STATE OF NEW JERSEY
BOARD OF PUBLIC UTILITIES

IN THE MATTER OF THE
REVISION OF RATES FILED BY
MIDDLESEX WATER COMPANY
BPU DOCKET NO. WR2305_____

PREFILED TESTIMONY

OF

ROBERT K. FULLAGAR
VICE PRESIDENT - OPERATIONS

MAY 2023

MIDDLESEX WATER COMPANY

STATEMENT OF THE VICE PRESIDENT OF OPERATIONS

TESTIMONY OF ROBERT K. FULLAGAR

Q. PLEASE STATE FOR THE RECORD YOUR NAME, OCCUPATION AND BUSINESS ADDRESS.

A. My name is Robert Fullagar. I am the Vice President of Operations of Middlesex Water Company ("Middlesex," the "Company" or "Middlesex System"), located at 485C Route 1 South, Suite 400, Iselin, New Jersey.

Q. PLEASE STATE YOUR PROFESSIONAL AND EDUCATIONAL BACKGROUND AND EXPERTISE.

A. My professional qualifications and experience are set forth on Appendix A, attached hereto.

Q. ARE YOU FAMILIAR WITH THE ASSETS AND OPERATIONS OF MIDDLESEX WATER COMPANY?

A. Yes. I joined Middlesex Water Company in October 1997 as Director of Distribution. I was promoted to Assistant Vice President in January 2019 and to Vice President of Operations in July 2019. With the various positions I have held within the Company during the past twenty four years, I have supervised, reviewed, and managed elements pertaining to system operations, maintenance and construction; safety compliance and program development; operational risk and resiliency; emergency management and planning; and physical security.

Q. WILL YOU BRIEFLY DESCRIBE THE CUSTOMER BASE, SOURCE OF SUPPLY AND UTILITY PLANT OF MIDDLESEX WATER COMPANY?

A. Middlesex presently serves approximately 61,000 retail customers, primarily in Middlesex County. We serve retail customers in Woodbridge Township, the City of South Amboy, the Boroughs of Metuchen and Carteret, roughly one half of the Township of Edison, roughly one third of the Borough of South Plainfield in Middlesex County and a portion of the Township of Clark in Union County. Middlesex also provides water service to approximately 300 customers in Cumberland County in a system known as the

Bayview System. The Bayview System, although part of this proceeding, is not physically interconnected with the Middlesex System. On a wholesale contract basis, the Company serves an additional section of the Township of Edison, the Borough of Highland Park, the Old Bridge Municipal Utilities Authority, the Marlboro Township Water Department and the City of Rahway. Under a contract with the Township of East Brunswick, Middlesex provides treatment and delivery of East Brunswick's entire water supply. The raw water supply is allocated and purchased by East Brunswick directly from the New Jersey Water Supply Authority (NJWSA).

The Middlesex System, other than the Bayview portion of the Middlesex System, obtains water from three sources: a) raw surface water through the Delaware and Raritan Canal purchased from the NJWSA; b) groundwater from Company-owned wells; and c) purchase of treated water from the New Jersey American Water Company (NJAWC). The entire Middlesex transmission and distribution network functions as an integrated fully interconnected system. An automated and unstaffed raw water intake and pumping station, with auxiliary electric power generation, is located on the banks of the Delaware and Raritan Canal in New Brunswick. This station delivers raw surface water to the Company's Carl J. Olsen Water Treatment Plant (CJO Plant) located in Edison through a 54-inch diameter raw water supply main approximately 5,200 feet in length; and a 60-inch raw water supply main approximately 6,250 feet in length.

The CJO Plant comprises chemical treatment facilities, high rate up-flow clarifiers, ozone contact chambers for primary disinfection, secondary chlorination facilities for disinfection resiliency, mixed media filters with appurtenant wash water and reclamation facilities, filtered water pumps, post treatment chlorination, auxiliary electric power and a Supervisory Control and Data Acquisition System (SCADA). The CJO Plant has a rated total capacity of 60 million gallons per day (mgd or MGD).

The installed pumping capacities of Company-owned wells are as follows:

Location	No. of Wells	Capacity MGD
Park Avenue	15	12

Tingley Lane	9	5.4
Sprague Avenue	2	2.4
Maple Avenue	1	0.9
Total	27	23.1

Detailed below is an approximation of the mix of the source of supply under reasonably 'normal' operating parameters when we have the use of all our sources of supply described above which are used to serve our customers in the Middlesex system:

Surface	74%
Purchased	7%
Wells	19%
Total	100.0%

The Middlesex System has approximately 746 miles of transmission and distribution (T&D) mains, ranging from 4 inches to 48 inches in diameter, and approximately 63,000 meters and 4,800 hydrants in service.

In addition, the Middlesex System has approximately 17 million gallons of distribution storage provided by one 5-million gallon steel reservoir, one 2-million gallon steel standpipe, and one 10-million gallon steel reservoir, all located in Edison. There are four booster stations within the Middlesex System. One (Edison) is used in conjunction with the distribution storage facilities and three (Tingley Lane, Menlo Park and Randolph Avenue) are used to facilitate the purchase of water from NJAWC.

Q. HOW WERE THE PUMPAGE ESTIMATES DEVELOPED AND USED TO DETERMINE THE POWER, CHEMICAL AND RESIDUAL ADJUSTMENTS?

A. Total pumping estimates were developed using a five-year average of total production costs for the entire Middlesex System where the Park Avenue costs are a subset. The five-year average is a compilation of monthly data. The months where Park Avenue was off-line during the GAC upgrade have been removed from the five-year analysis. Monthly data is utilized in order to identify atypical events and to prevent them from

skewing the analysis. For the purpose of these estimates, we utilized the months of January through October spanning 2017 through 2021 and for the months of November and December we used the years spanning 2016 through 2020. The resulting total production cost was then used to develop production estimates for the Company's individual production facilities, namely the CJO Plant and the Company-owned wells. These individual production facility values were then used to determine the costs for power, chemicals, replacement cycle of the granular activated carbon for the new and upgraded treatment process at the Park Avenue Water Treatment Plant (Park Avenue WTP), purchased water for the CJO Plant as well as residuals disposal. Chemical cost estimates include the addition of liquid oxygen, sodium bisulfite and hydrogen peroxide as these treatment chemicals are associated with the operation of the ozone treatment system at the CJO Plant and the granular activated carbon treatment system at the Park Avenue WTP.

Q. WHY WAS IT NECESSARY TO INSTALL GRANULAR ACTIVATED CARBON TREATMENT AT THE PARK AVENUE WTP?

A. The construction and installation of a Granular Activated Carbon (GAC) water treatment system at the Park Avenue WTP was necessary in order to comply with recently-promulgated New Jersey Department of Environmental Protection (NJDEP) regulations pertaining to perfluoralkyl and polyfluoroalkyl chemicals (PFAS), in the Park Ave. situation, mostly PFOA. Specific information on that construction project is provided in the pre-filed testimony of Mr. Brian Carr. I am providing support testimony for the operations costs associated with the GAC system as well as the operations impact of both having the Park Ave. wellfields off line for some time over the last few years as well as how Middlesex intends to operate once the Park Ave. wellfields come on line and are being treated by the WTP..

Q. CAN YOU GENERALLY EXPLAIN THE PROCESS THAT LED TO THE DECISION TO INSTALL THE GAC SYSTEM?

A. The NJDEP PFAS regulations, specifically with regard to perfluoroctanoic acid (PFOA), became effective on January 1, 2021. Under these new DEP regulations, a maximum contaminant level (MCL) of 14 parts per trillion (ppt) established for PFOA was set to be

measured based on a running annual average of quarterly reports to be submitted to the NJDEP under the new rule starting in 2021.

Prior to 2020, Middlesex became aware, informally, that the NJDEP was considering establishing new, and significantly stricter, PFAS regulations. It was not known at that time what any new MCLs under such a regulation might be or, whether and when the NJDEP might promulgate such a regulation. The Company had been monitoring the PFOA level at the Park Avenue wellfield for a number of years as required under the U.S. Environmental Protection Agency's Unregulated Contaminant Monitoring Rule 4 (UCMR4). It was determined that any potential regulation which might ultimately be more restrictive than the levels of PFAS we had been encountering in our raw well water under UCMR4 would require significant investments in additional treatment capability at that source of roughly 20% of our raw water supply.

Knowing that in the event Middlesex decided that construction of a treatment addition at the Park Avenue WTP was the best option to address PFAS levels, such a project would take multiple years to complete and the specifics of that project would vary based on a myriad of factors including, but not limited to, the new regulations, the water testing results, the engineering analysis of the requirements of our design and operation of the system, and the various options of what changing regulations might occur over time. Many of these considerations might be unknowable during this period, but any responsible water supplier had to consider as many of these factors as we could.

A pilot study was undertaken to evaluate various treatment alternatives relative to quality and cost. Middlesex first commenced planning for such a pilot study in early 2019. Although the NJDEP did not issue any formal announcement of proposed MCLs as of that time, it became more commonly-believed within the water utility industry that any proposed MCLs would be significantly more aggressive than the levels then-detected by the Company. Middlesex subsequently determined that the construction of a new treatment process at the Park Avenue WTP to address the anticipated PFAS levels was the most prudent alternative given the significant water supply provided by the Park Avenue wellfield at 12 MGD, which constitutes approximately 20-25 percent of the Middlesex System's overall water supply. The Company therefore, set out to plan, design

and construct the new treatment process at the Park Avenue WTP as far as responsible in advance of when the promulgation of these new, aggressive NJDEP regulations would be effective.

Q. HOW WAS THE ESTIMATE DEVELOPED FOR THE REPLACEMENT OF GAC AT THE PARK AVENUE WTP?

A. The unit cost to replace the GAC in a single vessel is based on the design Engineer's 2019 estimate of $60,000 per vessel. There are twenty (20) vessels in the GAC system at the Park Avenue WTP. The estimated annual GAC system replacement cost of $600,000 is based on the Company's current experience with PFOA "break-through" at designated sample ports corresponding to 25%, 50% and 75% of the GAC bed within the four vessels the Company had installed, with NJDEP approval, as a temporary treatment solution subsequent to the MCL's becoming effective but prior to completion of the upgrades to treat the entire 12 MGD supply. These four vessels used for the temporary treatment solution are now being incorporated as part of the twenty vessels required for the current solution.

Q. DID YOU PROVIDE THIS WATER PRODUCTION INFORMATION TO THE COMPANY WITNESS SPONSORING AN EXHIBIT REPRESENTING THE PRO FORMA INCOME STATEMENT FOR THE ADJUSTED TEST YEAR LABELED P-5

A. Yes. The information on Exhibit P-5, page 3 includes pro forma purchased water volumes for untreated or raw water from the NJWSA and treated water from the NJAWC.

The electricity costs shown on Exhibit P-5, page 5 include a projected increase of 33% or $241,140 for the Park Avenue WTP. The projected increase is based on the fact that the GAC requires a third pumping stage where in the past there were only two pumping stages; 1) raw water delivered to the treatment process from the wells and, 2) finished water delivered to the system from the high-lift pumps. The introduction of GAC required an intermediate (or third) pumping stage to the process in order to push the partially treated water through the GAC vessels. Pumping within an individual site can and does vary depending on the configuration and head pressure. The electric usage to pump the wells is much lower than that of the high lift pumps because the wells are

pumping against a much lower head pressure. Whereas the high lift pumps are pumping against a much higher head pressure. The intermediate pumps needed for the GAC vessels will be similar to the well pumps in terms of head pressure. The well pumping is roughly 1/3 of the electric costs and the high lift pumps are the remaining 2/3. On this basis we believe a 33% increase in electricity consumption and cost is appropriate.

The chemical costs shown on Exhibit P-5, page 6 are based on anticipated dosages, expected average production by facility and the unit costs based on the chemical bids received.

The residuals disposal costs shown on Exhibit P-5, page 7 include a projected increase in 2023 as it pertains to the GAC system. Edison Township notified the Company on April 21, 2023 that there will be no increase in the rates charged to accept, treat and dispose of residuals coming from the CJO Plant in Edison. The Borough of South Plainfield has yet to notify the Company of the actual unit rate for residuals disposal associated with the Park Avenue WTP. The residuals disposal costs to be imposed by South Plainfield have been estimated to be $10,335. This figure is based on the Borough's rate schedule for industrial users, the design Engineer's estimated quantities of waste flow per vessel and actual sample data for biological oxygen demand (BOD), suspended solids (SS) and chlorine demand. As stated previously, this is a new discharge and the Company has no history with which to definitively project these costs. As we update the data on South Plainfield's charges and get more experience with the operating results of how much residual will be produced, we will update the parties in this proceeding.

Q. CAN YOU DESCRIBE THE INDUSTRY-WIDE CHANGES IN THE DEMOGRAPHICS OF THE WORKFORCE WITH RESPECT TO THE LEVEL OF WORKER EXPERIENCE AND HOW THAT IS IMPACTING MIDDLESEX?

A. As I testified in the last Middlesex rate case, employee retirements and the associated loss of significant institutional knowledge is creating more and more challenges with respect to maintaining our high levels of operational resiliency and overall customer service. The ratio of heavily experienced-to-a lesser experienced workforce has shifted over time to reflect proportionally less experienced workers. And, what was once a more gradual shift is shifting at an accelerating pace due to the retirements in greater numbers of the post-

World War II baby boom generation. Based on current job descriptions of entry to mid-level supervisors, the Company's experience is showing above average performances being reflected in our employees with 5 to 10 years of service. Those more experienced employees also seem to have more of a successful ability to manage increasing levels of responsibility.

In the early 2000's Middlesex's ratio was approximately 30:1. In 2017, this ratio was approximately 10:1. At present, the experienced-to-lesser experienced ratio is at 1:1 and we anticipate this ratio continuing to trend downward as the quantity of less experienced workers continues to grow as the more experienced workers continue to retire.

Experience also demonstrates that this situation is being exacerbated by the fact that all utility sectors (electric, gas and water) and contractors seem to be competing for a diminishing pool of experienced and even non-skilled resources.

This factor is making it more challenging to attract, recruit and retain experienced treatment plant operators, mechanical maintenance staff, laboratory technicians, front-line supervisors and network (T&D) repair crews. The Company invests several weeks of initial safety and skills training on new employees, followed by successive skills development training over several months to increase the versatility of these individuals to perform a variety of required operational and supervisory tasks. Our overarching objective is to enable the Company to continue to allocate resources expeditiously and effectively where the inherent risks associated with certain operational functions are highest.

Q. HOW HAS THE COMPANY RESPONDED TO THE CONTINUING CHALLENGES PRESENTED BY THESE CHANGES?

A. The shift in the ratio of experienced-to-lesser experienced personnel mentioned above and the associated loss of institutional knowledge within our workforce has increased the need to place significantly greater emphasis and provide more safety and skills training of our growing number and proportion of less experienced personnel. In order to develop, evolve, maintain and continually deliver safety and skills training, the Company is in the process of creating a Control Room Simulator for our treatment plant control room Operators. Much like a flight simulator used by new airline pilots, the Control Room

Simulator will be used by new hires to propel their skills development and shorten the learning curve as capable and competent treatment plant control room Operators. The Company also confirmed through COVID 19 that the most critical function within the operating divisions of a water utility is the sustainability of the water treatment process and that this vital function resides in the control room. We also learned that this is the one and only functional area where the Company cannot readily obtain the requisite services from an external consultant, contractor or vendor. In order to develop the necessary control room resiliency, the Company is looking to our laboratory personnel to support this vital function as a secondary duty. Similar to the model utilized by electric utilities where personnel have designated "storm duties" that align with, but that are not necessarily, their normal day-to-day functions; the Company is applying this resiliency strategy to the water treatment plant control room. In order to develop a bench of additional personnel capable of performing these secondary duties, the Company is hiring one additional Instrumentation Water Quality Technician and has hired an additional Water Quality Technician III. As a corollary benefit, these new positions will help the Company keep up with the pace and frequency of both regulatory-required water quality sampling/analysis and process control sampling/analysis within our own NJDEP certified laboratory. Combined with the reality that the additional training commitment I have discussed above will take time from our employees' other responsibilities, these personnel additions are vital.

Maintaining the current state of water quality related sampling and compliance is expected to allow the more senior and experienced laboratory personnel additional time necessary to develop the skills and knowledge required to provide the resiliency in the control room operations. The Company is also hiring two (2) full time Operators specifically for the Park Avenue WTP. These positions will perform regular process control monitoring through sampling of the GAC system for breakthrough, they will control the lead/lag status of the GAC vessels based on the sample analysis and they will perform the carbon removal, replacement, flushing and arsenic sampling of the replacement GAC in all of the twenty (20) large diameter GAC vessels as needed in order to keep them in service. The two Operators will also perform other duties at the wellfield

such as managing the flows through the GAC vessels so as not to exceed their daily rated capacity and they will periodically change the 500 pound, bag filters for pre-GAC treatment. This new step has been implemented so as to protect the GAC media and will thus prolong the life of the GAC. Lastly, these additional positions will perform treatment equipment inspections, equipment service, infrastructure repairs, buildings/grounds maintenance, and site security activities to keep the facilities operating at peak efficiency. The labor and benefits costs for the above positions has been included as adjustments to the Test Year as shown on Exhibit P-5, pages 9 and 11. Ms. Tilley has also sponsored testimony on the mathematical calculations for the impacts of these various positions.

Q. HAVE YOU SPONSORED PROPOSED NON-RATE CHANGES TO THE MIDDLESEX WATER COMPANY TARIFF FOR WATER SERVICE (TARIFF)?

A. Yes. The Company is proposing to revise or add:

- Sections 7.1, 7.13, 10.8 and 12.2. Sections 7.8, 7.9, 7.10, 10.2 and 10.3 to reference the need for a NJDEP Physical Connection Permit.
- Section 2.5 to clarify that applications for water service shall expire after one year from the original date of application if it is not acted upon by the Applicant.
- Section 7.12 to reference 30 days for a Customer to repair a non-emergency leak.
- Section 7.14 has been added to require that backflow prevention test results be submitted to the utility in accordance with the Middlesex Cross Connection Control Program and the NJDEP Physical Connection Permit. Furthermore, the Company is also requiring that the Certified Backflow Protection Tester shall also confirm, in writing, to the W4 Licensed Operator of the Company, that there are no un-metered and therefore no un-protected connections attached to the Customer's connecting pipe(s) upstream of the backflow preventer and meter.
- Section 14.2.1 had previously referenced local newspaper circulation. It has been updated to state that the Company will post information on its website, issue calls to customers directing them to the website URL, post to social media and work with local municipalities to notify residents.

A marked copy of the Tariff with these proposed edits or additions has been filed as part of the Petition at Exhibit A.

Q. MR. FULLAGAR, DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes it does.

PROFESSIONAL QUALIFICATIONS

~ *ROBERT K. FULLAGAR, P.E.* ~

SUMMARY OF QUALIFICATIONS

Over 30 years of diverse experience in water supply/wastewater utility operations management, subsidiary executive administration and consulting engineering. Expertise in areas including but not limited to infrastructure resiliency; regulatory compliance; operational risk management; emergency management; business continuity program development and implementation; development of resiliency and security best practices; asset management and system rehabilitation.

EXPERIENCE

Middlesex Water Company (2019 to present) – Vice President of Operations

Establishes the vision in accordance with the core values of the Enterprise and develops strategic plans to drive performance and achieve all levels of compliance within the regulated operating units and the unregulated business units. Oversees and administers the operation, maintenance, rehabilitation and construction of water and wastewater infrastructure associated with the entire operations portfolio. Responsible for the operating expense budgets and capital project delivery across the Enterprise.

Emergency Management and Security Committee Chair (2005 to present)
Safety Committee Chair (2011 to present)

Directs and administers corporate functions relating to operational resiliency, safety, security, emergency management and business continuity.

Middlesex Water Company (1997 to 2018) - Director of Distribution

Directs and administers the operation and maintenance of infrastructure associated with the transmission and distribution (T&D) network, retail/wholesale customer meter management, field services, T&D network construction, capital improvement planning and program implementation, fleet and building maintenance management/administration.

Utility Service Affiliates (2019 to present) – Subsidiary President
(2009 to 2018) - Subsidiary Vice President of Operations

Utility Service Affiliates is a wholly-owned, unregulated subsidiary of Middlesex Water Company. Provides executive-level administration and oversight of subsidiary business functions associated with utility operation and regulatory compliance contracts for the Borough of Highland Park and Township of Monroe.

Twin Lakes Utilities, Inc. (2019 to present) – Subsidiary President
(2009 to 2018) - Subsidiary Vice President of Operations

Twin Lakes Utilities, Inc. is a wholly-owned, regulated subsidiary of Middlesex Water Company. Provides executive-level administration and oversight of subsidiary business functions including but not limited to regulatory compliance, capital program development/delivery, rate case proceedings and utility operations.

U.S. Water L.L.C (1994 – 1997) - Senior Project Manager, Project Manager

Managed the utility operations, regulatory compliance, capital and expense budgets; associated with potable water and sanitary wastewater systems at various municipalities in New Jersey, including but not limited to those in North Brunswick Township and Howell Township.

CFM Associates, Inc. (1990 - 1994) - Staff Engineer

Performed engineering analysis, evaluation and design associated with potable water treatment/distribution and sanitary wastewater treatment/collection projects.

Killam Associates, Inc. (1989-1990) - Staff Engineer

Performed engineering analysis, evaluation and design associated with hazardous waste remediation projects.

PROFESSIONAL LICENSES, QUALIFICATIONS AND AWARDS

New Jersey Professional Engineer (#39457) 1995
Pennsylvania Professional Engineer (#050207) 1995
New Jersey Water Treatment Plant Operator, Classification T4 (#20380) 1998
New Jersey Water Distribution System Operator, Classification W4 (#19108) 1998
New Jersey Wastewater Collection System Operator, Classification C2 (#15373) 1995
New Jersey Industrial Wastewater Treatment Plant Operator, Classification N2 (#4681) 1993
Pennsylvania Waterworks Operator, Classification WA1 (#W8072) 1996
Pennsylvania Sewage Treatment Plant Operator, Classification SA1 (#T2043) 1996
U.S. Department of Homeland Security – SECRET Level Clearance
New Jersey Incident Management Level 3 Certification
New Jersey State Firefighter II
Lead NJ Fellow - Class of 2015
American Water Works Association – New Jersey Section, 2016 Meritorious Operator Award

PROFESSIONAL AFFILIATIONS

- New Jersey Office of Homeland Security and Preparedness - Infrastructure Advisory Committee (IAC) Water and Wastewater Systems Sector Chair (2016 to present)
- New Jersey Utility Association – Operations Committee, vice Chair (2014 to 2022)
- New Jersey Section American Water Works Association – Licensed Operator Committee (2016 to 2019)
- American Water Works Association
- American Society of Civil Engineers
- National Fire Protection Association
- ASIS International

EDUCATION

B.S. Civil Engineering - New Jersey Institute of Technology, Newark, New Jersey