue adjustments the Company is proposing in this case that require quantitative analysis of water consumption by NJAWC's water customers?

A. In this section of testimony I will explain the modeling used to develop the revenue forecasts for the residential, commercial and OPA customers. For those customers, the Company is proposing adjustments for the normalization of historical billing determinants related to trends in declining use and weather normalization, and the impact of the COVID-19 public health emergency on water consumption for New Jersey-American Water's water customers. These adjustments require the Company to analyze water consumption and determine (1) if there is a significant and pervasive rate of decline in water use per customer over time, (2) if there are significant relationships between water consumption and weather conditions in the Company's service territory (and, if weather was different from normal during this historical base period, is a weather normalization adjustment to usage appropriate to reflect more normal weather conditions for a forecast period, and (3) if the COVID-19 public health emergency has had a significant impact on water consumption for New Jersey-American Water's customers (again to determine if a COVID-related adjustment to usage is appropriate for the Forecast Year).

52. Q. How do you determine the parameters and relationships necessary to analyze declining water use, weather impacts on water consumption, and the impact of COVID-19 on water consumption for NJAWC's customers?

A. The parameters and relationships necessary to analyze declining use, weather, and COVID-19 on water consumption for NJAWC's customers are estimated through the use of statistical linear regression modeling

A. Statistical Analysis

53. Q. What is a statistical linear regression model?

A. Statistical linear regression modeling is a commonly used type of mathematical predictive analysis. The overall idea of regression modeling is to examine two things: (1) whether a set of independent explanatory variables does a good job of predicting an outcome (dependent) variable, and (2) which independent explanatory variables are significant predictors of the dependent variable, and in what way in particular do they help predict the results of the dependent variable.

There are three major uses for statistical linear regression analysis. These major uses are: (1) determining the predictive power of independent explanatory variables; (2) forecasting the effect that independent variables have on a dependent variable; and (3) trend forecasting. First, the regression analysis can be used to identify the strength of the effect that independent explanatory variables have on a dependent variable. A typical question is: "What is the strength of the relationship between summer heat, precipitation, and water sales?" Second, regression analysis can be used to forecast effects or impacts of changes. That is, the regression analysis helps us understand how much the dependent variable changes with a change in one or more of the independent variables. A typical question is: "What volume of water sales can the Company expect to lose for each inch of rainfall above normal in any given period?" Third, regression analysis can predict trends and future values. The regression analysis can be used to get point estimates of future values of the dependent variable based on assumed values for the

independent variables. A typical question can be: "Given current trends in water sales, what can we expect water sales to be each month next year assuming normal weather?"

54. Q. What does a statistical regression model produce?

A. A statistical linear regression analysis is a way of mathematically validating which independent variables have a significant impact on the dependent variable – the main factor, the one you are trying to better understand or predict. A statistical linear regression model produces an equation that describes a historical relationship between a set of independent variables and a single dependent variable that can be used to forecast future values of the dependent variable based on assumed values of the independent variables. An example of such an equation is shown below:

UPCn = a0 + (a1 x RAINn) + (a2 x CDDn) + (a3 x HDDn) +
(a4 x COVIDn) + (a5 x TIMEn)

Where:
UPCn = Use per customer in month n
RAINn = Rainfall in month n
CDDn = Cooling Degree Days ("CDD") in month n
HDDn = Heating Degree Days ("HDD") in month n
COVIDn = COVID-19 effect in month n (0% to 100%)
TIMEn = Year/Month for month n

and:
a0 = constant term
a1 = coefficient for RAIN
a2 = coefficient for CDD

a3 = coefficient for HDD

a4 = coefficient for COVID-19 impact

a5 = coefficient for TIME (declining use value)

In this example, use per customer is the dependent variable (outcome) and all other variables are independent variables (predictors).

55. Q. Can statistical linear regression models be used to weather normalize historical water sales for different customer classes?

A. Yes. In the statistical model in the example above, the a1 coefficient for RAIN can be used to estimate the impact of rainfall on use per customer in any given historical period and estimate what the usage per customer would have been if rainfall had been different, especially when actual precipitation was higher or lower than normal. Below is a sample calculation of how weather normalization works with a statistical regression model that uses weather as a strong predictive independent variable that affects the use per customer dependent variable.

IMPACTn = a1 x (ACTUAL RAINn – NORMAL RAINn)

Where: IMPACTn = Weather impact due to abnormal rainfall in period n

ACTUAL RAINn = Actual Rainfall (in inches) in period n

NORMAL RAINn = Average Rainfall (in inches) in period n

If the value of the a1 coefficient for rainfall is -0.30 in this example, actual rainfall for the period is 6 inches and normal rainfall for the period is 4 inches, the weather impact for the period due to higher-than-normal rainfall is a negative 600 gallons

per customer meaning that the Company sold 600 fewer gallons per customer of water than it otherwise would have [-0.30 x (6 – 4) = -0.60]. If there are multiple weather variables in the statistical regression analysis, this calculation is completed separately for each variable and the sum of the calculations is rolled up into a single weather impact. This approach to weather normalization allows an analyst to independently assess the impact of each weather component, and also allows an analyst to state the weather impacts over time both in terms of consumption and in terms of revenues by multiplying the consumption impact by a volumetric price.

56. Q. Can statistical linear regression models be used to estimate the impacts of COVID-19 on water sales for different customer classes?

A. Yes. In the statistical model example above, the a4 coefficient for COVID-19 is the estimate of the impact of the COVID-19 public health emergency on monthly use per customer. The historical data set contains a variable for each month that indicates the assumed qualitative level impact from COVID-19 in that month. In all months prior to April 2020 that value was set at 0%. From April 2020 on, that value is set at 100% when maximum COVID-19 impacts are observed, or at a level less than 100% where we see reduced COVID-19 impacts on usage. The coefficient for the COVID-19 impact variable estimates the average monthly use per customer based on the months that have been designated as COVID-19 months. This coefficient can then be used to (1) identify a normal level of usage that is not influenced by the impact of COVID-19, in a manner similar to a normalization calculation that adjusts for the influence on water usage associated with weather

conditions that depart from normal, and (2) reflect estimates of future impacts of the COVID-19 public health emergency.

57. Q. Can these models be used to estimate trends in declining use per customer for different customer classes

A. Yes. In the same statistical model example represented above, the a5 coefficient for TIME is the estimate of declining use per customer per month. This coefficient measures the rate of decline in use per customer over the historical data set independent of the effect of any other variable in the model. The historical data set contains a variable for each month that is a timestamp that starts at one for the first month in the dataset and increases by one for every month going forward. This acts as a trend variable for both historical periods in the dataset and future forecast periods. The coefficient for this trend variable is applied to future increasing values of the trend which results in decreasing forecasts of use per customer.

58. Q. How does one assess the accuracy of a statistical linear regression model?

A. A statistical linear regression model produces a set of statistics that can be used to judge the accuracy and fitness of the model. The most common statistics are (1) the "R-Squared" value, which is a statistical measure in a regression model that determines the proportion of variance in the dependent variable that can be explained by the independent variables, and (2) values and standard deviations for the coefficients, which can be used to determine "t-statistics" and "p-values" which tell how accurately and precisely the different coefficients are being calculated and

whether the associated independent variables are strong predictors of the dependent variable.

In the equation described above, the "R-Squared" value is a statistic that measures the percentage of variation from time period to time period in the dependent variable (water use per customer) that is explained by the mathematical relationship with the independent variables. The R-Squared can range from 0% (no explanatory ability) to 100% (perfect explanatory accuracy). In general, the higher the R-squared, the better the predictive value of the model.

The second major test involves comparisons of the values of each of the model coefficients and their associated standard errors. Because a statistical regression model estimates an explanatory relationship between a dependent variable and a set of independent variables, there will always be some degree of uncertainty around what that explanatory relationship actually is. As a result, each model coefficient has a level of uncertainty around it, and this level of uncertainty is represented by measuring how many standard errors each coefficient is away from zero, which the model also calculates.

Dividing the value of each coefficient by its standard error yields a t-statistic which can be used to judge the predictive power of the independent variable that the coefficient represents. For example, in the case of the generic statistical model described above, if the value of the a1 coefficient for rainfall is -0.30 and the standard error for that coefficient is 0.05 (meaning that the real value of the

coefficient could be anywhere between -0.35 and -0.25 with -0.30 being the most likely value), the value of the t-statistic is -6.0 (-0.30 divided by 0.05 = 6.0). Generally speaking, t-statistic values greater than 2.0 for positive coefficients or less than -2.0 for negative coefficients indicate an acceptable predictive relationship between that independent variable and the dependent variable of interest. The higher the t-statistic value, the greater the confidence we have in the coefficient as a predictor. Values between 2.0 and -2.0 indicate that the predictive power of that independent variable may not be very strong.

59. Q. Are there other more qualitative ways to determine whether a statistical linear regression model is accurate and produces reasonable results?

A. Yes. There are also several qualitative ways to determine whether a statistical regression model accurately describes the relationship that a chosen set of independent variables has with the dependent variable:

- **Does the model represent reality?** If it is generally known that water consumption is seasonal and is driven in the summertime by heat and precipitation, it is logical to assume that a statistical model that attempts to describe and predict seasonal water consumption would have explanatory variables related to summer heat and precipitation, and those explanatory variables would be shown to have a strong predictive value in the model. Models that attempt to accurately describe the drivers behind water consumption that do not contain statistically significant coefficients for

independent variables that are logically known to drive water consumption are likely not strong predictive models.

- **Are the signs of the coefficients for major independent variables correct?** If water consumption increases in the summertime with increasing heat and decreases in the summertime with increasing precipitation, it is logical to expect that the coefficients for the independent variables that represent summertime heat and summertime precipitation would be positive and negative, respectively.
- **Is the model based on a robust data set?** It is easy for a statistical model with many independent variables and relatively few observations of the dependent variable to accurately explain variation in the dependent variable, but that does not mean that the model has strong predictive power if the data set being analyzed is small in scope. A statistical model that attempts to describe water consumption that has good predictive explanatory power over multiple years of monthly historical data is very useful and accurate in projecting future trends and in explaining how changes in strong predictive independent variables will affect levels of the dependent variable.
- **Do the impacts on the dependent variable that the model describes make logical sense?** It is possible outside of a statistical linear regression model to make ballpark estimates of other facts like the impact of COVID-19 on water consumption and long-term trends in declining use. This can be done with a simple linear plot of annual usage data by year. For example, if a linear plot of

annual usage data suggests that there is a downward trend of approximately 1,000 gallons per customer per year, one would expect that a statistical model that is measuring that impact would yield a result that is similar. The same is true when looking at the potential impacts of COVID-19 on water consumption. If a visual examination of data suggests that water use per customer for a commercial class has decreased by 2,000 gallons per customer in 2020 due to the COVID-19 emergency, it is logical to expect a statistical regression model that attempts to statistically measure that impact to yield estimates consistent with that expectation.

60. Q. Please explain why this statistical modeling of usage for the residential, commercial, and public authority classes is preferable to simply taking an average of usage over a number of years to develop projections of usage for different customer classes.

A. This statistical approach to modeling residential, commercial, and public authority usage is more appropriate than taking a simple multi-year average because we know that weather impacts usage for both classes and we know that there has been a significant and pervasive downward trend in residential use per customer. We also know that the COVID-19 pandemic impacted usage for these classes. Simple averaging cannot account for these known and measurable impacts with any degree of precision and can only do so at a very general high level. The statistical modeling I have described can accurately identify the effects of all of these impacts and

normalize them going forward. This is why the statistical approach is more appropriate.

61. Q. Is developing a multi-year average of usage a form of statistical modeling?

A. Yes. If one were to run the statistical modeling I have described in my testimony on usage data but leave out all of the explanatory variables except for the monthly indicator variables, you would get precisely the same resulting forecast as you would get by using a multi-year average approach over the same data set. Leaving out all explanatory variables from the statistical model except for monthly indicator variables yields the same results as using a multi-year average, but the explanatory power of the model is much weaker than if you use a more robust model with explanatory variables known to affect usage, and the results from such an effort are much less realistic than with a more robust modeling approach.

62. Q. Is statistical modeling always preferable to using multi-year averages?

A. Not necessarily. In cases where variations in usage can't be explained by observable and forecastable variables (variations in industrial usage, for example), there is not much to be gained by a more robust statistical approach. However, when variations in usage can be explained by observable and forecastable variables, the statistical modeling approach I have described will always be more accurate.

C. <u>NJAWC-Specific Information</u>

63. Q. Please describe the statistical linear regression model you are using to analyze water consumption data for NJAWC.

A. In this proceeding, we are using multiple regression statistical models to analyze use per customer for the residential, commercial, and public authority classes that relate the dependent variable (i.e., water use per customer) to a collection of independent variables. Each regression model uses independent variables that can be broken down into four categories to explain monthly use per customer. The models all use 120 months of data running from July 2013 through June 2023. The four categories are:

- **Weather:** The weather variables used in the models are Cooling Degree Days ("CDDs"), Heating Degree Days ("HDD"), and precipitation. These weather variables are a weighted average of current month and lagged month weather readings taken by the National Oceanic and Atmospheric Administration at various points within NJAWC's service territory. This weighted average lagged approach is used to account for the differences between billing month sales and calendar month weather. Coefficients from these variables show the impact of weather on monthly use per customer over the 10-year period. Weather variables are modeled as monthly deviations from normal for each month in the data set (actual weather for the month less normal weather for the month for each individual weather variable). Normal weather is calculated for each month of the year based on the weather over the ten-year period that the historical data spans.
- **Time:** The time variable is a trending variable that notes the passage of time in the model and produces a coefficient that estimates the monthly trend in usage

per customer over the 10-year model. The time variable captures the range of conservation efforts that have been implemented by customers over time, such as the installation of more water-efficient fixtures and appliances, as well as any other factors that influence usage trends over time. Time on its own is of no consequence, but it is a powerful variable because it is the medium for capturing the conservation effect.

- **COVID-19 indicator**: For the residential and OPA classes, the COVID-19 indicator variable is set at 0% for months prior to April 2020 and 100% for the months of April 2020 through December 2021. For the commercial class, the COVID-19 indicator variable is set at 0% for months prior to April 2020 and 100% for the months of April 2020 through December 2022. The effect of this variable in the model is to look specifically for increases or decreases in use per customer for the April 2020 through December 2022 timeframe that may have happened due to systemic changes in the amounts of water customers use as a result of the COVID-19 public health emergency. The reduction in the COVID effect from 100% in 2020 down to 50% in 2021 and 2022 recognizes the immediate impact that the COVID-19 pandemic had on usage changes in 2020 and the diminished effect of COVID in calendar years 2021 and 2022, with a full return to a pre-COVID usage pattern in calendar years 2023 and beyond.
- **Monthly indicators**: The monthly indicator variables in the model measure structural monthly and/or seasonal changes in use per customer that cannot be explained by any of the other variables in the model.

64. Q. What information do these models provide that is useful for developing pro forma adjustments to revenues that you are sponsoring in your testimony?

A. Each model produces a set of weather coefficients that can be used to weather-normalize historical sales, a coefficient that indicates the monthly trend in declining use per customer for each class, and a coefficient that shows for each class the average use per customer impact associated with changes in usage due to COVID-19.

65. Q. You mentioned that you have developed models for customer usage relating to the residential, commercial, and public authority classes. Are you also modeling usage for the industrial and sales for resale customer classes?

A. No. The statistical modeling in this case is only for the residential, commercial, and public authorities' classes. Usage estimates for the industrial class and the sales for resale classes are developed individually for each customer using a simple multi-year average and are described by Company witness Heath Brooks.

66. Q. You previously discussed the various statistical tests used for accuracy and predictability. Please discuss the results of these tests for your models and why they are appropriate to use in this proceeding.

A. As shown in Schedules CBR-3, CBR-4, and CBR-5, the Adjusted R-Squared statistic for the residential usage model is 96%. The adjusted R-Squared statistics for the commercial and OPA models are 92% and 85% respectively. This indicates that the explanatory variables (weather, COVID-19 impacts, declining use, etc.) strongly explain the variability in use per customer over time. The values of the

coefficients, standard errors, and t-statistics for the major explanatory variables in the models are as follows:

TABLE 4
Residential Model Major Explanatory Variables

	Coefficient	Standard Error	t-Statistic
Declining Use Trend	-.0036	.0010	-3.6243
Precipitation	-.3641	.0355	-10.2579
CDD	.0062	.0011	5.4710
COVID-19 Impact	.3535	.1117	3.1638

TABLE 5
Commercial Model Major Explanatory Variables

	Coefficient	Standard Error	t-Statistic
Declining Use Trend	-.0067	.0055	-1.2187
Precipitation	-.9406	.1970	-4.7753
CDD	.0327	.0063	5.1818
COVID-19 Impact	-3.3266	.6199	-5.3667

TABLE 6
OPA Model Major Explanatory Variables

	Coefficient	Standard Error	t-Statistic
Declining Use Trend	-.0048	.0082	-.5901
Precipitation	-1.4933	.2969	-5.0301
CDD	.0406	.0109	3.7112
COVID-19 Impact	-7.6220	.9612	-7.9296

The statistics for the individual explanatory independent variables above show a high degree of explanatory power with all parameters having t-statistics all outside of the +/- 2.00 range with the exception of the usage trend variables for the commercial and OPA models. The signs for the precipitation variable are all negative as expected, meaning that more rainfall over the summer period results in

less seasonal water usage from our residential customers. The sign for the CDD and HDD variables are positive, which indicates that the hotter the weather gets in the summer and the colder the weather gets in the winter, customers use more water which is expected, and the COVID-19 impact variable indicates that residential usage went up as a result of COVID-19 and that commercial and OPA usage went down. The sign for the declining use variable is negative and is statistically significant for residential usage which means that there is a pervasive decline in use per customer for residential customers over the ten-year historical period.

67. Q. What assumptions are you making going forward regarding the impacts on customer usage related to the COVID-19 pandemic?

A. Analysis of the usage data shows that usage has generally returned to a level consistent with that seen before the COVID-19 pandemic, both in terms of actual levels and in terms of general trends, the Company assumes no impact on usage from COVID in the forecast period.

D. <u>Continuing Trends</u>

68. Q. Your regression models show a trend of declining use per customer. What is the amount of declining use your models have identified?

A. The annual amount of declining use identified for residential customers is approximately 520 gallons per year per customer. The annual amount of declining use identified for commercial and OPA customers is 970 gallons per year per customer for the commercial class and 695 gallons per year per customer for the OPA class.

69. Q. Why do you believe that declining use is a valid trend for residential and commercial customers that will continue?

A. Consumption patterns for the Company's customers are similar to those for other American Water operating companies which have experienced a decline in consumption per customer over the last 10 years. According to the 2010 Water Research Foundation report, "many water utilities across the United States and elsewhere are experiencing declining water sales among households." The report further states: "A pervasive decline in household consumption has been determined at the national and regional levels.[5]

70. Q. What is causing the decline in customers' usage?

A. Several factors drive the decline in usage. These factors include the incremental introduction of low-flow fixtures and appliances, new regulations that lead to further reductions in fixture flow rates, conservation programs, and public initiatives that have led to greater consumer water conservation awareness.

Plumbing fixtures such as toilets, showerheads, and faucets available to consumers today are more water-efficient than those fixtures manufactured in the past. Similarly, appliances such as dishwashers and washing machines are also more water efficient. When a customer replaces an older toilet, washing machine, or dishwasher with a new unit, the new unit will almost certainly use less water than the one it replaced. Similarly, the construction of new homes results in the

[5] Coomes, Paul et al., North America Residential Water Usage Trends Since 1992 – Project #4031, page 1 (Water Research Foundation, 2010).

installation of water-efficient fixtures meeting new, more efficient, regulatory standards.

71. Q. How much water do the new fixtures and appliances save?

A. The Energy Policy Act of 1992 mandated the manufacture of water-efficient toilets, showerheads, and faucet fixtures. For example, a toilet manufactured after 1994 must use no more than 1.6 gallons per flush, compared to a pre-1994 toilet, which typically used from 3.5 to 7 gallons per flush. In fact, toilets using only 1.28 gallons per flush or less are becoming more prevalent in the marketplace. Replacing an old toilet with a new one, therefore, can save from 2 to nearly 6 gallons per flush.

The Energy Independence & Security Act of 2007, which established stringent efficiency standards for dishwashers and washing machines, has further reduced indoor water consumption. Dishwashers manufactured after 2009 and washing machines manufactured after 2010 must use 54% and 30% less water, respectively. All other factors being equal, a typical residential household in a new home constructed in 2015, with water-efficient toilets, washing machines, dishwashers, and other fixtures, uses approximately 35% less water for indoor purposes than a non-retrofitted home built prior to 1994.

72. Q. Are there other factors contributing to the continued decline in water consumption patterns?

A. Yes. Programs to raise customer awareness and interest in the benefits of conserving water and energy continue to increase. As awareness of water and

energy efficiency increases, customers may decide to replace a fixture or appliance even before it has broken. Additionally, customers may further reduce consumption by changing their household water use habits in other various ways.

73. Q. Do you expect the trend of declining usage to continue in the future?

A. Yes. Water-efficient fixtures and other drivers such as conservation education and government-mandated standards will continue to drive further efficiency into residential and non-residential usage per customer. In fact, the trend is well established and continues to affect water usage on the Company's system as well as most water utilities across the United States. The rate of the continued trend is dependent on the pace of fixture replacement within the Company's footprint as well as the broadening acceptance of a conservation ethic through raised customer and business awareness programs, government conservation policy, and similar behavior modification-related programs.

Technology is now available for newer, more water-efficient products that further improve on Energy Policy Act levels, and there has been a growing movement to codify these more stringent specifications. The introduction of progressive code modifications – such as the International Code Council's International Green Construction Code and the International Association of Plumbing and Mechanical Officials Green Plumbing and Mechanical Code Supplement (2011) – support uniform implementation of increased water efficiency standards. An article in the June 2012 issue of the AWWA Journal entitled "Insights into declining single-family residential water demands" recognizes this decline in water consumption:

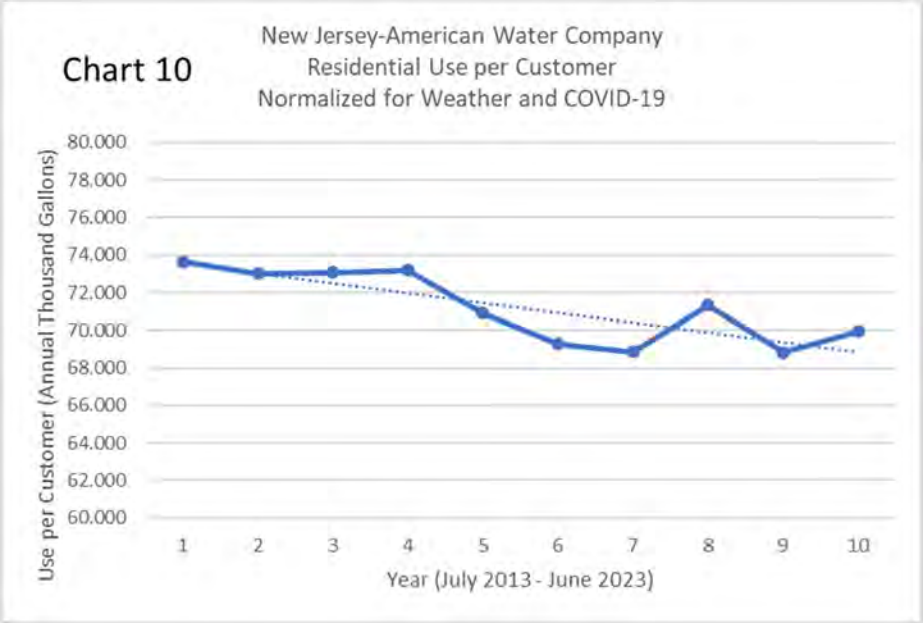
"[r]educed residential demand is a cornerstone of future urban water resource management. Great progress has been made in the last 15 years and the industry appears poised to realize further demand reductions in the future." The trend of declining water consumption based on improved water efficiency has continued over time.

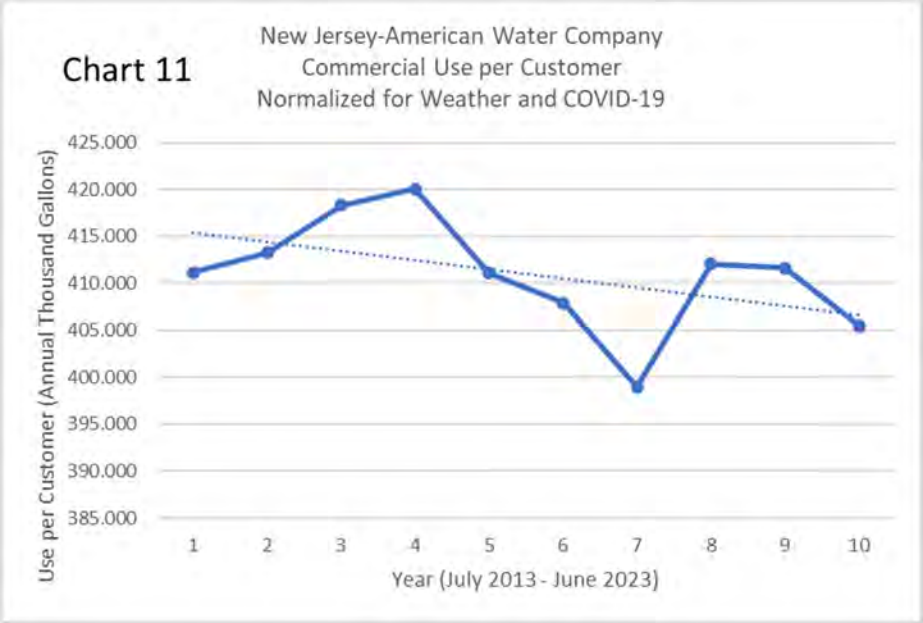
B. Conclusions

74. Q. Normalizing historical usage for weather and the COVID-19 emergency, what has the overall trend been for use per customer for the residential, commercial, and public authority classes?

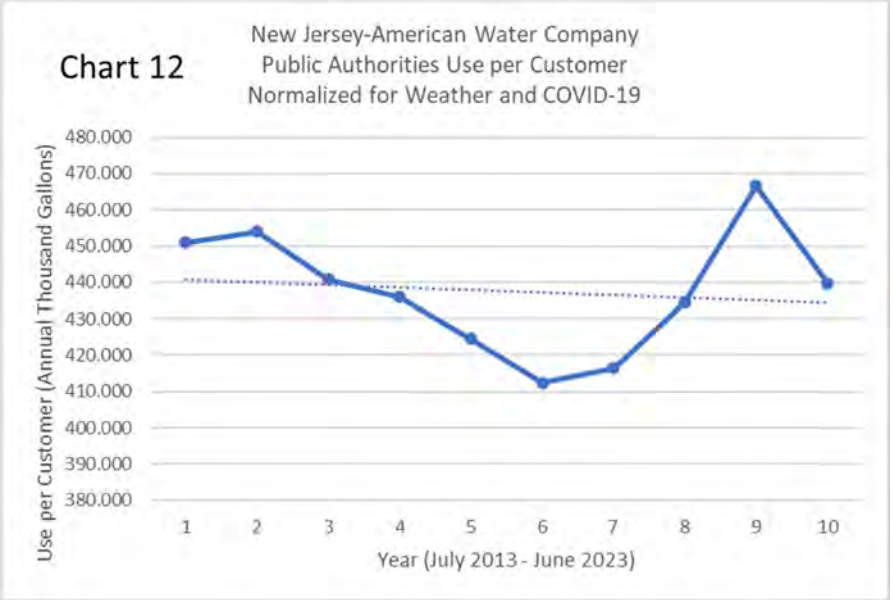
A. The statistical analysis of usage for these customer groups shows that once weather effects and the one-time effects of COVID-19 have been accounted for, there is a downward trend in usage for all customer classes and a significant downward trend in usage for residential customers. The charts below show use per customer for the residential class for the ten years ended June 2023, adjusted for the weather impacts and COVID-19 impacts I previously described in my testimony.

NEW JERSEY-AMERICAN WATER COMPANY, INC.





NEW JERSEY-AMERICAN WATER COMPANY, INC.



75. Q. What conclusions do you draw from this chart and your supporting analysis?

A. The charts and the supporting analyses demonstrate that there has been a significant and pervasive decline in normalized use per customer in the NJAWC service territory. The Company's modeling normalizes for weather and COVID-19 and shows that there has been a pervasive decline in usage over the past ten years. The historical trends in adjusted monthly use per customer will continue through the for the relevant time periods going forward.

V. REVENUE DECOUPLING

A. Introduction

76. Q. Is the Company offering a proposal for a revenue decoupling in this case?

A. Yes. The Company is proposing in this proceeding a Revenue Decoupling Mechanism ("RDM") for water service.

77. Q. What is the purpose of the RDM?

A. The RDM is an alternative rate design mechanism whose purpose is to harmonize revenue actually collected with the revenue requirement and associated fixed costs approved by the Board in this case.

78. Q. Is recovery of fixed costs a ratemaking concern?

A. Yes. Approximately 67% of the Company's water service revenues will be collected through volumetric rates under the Company's proposed rate structure in this case, which means that revenues will vary up or down depending on how much water our customers use. At the same time, approximately 95% of the Company's costs are fixed costs, which do not vary depending on how much water our customers use. If water sales are less than the levels used to set the Company's water service rates in this proceeding, the Company's revenues will be less than the authorized level in this proceeding, and as a result, the Company's ability to recover the costs that the Board determines to be prudent will be diminished. Likewise, if revenues exceed the authorized level in this proceeding due to higher than anticipated water sales, customers will be paying more than the rate levels authorized in this proceeding. The RDM will allow the Company a better opportunity to recover the levels of revenue requirement and fixed cost authorized in this case, as the difference between those amounts and actual revenues will be charged or credited back to customers in the subsequent year.

79. Q. What are some of the factors that jeopardize the Company's ability to recover its fixed costs of providing service?

A. The primary factor that causes revenue volatility and the associated risk in matching revenue collected to the fixed costs from year to year is variations in seasonal weather conditions. Seasonal weather conditions can cause water sales to either increase or decrease from expected going-forward levels, which, in turn, causes revenues to increase or decrease from expected going levels. Cold winters and hot dry summers tend to increase water sales, and warmer winters and cooler wetter summers tend to decrease water sales. Weather volatility in either direction causes volatility in revenues and a mismatch with cost recovery.

80. Q. Does the Company have any control over either seasonal weather conditions?

A. No, it does not.

81. Q. Are there other factors that can cause the Company's revenue to deviate from expected levels?

A. Yes. The recent COVID-19 pandemic situation is a prime example of an external event that can cause the Company's revenues to vary from expected or approved levels. During the pandemic, the Company saw increased sales volumes for residential customers beyond expected levels due to the COVID-19 pandemic as more people were staying home from work and schools. Over the same period, the Company saw decreases in sales volumes from expected levels in the commercial and municipal classes. These changes in volumes, whether temporary or permanent, cause changes in revenues from expected or authorized levels and increase the Company's revenue volatility. In addition, the failure of a sales forecast adequately to capture a long-term trend of declining use per customer can

also result in revenue under or overcollection. Implementation of a well-structured RDM can stabilize customer bills over time and help avoid over-recovery or under-recovery of fixed costs because of revenue volatility due to circumstances beyond either's control.

82. Q. Does the Company have the ability to significantly change its cost structure in order to compensate for changes in revenues?

A. To some extent, the Company experiences a reduction in variable costs associated with the reduced cost of treating and pumping less water. For the most part, however, the Company's ability to reduce its fixed costs during periods when water sales are lower is limited, and it is generally not in the long-term best interests of our customers for the Company to do so. One simple example of this is employee counts. The Company can hardly hire and fire its well-trained work force based on short-term trends in weather or economic conditions simply to keep expenses in line with revenues. Similarly, although maintenance could be deferred in a period of reduced revenue, that would merely forestall the inevitable, could degrade the quality of service provided to NJAWC's customers, and increase the cost of service over time.

83. Q. How is a volatile revenue stream not in the long-term best interests of the Company's customers?

A. The Company is committed to helping customers use water efficiently and providing quality service that is affordable. As I explain below, the Company's ability to reliably recover its revenue requirement and recover its fixed cost of

providing service over the long term through rates is an important part of the Company's ability to continue to properly operate, maintain, and invest in the water system at a reasonable cost. This ability to prudently manage the system at a reasonable cost is in the long-term best interests of our customers.

B. Description of Proposal

84. Q. Please describe the Company's proposed RDM.

A. The Company's proposed RDM is an alternative rate design mechanism that couples traditional rate design with elements of Straight Fixed Variable ("SFV") Pricing. This mechanism couples the benefits of traditional rate design that customers see and will continue to see (cost causation, affordability, gradualism, efficiency of use, simplicity, feasibility, etc.) with the revenue stability that would be provided to the utility and its customers through a SFV rate design. This mechanism compares the revenues collected under traditional customer-facing rate design with the revenues that would have been collected through a SFV rate design on a forward-looking basis and accrues the differences to be either credited to customers or collected from customers at a later time. The proposed RDM identifies three cost components as the basis for revenues that would be collected through the SFV rate design that form the basis of the revenue comparisons going forward. These cost components are:

- **Volumetric Charge (VC)**: A charge in dollars per hundred gallons that applies to all water volumes sold to customers.

- **Residential Fixed Charge (RC)**: A flat dollar charge per month that applies to all residential customers.
- **Non-Residential Fixed Charge (NC)**: A flat dollar amount that applies to all non-residential customers.

85. Q. What is SFV Pricing?

A. SFV Pricing is a rate design that collects all of a utility's fixed costs through fixed charges and all of a utility's variable costs through volumetric charges. For utilities where nearly all of the revenue requirement is fixed cost, SFV results in monthly charges to customers that are relatively high and volumetric rates that are relatively low. SFV pricing aligns cost recovery with the nature of the costs being recovered, provides a stable and reliable revenue stream for the utility, and very effectively satisfies the revenue stability rate design principle. On the other hand, SFV is arguably not consistent with generally accepted cost causation principles at a customer class level, can lead to inefficient use of resources because of low volumetric charges, tends to disadvantage lower income customers from an affordability perspective, and is nearly impossible to achieve in practice for a water utility where nearly all the revenue requirement recovers fixed costs.

86. Q. How are the cost components of the proposed RDM determined?

A. The three different cost components are calculated based on the allocated revenue requirements to customer class, the level of production costs identified in the class cost of service studies sponsored by Company witness Brooks, and the total

volumes of water approved in this proceeding that form the basis of the billing determinants for water service. Specifically, the calculation for the different cost components is as follows:

- **Volumetric Charge (VC)**: Total Production Costs allocated to eligible customers divided by total volumetric sales associated with eligible customers.
- **Residential Fixed Charge (RC)**: Total revenue requirement allocated to residential customers for rate design purposes less the Volumetric Charge multiplied by total volumetric sales associated with residential customers divided by the total number of residential customers in the case.
- **Non-Residential Fixed Charge (NC)**: Total revenue requirement allocated to eligible non-residential customers for rate design purposes less the Volumetric Charge multiplied by total volumetric sales associated with eligible non-residential eligible customers divided by the total number of non-residential customers in the case.

87. Q. Do you have a calculation of these cost components?

A. Yes. Schedule CBR-6 provides a calculation of the three RDM cost components based on the cost of service studies supported by Company Witness Brooks.

TABLE 7
Water

RDM Cost Components	**Amount**	**Description**
Residential Fixed Charge	$79.08	$ per residential customer per month
Nonresidential Fixed Charge	$425.26	$ per nonresidential customer per month
Volumetric Charge	$.0599	$ per hundred gallons sold

88. Q. Can you provide an example of how the RDM would work on a forward-looking basis?

A. The proposed RDM works by comparing actual revenues recovered from eligible customers in a given month or year to the revenues that would result from applying the RDM cost-components described above. If actual revenues are higher than would have been collected under the RDM formula, the difference is credited to customers in the following year. If actual revenues are lower than would have been collected under the RDM formula, the difference is collected from customers in the following year. As I've previously described, the RDM cost components are developed based on approved customer counts, sales, production costs, and total revenue requirements in this case. On a monthly basis, the RDM is as follows:

RDM Res = REV – (VC * Res Usage) – (RC * ResCust)

Where: RDM Res = amount of revenue to be accrued from residential

REV = total revenue in the month from eligible customers

VC = Volumetric Charge

Res Usage = total water volumes sold to residential customers

RC = Residential Fixed Charge

ResCust = number of residential customers for the month

RDM Com = REV – (VC * Usage) – (NC * ComCust)

Where: RDMNon = revenue to be accrued from nonresidential customers

REV = total revenue in the month from eligible customers

VC = Volumetric Charge

Usage = total water volumes sold to nonresidential customers

NC = Nonresidential Fixed Charge

NonCust = number of nonresidential customers for the month

89. Q. Please describe how the Company proposes to implement the RDM.

A. The Company's proposed RDM will apply to water service. The recovery/credit mechanisms are proposed to be volumetric and apply separately for each customer class. Amounts accrued over the course of the year that will be credited to or collected from customers will be applied in the following year to forecasted sales volumes and a volumetric credit/surcharge will be calculated on a dollar per hundred gallons basis.

90. Q. Are the cost components of the RDM calculation themselves fixed or do they change over time depending on changes in revenue requirements?

A. The cost components of the RDM shown above in Table 7 are fixed and will not change until a future rate case with a different set of revenue requirements and calculations for cost components.

91. Q. What customer classes are included in the Company's proposed RDM?

A. The proposed RDM will apply to all residential and non-residential customers in the General Metered Service ("GMS") rate class.

92. Q. Please describe the Company's proposed method for RDM reporting and reconciliation filings with the BPU.

A. Each month the Company will compare the actual metered revenues for the applicable customer classes to the calculated authorized revenues under the RDM cost component structure. If the actual revenues fall short of the RDM calculation, the difference in the revenue will be temporarily deferred to a regulatory asset account. If the actual revenues are more, the difference would be temporarily deferred to a regulatory liability account.

Then, the Company proposes to make a filing with the BPU on or before January 31 of each year that includes the RDM calculation and support for any annual adjustments to be effective under the RDM tariff. The Board Staff and other interested parties would have 60 days to review. If either a charge or a credit is in order, the reconciliation amount would be charged from April 1 through December 31 for that calendar year.

93. Q. How does the Company propose to treat customer growth through acquisitions in the RDM process?

A. Any acquisitions that are completed by the Company that are not already included in this proceeding will not be included in the proposed RDM until such time that they are included in rate base and revenue requirement calculations in a future proceeding. For any acquisitions that may occur that are not already included in this case, sales and revenues will be tracked separately and excluded from the calculations used to support charges or credits under the Company's proposed RDM.

C. Comparison to Revenue Stabilization Mechanisms

94. Q. Has the Company filed a proposal for a Revenue Stabilization Mechanism ("RSM") in previous rate cases in New Jersey?

A. Yes. The Company included an RSM in its 2019 rate case filing in Docket WR19121516 and its 2017 rate case filing in Docket WR17090985.

95. Q. Are there significant differences between the Company's proposed RDM in this case and the RSM that it has proposed in previous cases?

A. Yes. These differences are listed below:

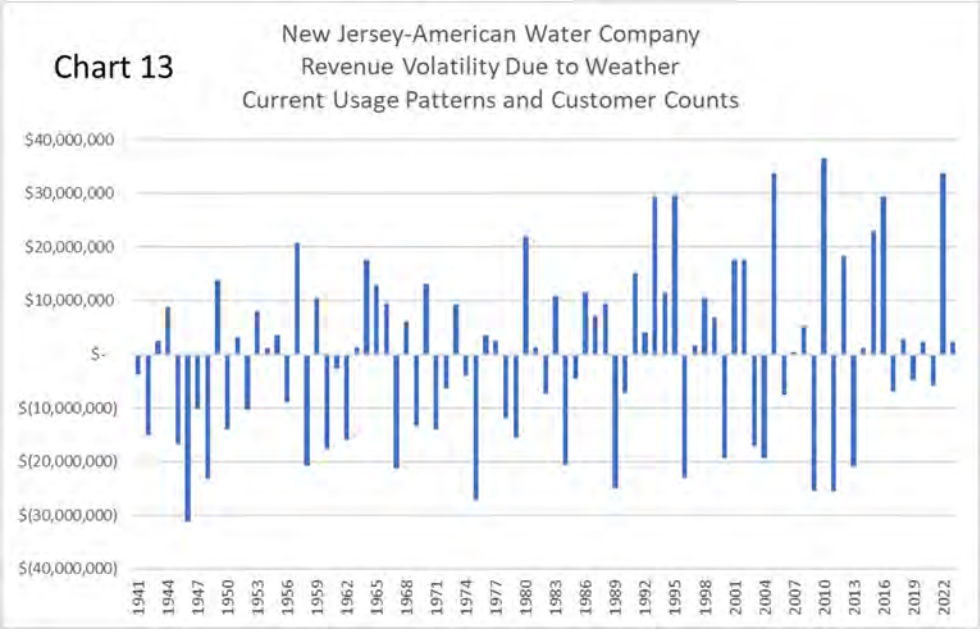
- Proposed RSMs in the past were primarily an accounting tool that is designed to align the Company's revenues going forward (i.e., beyond the conclusion of that proceeding) with the level of authorized revenue ultimately approved by the Board in that proceeding. While there is accounting involved in the Company's proposed RDM, the RDM is much more of a rate design tool that couples the best of rate design principles afforded through traditional rate design with the revenue stability afforded through SFV pricing. The focus on rate design issues in the Company's proposed RDM sets it apart from the RSM proposals the Company has made in the past.
- Proposed RSMs were based on a static revenue requirement to be approved in that case and going-forward comparisons in the RSM compared revenues to that approved static revenue requirement. The proposed RDM in this case is not based on a static revenue requirement. If volumes sold going forward fluctuate up or down, the revenue calculations under the RDM will go up or

down accordingly, but only to the extent that changes in volumes sold cause changes in short-term variable costs. Similarly, if there is customer growth or customer reductions (exclusive of acquisitions), the revenue calculations under the RDM will increase or decrease accordingly based on the approved level of fixed cost per customer required to serve customers as identified in this case.

A. Customer Impacts

96. Q. Do you have a chart that shows the long-term variability that climate has on the Company's revenue stream?

A. Yes. The chart below shows a long-term view of the weather impacts that would have happened year by year assuming the Company's proposed rate design for GMS rates in this case and annual climate conditions in the state of New Jersey going back to 1941.



The chart shows two significant findings. The first is that the combination of changes in summer temperature and precipitation over time is resulting in more weather sensitive usage and weather sensitive revenues, which is shown by the upward trend in the chart. The second significant finding is that fluctuations in revenue due to weather are increasing over time as shown by the fact that the spread of results in later years (the right hand side of the chart) is greater than in earlier years. This chart shows that climate changes from 1941 to the present time are resulting in higher variability of revenues due to weather and more weather-sensitive usage in the Company's service territory.

97. Q. What variability do you expect to see in annual water revenues in the future?

A. An analysis of the historical data shown above shows that in any given year water revenues at the Company's proposed rates in this proceeding can swing from the projected amount by as much as plus or minus approximately $20,000,000 (one standard deviation around normal). A statistical analysis of the data shows that an 80% confidence upper and lower bound around projected annual water revenues is plus or minus $25.7 million. This means that 80% of the time revenues are expected to be within plus or minus $25.7 million of the forecast, but there is a 10% chance that revenues will be more than $25.7 million above the forecast, and a 10% chance that revenues will be more than $25.7 million below the forecast.

B. Public Interest

98. Q. Are there policy concerns among public utility regulators that an RDM addresses?

A. Yes. The National Association of Regulatory Utility Commissioners ("NARUC") has been at the forefront of this issue. At its November 2013 annual meeting, NARUC adopted a resolution, attached hereto as Schedule CBR-7, that supports consideration of alternative recovery mechanisms for water and wastewater utilities. The NARUC resolution recognizes declining use per customer, a shift to non-revenue producing infrastructure replacement and that the traditional cost of service model is not well adapted to this new environment. It states, in part:

> WHEREAS, Traditional cost of service ratemaking, which has worked reasonably well in the past for water and wastewater utilities, no longer adequately addresses the challenges of today and tomorrow. Revenue, driven by declining use per customer, is flat to decreasing, while the nature of investment (rate base) has shifted largely from plant needed for serving new customers to non-revenue producing infrastructure replacement and compliance with new drinking water standards; and
>
> WHEREAS, The traditional cost of service model is not well adapted to a no/low growth, high investment utility environment and is unlikely to encourage the necessary future investment in infrastructure replacement; and
>
> WHEREAS, Compared to the water and wastewater industry, the electric and natural gas delivery industries have in place a larger number and a greater variety of alternative regulation policies, such as multiyear rate plans and rate stabilization programs, and those set forth in the 2005 Resolution; and
>
> WHEREAS, The U.S. water industry is the most capital intensive sector of regulated utilities and faces critical investment needs that are expected to total $335 billion to $1 trillion over the next quarter century, as noted in the American Society of Civil Engineers 2013 Report Card for America's Infrastructure…

The NARUC resolution goes on to recommend the adoption of alternative recovery mechanisms such as the RDM. It states that:

> Alternative regulatory mechanisms can enhance the efficiency and effectiveness of water and wastewater utility regulation by reducing

regulatory costs, increasing rates for customers, when necessary, on a more gradual basis; and providing the predictability and regulatory certainty that supports the attraction of debt and equity capital at reasonable costs and maintains that access at all times.

99. Q. How does a properly structured RDM meet these policy objectives and benefit NJAWC's customers?

A. It is in the long-term best interests of customers for the Company to be able to reliably recover its fixed costs on an ongoing basis. The authorized water revenue requirement approved by the Board in this case represents the amount of revenue the BPU determines that the Company needs to operate, maintain, and invest in its water system in a prudent and efficient manner, the vast majority of the costs of which are fixed in the short term. The ability to reliably recover the Company's fixed cost of providing service to customers improves the Company's ability to plan, manage, maintain, and invest in the facilities necessary to continue providing safe, reliable, and high-quality water service at a reasonable cost to customers, and a properly structured RDM does just that.

100. Q. What percentage of the Company's proposed revenue requirement in this case represents fixed costs?

A. As I stated previously, approximately 95% of the Company's costs are fixed costs, which do not vary depending on how much water our customers use, while approximately 67% of the Company's water service revenues will be collected under volumetric rates under the Company's proposed rate structure in this case, which means that far more revenues than costs will vary up or down depending on how much water our customers use. The fact that more than 60% of the Company's

fixed costs will be recovered through volume-based revenues subjects the Company to significant levels of risk related to recovery of fixed costs.

101. Q. Are alternative regulatory mechanisms such as the RDM recognized in the regulatory community as an effective means of addressing these policy concerns?

A. Yes. Revenue decoupling mechanisms have been adopted in many states to promote several laudable policy goals such as: eliminating the throughput incentive; supporting energy efficiency and conservation initiatives and investment; and aligning actual revenue collection with authorized revenue. Mechanisms similar to the Company's proposal here have been successfully used for some time for water utilities in New York and California and have been more recently adopted for water utilities in Connecticut, Nevada, Maine and Illinois. In addition, similar revenue stabilizing mechanisms have been approved for gas utilities in 23 jurisdictions, according to the December 2016 report from the American Gas Association entitled "Innovative Rates, Non-Volumetric Rates, and Tracking Mechanisms: Current List."[6] This report also states that Weather Normalization Adjustments are allowed in 22 states. A December 2017 report by the Institute for Electric Innovation lists 32 states and the District of Columbia that

[6] An earlier 2013 study by the Brattle Group entitled "Alternative Regulation and Ratemaking Approaches for Water Companies: Supporting the Capital Investment Needs of the 21st Century," prepared for the National Association of Water Companies, (September 30, 2013) found that 27 states for electricity, 30 states for natural gas delivery, and 5 states for water have these types of mechanisms.

have an approved fixed cost recovery mechanism for electric utilities with an additional state pending approval.

102. Q. Are there other benefits to customers from implementation of an RDM?

A. Yes. As I noted, an RDM will eliminate the throughput incentive – the Company's financial incentive to sell more water. Under the current rate structure (without an RDM), the more water customers use, the more water the Company sells, the more revenue the Company collects, and the better the Company's financial performance. Currently, from a public policy perspective, any actions taken by the Company or the government (local, state, or federal) to encourage conservation, no matter how beneficial to society, creates a disconnect between the public policy goal of more efficient use of water resources and the Company's legitimate financial objectives.

This, in turn, allows for a much higher degree of freedom to consider alternative rate designs that can improve affordability and efficiency of use for customers. Freedom to implement rate designs that can improve affordability and improve price signals to different types of customers can come in the form of lower monthly service charges and higher volumetric rates which can help lower income customers and provide a more significant volumetric incentive to use resources more economically. Rate designs that price Basic Water Service differently from seasonal usage can be implemented that can improve affordability across the board for lower income customers and provide better price signals that better reflect cost causation principles for customers that use more water for seasonal discretionary

purposes. Implementing these beneficial alternative rate designs normally could have significant short term and longer-term impacts on usage and revenues that may be detrimental to the Company's legitimate financial objectives without an RDM mechanism, but the associated financial risk to both the Company and its customers is covered under the Company's proposed RDM.

103. Q. Please summarize why adoption of an RDM in this proceeding is appropriate for the Company and its customers.

A. Adoption of the Company's proposed RDM is in the long-term best interest of both the Company and its customers. Rate designs that tie a utility's revenue recovery directly to sales volume have prompted concerns in modern utility regulation that because of seasonal variability and declining use per customer, volumetric rates that collect most of a Company's fixed cost do not give water utilities a reasonable opportunity to recover the fixed costs associated with providing service to customers. An alternative rate design mechanism that couples elements of SFV pricing with traditional rate designs brings the best of both worlds to both the Company and its customers. Implementing this alternative rate design solution: 1) makes the Company indifferent to selling less water; 2) promotes water efficiency and conservation; 3) reduces the adverse impact of weather variability for both the utility and its customers; and 4) reasonably ensures that sufficient revenues for continued investments in the system are available. The result is a better alignment of all stakeholder interests.

NEW JERSEY-AMERICAN WATER COMPANY, INC.

104. Q. Does this conclude your Direct Testimony?

A. Yes, it does.

NEW JERSEY-AMERICAN WATER COMPANY, INC.

Appendix A

1. Q. Please describe your educational background and professional associations.

A. I received a Bachelor of Arts degree in Computer Science from the University of Illinois at Springfield in 1986 and a Master's degree in Statistics and Operations Research from Southern Illinois University at Edwardsville in 1990.

2. Q. What has been your business experience?

A. I have been employed by AWWSC since January 2018 in my role as Senior Director, Rates and Regulatory. Previous to my employment with AWWSC, I was employed by MidAmerican Energy Company from June 1990 through January 2018. I have more than thirty years of utility experience covering a wide range of issues including electric system planning, sales and revenue forecasting, electric load research, marketing, rates, class cost of service, and energy efficiency. Most recently at MidAmerican, I was Director, Energy Efficiency and Regulatory Analytics. In that position, I had responsibility for planning, evaluation, and operational management of MidAmerican's energy efficiency and demand response programs in Illinois, Iowa, and South Dakota, as well as direct responsibility for electric and natural gas sales and revenue forecasting, electric peak demand forecasting, load research, retail pricing of electric and natural gas products, and electric and natural gas cost of service and rate design.