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 MODIFICATIONS

BPU Docket No. WR1709____

DIRECT TESTIMONY OF

DONALD C. SHIELDS

Exhibit PT-3

NEW JERSEY-AMERICAN WATER COMPANY, INC.

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

A. My name is Donald C. Shields, and my current business address is 1025 Laurel Oak Road, Voorhees, New Jersey 08043.

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

A. I am employed by the New Jersey American Water Company, Inc. (hereinafter referred to as "NJAWC" or the "Company") as Vice President and Director of Engineering.

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

A. My present responsibilities include managing the engineering and capital programs for NJAWC, consisting of planning, design and construction engineering activities.

4. Q. What are your educational background and professional registrations and affiliations?

A. I earned a Bachelor of Mechanical Engineering degree (1991) from Villanova University, Villanova, Pa. I am a registered Professional Engineer in the State of New Jersey and am currently licensed in an inactive status in multiple states including Pennsylvania, Ohio, New York, Missouri, Maryland and Delaware.

5. Q. Please describe your professional experience.

A. I have over twenty-six years of experience in the water and wastewater utility engineering field. From 1991 to 2001, I was employed by the Bergen County Utilities Authority ("BCUA") in various engineering positions of increasing responsibility

including, Assistant Engineer and Senior Environmental Engineer where I designed, managed and commissioned multi-disciplined wastewater infrastructure projects. I led projects that were focused on operational efficiency and data collection along with significant plant and collection system improvements. Some examples include:

- Upgrade of all of the BCUA's open channel flow metering equipment.
- Management of permitted overflow level monitoring
- Replacement of 42" PCCP Force Main
- Rehabilitation of 12" Gravity sewers with fold and form lining technology
- Treatment plant additions including addition of Sludge thickening centrifuge and associated equipment; polymer feeds, electrical equipment and controls
- Replacement of Waste Activated Sludge Pumping System

From 2001 through 2011 I was employed by Applied Water Management Inc. ("AWM"), where I worked in various positions of increasing responsibility from staff engineer to Design Build Director (Company Officer). I also held a position of Officer and Director on the Board of Applied Wastewater Management, Inc. ("AWWM"), a New Jersey Board of Public Utilities ("BPU" or "Board") -regulated subsidiary of AWM. Much of my experience at AWM was in design construction and operations of small, decentralized water and wastewater treatment facilities. My work included responsibility for complete design, construction and facility commissioning for Integrated Biological Membrane Filtration Plants for sewage treatment and discharge to ground water. These plants were designed for strict groundwater discharge limits (Nitrogen) and allowed for a high degree of automation

for continuous unattended operation. Water systems design and construction included well stations with treatment (air stripping, disinfection) and distribution equipment (hydro pneumatic tanks, pumping systems, fire flow systems).

AWM was a subsidiary company of American Water Works Company, Inc. ("AWW") until 2011. Upon the completion of the sale of AWM in December 2011, I took a position with AWW as an engineer with the American Water Works Service Company, Inc. ("AWWSC"). I held a Director of Engineering position, primarily supporting business development activities as a technical expert. I also provided engineering support and leadership for various strategic initiatives including wastewater growth opportunities and water/wastewater system planning and infrastructure renewal. I assumed my current position as Vice President- Engineering for NJAWC in January of 2014.

6. Q. Have you previously participated in regulatory matters?

A. Yes. I have previously submitted testimony on behalf of NJAWC in the Company's base rate case application in BPU Docket No. WR15010035. In addition, I have previously submitted testimony on behalf of AWWM in the Company's rate applications in BPU Docket Nos. WR08080550 and WR03030222. My primary responsibility in those proceedings had been in support of capital construction additions.

7. Q. Are you familiar with the properties and business of NJAWC?

A. Yes.

8. Q. What is the nature of your testimony?

A. The purpose of my testimony is to (1) describe utility plant additions that have been closed to utility plant in service ("UPIS") since the Company's last base rate case filing, effective September 21, 2015, through September 30, 2018, and the UPIS that will be closed and providing service to our customers, including $243.7 million of DSIC-eligible plant additions and $624.5 million of other plant and infrastructure additions; (2) outline some of the major challenges and capital plan priorities in NJAWC's four operating areas; (3) review the Company's most recent projects including those related to asset hardening and resiliency; (4) highlight the Company's plans to address emerging environmental regulations and issues; (5) discuss the Company's engineered coating of steel structures (tank painting) program and requirements, including the need for a modern, consistent ratemaking approach to support systematic investments in these critical assets; (6) support the testimony of Kevin Kirwan, and Thomas Shroba regarding the Company's non-revenue water ("NRW") initiative; (7) Discuss the Company's acquisitions of Haddonfield Water and Wastewater Systems and Shorelands Water Company; (8) present the Company's proposal for the replacement of customer-owned lead service lines within its service territory; and (9) discuss the challenges posed by the simultaneous trends toward lower per-capita annual consumption and higher seasonal peak demands.

9. Q. Are you familiar with the projects detailed on Schedule DCS-1, which are utilized in developing the pro forma UPIS shown on Schedule DCS-1?

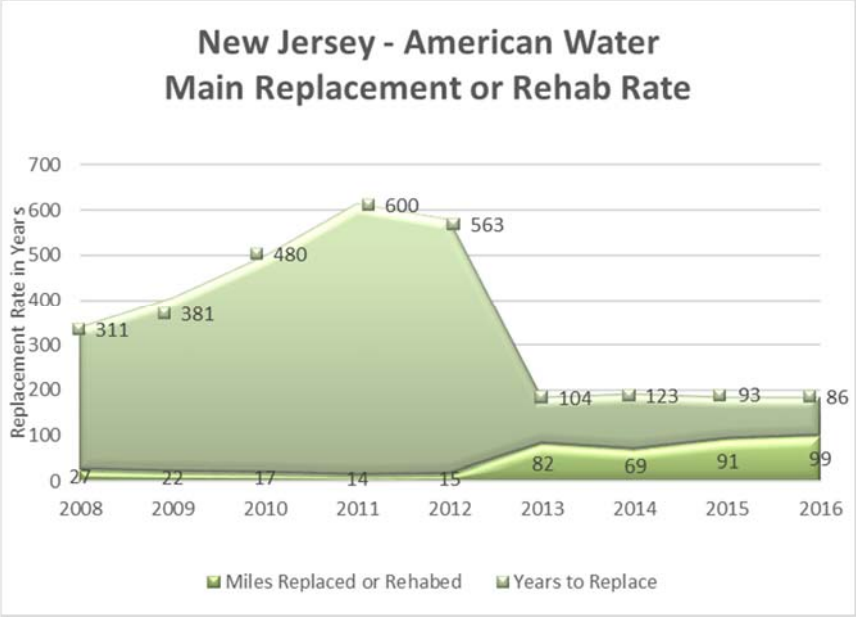
A. Yes. The total additions to UPIS since the Company's last base rate case filing, effective September 21, 2015, through the post-test year of September 30, 2018 in this proceeding is $868.2 million. These projects placed into service since the last base rate case were considered as additions to UPIS and are presented by Company Witness Simpson in his direct testimony, Exhibit PT-4. The UPIS projects placed in service between April 1, 2017 and September 30, 2018 and included on Schedule DCS-1 are segregated into two primary categories as follows: (1) major investment projects and; (2) ongoing major recurring investment, which includes the Company's DSIC program.

10. Q. Please discuss the category described as ongoing major recurring investment.

A. This comprises the Company's investment in the following: the reinforcement/rehabilitation and replacement of water mains (including customer service connections), sewer mains, hydrants and valves; the installation of new and replacement water meters; office equipment; transportation equipment; general equipment; laboratory equipment and other miscellaneous equipment and routine capital items. This category also includes construction performed under main extension agreements with developers. All of the investment for recurring projects is expected to be completed and in service by March 31, 2018. The Company's DSIC program investment is included in this general category. Please note that the revenues associated with the DSIC additions are included in the Company's pro forma present rate revenues as presented in the direct testimony of Company Witness DeStefano, Exhibit PT-5.

11. Q. Has the Company utilized DSIC to increase its rate of eligible distribution system rehabilitation and replacement?

A. Yes. Prior to the DSIC regulations, the Company replaced or rehabilitated, on average, about 15-20 miles of main each year. Of course, to minimize the impact of regulatory lag, while still providing safe, adequate and proper service, in some years the Company would renew more and in some years fewer, and the main renewal rate was between 300 and 600 years (please see chart below). However, since the DSIC program started, the Company has been able to efficiently and cost-effectively renew between 80 and 90 miles of main per year, which is driving the renewal rate down significantly. The DSIC program has allowed NJAWC to achieve and even exceed a renewal rate of about 100 years, or 1 percent.



12. Q. What is the current status of the Company's DSIC program?

A. All of the projects the Company has submitted in its DSIC surcharge filings are in service and used and useful. The Company is asking the Board to approve the inclusion of those projects in the rate base that is set in this proceeding. As Company Witness DeStefano states in his direct testimony, the Company has also requested that the DSIC revenues be "rolled into" base rates and the DSIC surcharge be reset to zero. The Company will soon be filing a separate Foundational Filing to be reviewed concurrently with this rate proceeding, in order to allow for that Foundational Filing to be approved and become effective concurrent with the conclusion of this base rate case.

13. Q. What modifications would you recommend to the DSIC program to make it more effective?

A. While we are not proposing any changes to the DSIC program, regulations or processes as part of this rate case, we will shortly be filing a new Foundational Filing. The recently revised rules (or applications thereof) regarding the surcharge reset, timing of Foundational Filing approval, and surcharge periods will help to mitigate some awkward timing situations for companies attempting to maintain a consistent level of activity in the DSIC program. In addition, expanding the eligible asset classes, particularly to wastewater (as in Pennsylvania) and raising the cap are other modifications that would enhance the DSIC mechanism and should be considered by the Board. It is noteworthy and encouraging that the Board, at its recent June 2017

meeting directed Staff to explore expanding the asset classes to include, or create a new program specific to, wastewater.

14. Q. You have stated that the remaining category of utility plant additions was for investment projects. What are the utility plant additions that will be completed on or before March 31, 2018?

A. Listed below are several of the larger utility plant additions that will be placed into service on or before March 31, 2018, and are included for recovery in this base rate case proceeding. Please see Schedule DCS-1 for a complete listing of the projects included within this base rate case proceeding.

- Haddonfield – Atlantic Avenue Sewer Lift Station
- Haddonfield – Coles Mill Sewer Lift Station
- Millburn – Wyoming Reservoir Number 2 Tank Roof Rehabilitation
- Galloway – High Service Gradient
- Lakewood – Teaberry Court Sewer Lift Station
- Little Silver – 36-inch Cast Iron Water Transmission Main Replacement – Rumson Place
- Delran – WTP Chlorine Gas Conversion Project
- New Egypt – Well and Treatment System
- North Operating Area – Automation and Controls Upgrades, Phase 2
- Raritan Millstone WTP – Phosphoric Feed Improvements
- Howell-to-Lakewood Transmission, Phase I
- Southwest Operating Area – Automation and Controls Upgrades, Phase 2
- Washington/Oxford – Oxford Station Treatment Upgrades
- Asbury Park – Main Replacements (Route 71)
- Mt. Holly – Cleaning and Lining, Phase 2
- Lakewood – Operating Center Relocation, Phase I

15. Q. What are the utility plant additions that will be placed into service on or before September 30, 2018, the end of the post-test year period in this proceeding?

NEW JERSEY-AMERICAN WATER COMPANY, INC.

A. Listed below are descriptions of the larger post-test year additions that will be placed into service on or before September 30, 2018. Schedule DCS-1 provides complete listing of the post-test year projects, which are also listed and described in detail below:

- Howell - Oak Glen Water Treatment Plant Expansion
- Rumson-Sea Bright Transmission Main
- Raritan Millstone Water Treatment Plant - Raw Water Pumping Improvements
- Lakewood - Sunset Road Sewer Upgrades
- Lakewood - Sunset Road Water Treatment Plant Expansion
- Short Hills - Permanent Canoe Brook Volatile Organic Compound Treatment System
- Lakewood - Oak Street Treatment Improvements
- Raritan Millstone Long Term Flood Control
- Somers Point - South Linwood Station-Well Improvements

Howell - Oak Glen Water Treatment Plant Expansion

The existing Oak Glen Water Treatment Plant (OGWTP) is located in Howell Township, NJ and provides finished water to the Coastal North System in the Monmouth Main and Lakewood/Howell service areas. The current treatment plant consists of four treatment trains, which have a combined capacity of 10 MGD. Recent, rapid population growth in the Lakewood area has resulted in the need for this plant expansion.

The existing plant was designed and built with provisions for a future expansion, which will allow the existing plant to remain in service during construction to continue meeting current system demands. The expansion, from a reliable capacity of 8.0 MGD to 15.0 MGD, includes the following: two additional dissolved air floatation (DAF) treatment trains; four new granular activated carbon filters; an

additional distributive pump; installation of a third backwash clarifier to manage the residuals from the new filters; a new standby generator capable of supplying power to the entire expanded facility; upgrades to the chemical feed/electrical/instrumentation/control system; and a pole barn storage structure to allow for safe storage of the production group's spare parts/equipment.

As part of this project, certain equipment and controls within the existing plant will be replaced to improve efficiency and ensure consistent instrumentation and operation and maintenance practices throughout the entire plant. The new assets will be more energy efficient than the existing facilities. The new water treatment process will be able to consistently and reliably produce finished water at the reliable capacity of the plant.

Rumson-Sea Bright Transmission Main

Description: Approximately 400LF of 18-inch PCCP transmission main located beneath of the Shrewsbury River risked failure due to age and deterioration from brackish water. It is the primary feed to Sea Bright, and during events where the 36-inch transmission main from Newman Springs is out of service, the Rumson-Sea Bright main provides redundant service to Rumson. NJAWC collaborated with the Boroughs of Rumson and Sea Bright to directional-drill 440 Linear Feet (LF) of the sixteen (16) inch High Density Polyethylene (HDPE) transmission main forty five (45) feet under the bottom of the Shrewsbury River. In addition, the project included 1,800 LF of distribution mains, which were installed to feed Rumson and Sea Bright customers. Some highlights from this project are as follows: NJAWC completed

these tasks before the height of the summer season at the shore, pleasing the Boroughs. NJAWC also coordinated with New Jersey Natural Gas Company to share and coordinate contractors, traffic control, paving costs, thus further controlling costs and working to complete a complex project in an efficient and timely manner. See project photos below:

Raritan Millstone Water Treatment Plant - Raw Water Pumping Improvements

The Raritan Millstone WTP Facility Master Plan (RMWTP FMP) included many recommendations for replacing aged equipment in the low lift pumping station. In 2010, the RMWTP FMP identified various facility improvements to replace aging equipment and structures, increase plant efficiency, and provide additional operational flexibility to accommodate variations in raw water quality. Originally built in 1929, the low lift pumping station at the RMWTP has gone through several phased expansions to meet increasing water demands and regulatory standards. The facility has aging equipment where consistent reliability is becoming an issue, thus, there are opportunities for Low Lift Pump Station efficiency improvements.

Work at the low lift station will include the following:

- Replace inefficient pumps and motors. The current low lift pumps and motors are aging, with some dating back to 1930s and 40s. They require frequent, costly maintenance. These pumps were also rated as inefficient during a recent EUI study.

- Replace suction and discharge piping and appurtenances for all pumps except for P8 and P9, which are newer. The station has very limited options for isolation of pumps for maintenance due to lack of isolation valves. Multiple pumps were affected when isolating some pumps from the discharge side. The valves are necessary to isolate individual pumps for both replacement and future maintenance.

- Perform SCADA and instrumentation upgrades to the station, including pumps and chemical feed systems. SCADA upgrades are included with this project instead of within a separate SCADA project in order to avoid operational interruptions. These upgrades will eliminate the existing mechanical controls (switches/ push buttons) and multiple operating consoles/screens. The new HMI screen will simplify operation of the station.

- Expand the control room to enhance safety and ergonomics. The added space will provide better accessibility to the control room and movement within the room. It will also create a separate laboratory area essential for raw water quality assessment.

- Perform electrical upgrades (installation of Variable Frequency Drives (VFD's)) associated with new pumps. The service voltage of a portion of the existing 4160V electrical system will be stepped down to 480V to increase efficiency. VFD's will be added to two of the pumps for flexibility in meeting raw water demands.

Lakewood - Sunset Road Sewer Upgrades

The Sunset Road sewers are located in Lakewood Township (LW Basin 3) and have been an area of concern due to significant housing and commercial development that has occurred within the basin, which has led to increased wastewater flows. For some time, there has been a restriction on development in parts of this basin due to limitations in the available capacity of the Sunset Road sewer mains. The majority of the development elsewhere in Basin 3 has been occurring over several years. The sewers in Sunset Road increase to 20 inches between Powderhorn Drive and the inverted siphon, which conveys flow under the Watering Place Branch of the Metedeconk River via 10-inch, 12-inch and 16-inch siphon pipes. Flows continue through 24-inch sewers in Caranetta Drive, Kimball Road, and South Lake Drive and then discharge to the Ocean County Utilities Authority (OCUA) interceptor sewer located in South Lake Drive east of Davis Road.

NJAWC has experienced high flow conditions in this area that have led to customer complaints from blockages, odors and other flow-related issues. In addition, the existing trunk sewers are undersized and place NJAWC at risk of sanitary overflow conditions, which in turn place our customers at risk. The work completed under this

project will replace undersized sewers to allow for adequate flow conditions both now and into the future planning horizon of 20 years. The project will include replacement of sewers currently ranging in size from 8-inch diameter to 24-inch diameter, with new sewers ranging in size from 18-inch diameter to 36-inch diameter.

Lakewood - Sunset Road WTP ("SSRWTP") Expansion

This project is currently under construction. The Coastal North System has a reliable maximum day supply deficit. NJAWC has an approved allocation to operate both Sunset Road Well No. 10 and the proposed Well No. 17 simultaneously, for a total capacity of 3.9 mgd. The current capacity of the SSRWTP is 2.16 mgd. Expanding the SSRWTP will increase the reliable maximum day capacity in the system and allow NJAWC to fully utilize the water allocation limits.

The SSRWTP consists of a circular clarifier, three pressure filters, an above-grade clearwell, chemical storage, a low service pump, and three distributive service pumps (at a capacity of 2.16 mgd, 1.73 mgd, and 1.0 mgd). The treatment plant treats water that is pumped from Sunset Road Well No. 10 (currently pumping at 1,000 gpm). The work at the individual wells includes the following:

- Well No. 10 was redeveloped under Phase I of the project to increase rated capacity from 1,000 to 1,500 GPM (permitted withdrawal rate).

- The addition of Sunset Road Well No. 17 under Phase II of the project (at a capacity of 1,200 gpm), which will serve as a backup well to Sunset Road

Well No. 10 due to the current treatment restrictions. With expansion of the treatment plant, SSRWTP will be able to treat approximately 4 mgd.

The executed project work also consists of expanding the SSRWTP to treat the water from both Sunset Road Well No. 10 and Well No. 17. The plant expansion will consist of the following work:

- Two 2.0 mgd plate settling clarifiers to replace the existing 45 foot diameter circular clarifier. The new clarifiers should be approximately 10 feet wide by 45 feet long.
- Two new low service pumps, each capable of 3.9 mgd. This will provide redundancy in case one low service pump is out of service.
- Two new pressure filters, each at 8 feet in diameter and 25 feet long (same as existing filters). The new filters are housed in a new expansion to the existing filter building.
- Three new distributive pumps, each with a capacity of 2.0 mgd, for a total reliable pumping capacity of 4.0 mgd. The new pumps should have similar total head as the existing pumps.

These improvements will increase the plant capacity from 2.16 mgd to 3.9 mgd, providing an additional 1.73 mgd to the reliable maximum day capacity of the Coastal North System. This will also allow NJAWC to fully utilize the allocation limits set forth for Sunset Road Well No. 10 and Well No. 17.

Short Hills - Permanent Canoe Brook Volatile Organic Compound Treatment System

This project is currently under construction. NJAWC's Canoe Brook Water Treatment Plant (CBWTP) is sourced by both ground water and surface water supplies. Several of the groundwater wells have been identified with volatile organic compounds (VOC's). In response to the elevated VOC concentrations, NJAWC recently constructed a temporary granular activated carbon (GAC) system to treat several wells. The objective of this project is to construct a permanent VOC removal facility at the CBWTP to treat all nine ground water supply wells associated with the CBWTP. The new facility will also include chemical treatment for disinfection and scale control on the packed tower aeration system, installation of a treated water wet well and intermediate pump station, upgrades to the well pumps, electrical and demolition work. The facility will have a firm capacity of 5.0 MGD with a future firm capacity of 7.5 MGD.

In addition to VOC issues discussed above, Well Nos. 53 and Layne D have tested positive for 1,4 dioxane. Although not currently a regulated contaminant, the Company is monitoring these wells, and it is possible that future treatment will be required for 1,4 dioxane. Provisions for future treatment equipment, chemical storage and electrical requirements will be provided as part of this project in the event they are needed in the future.

NEW JERSEY-AMERICAN WATER COMPANY, INC.

Lakewood - Oak Street Treatment Improvements

This project is currently under construction. The Oak Street Station has seen elevated levels of radionuclides in Wells 13 and 14. Well 13 has had average gross alpha levels of 16.1 pCi/L and combined radium of 4.5 pCi/L. Well 14 has had gross alpha levels of 12 pCi/L and combined radium of 5 pCi/L. Well 12 has radionuclide concentrations in excess of 50% of the MCL and two instances of combined radium over the MCL. Wells 15 and 16 have had lower gross alpha and combined radium at approximately 50% of the MCL. All these wells (12-16) derive their water from the Cohansey Aquifer. There is currently a temporary treatment facility at Well No. 13 to treat 400 gpm; however, this system is not a permanent installation nor is adequate to treat for the entire Cohansey Aquifer-derived supply, which is prone to elevated radionuclides. The Company is also in the process of providing temporary treatment at Well 14 as a full-scale pilot using a different media to remove radium. This temporary system can treat 400 gpm.

Two wells, Well Nos. 15 and 16, are located on the treatment plant site and the other four wells are located on a remote site approximately 800 to 2,200-feet away. Over time, NJAWC observed significant levels of radium and gross alpha radionuclides in Well Nos. 13 and 14. The gross alpha radionuclides levels in Well 13 are over the MCL and in Well 14 is more than 80% of the MCL, and as a result, these wells are no longer used. Since August 2014 temporary Radium removal treatment at Well 13 has allowed for its continuous operation and assured the station-delivered water remained consistently below the MCL.

This project will treat supply from all existing Cohansey Aquifer wells (Nos. 12, 13, 14, 15 and 16) for radionuclides using WRT equipment. The treated supply totals 1,300 gpm. Also included in this project will be a raw water main extension from Well 18 to Oak Street Station, replacement of pumps and motors at Wells 12, 13 and 14, a building addition, installation of a new emergency generator, security improvements, demolition of the temporary WRT system at Well 13, HVAC and dehumidification processes, chemical feed system improvements, electrical improvements and instrumentation improvements.

Raritan Millstone Long-Term Flood Control

The Raritan Millstone Water Treatment Plant ("RMWTP") Flood Protection Wall – This project is currently under construction with a scheduled completion date of June 30, 2018.

The RMWTP is one of two major water production facilities in NJAWC's Raritan System. The RMWTP is situated in Bridgewater Township and is NJAWC's largest water production facility. It provides potable drinking water for consumption and fire-fighting purposes to over 1 million people. It is a "regional" source of water supply for all or parts of 7 counties. Water supply is also provided to five (5) large Bulk Sales connections, and two (2) Critical Regional Emergency Interconnections – the cities of Newark and Trenton.

The RMWTP typically accounts for on average 65% of the Raritan System's annual water needs. It produces an average system delivery of 92 MGD, and is capable of

peaking at 155 MGD. It is a Tier 1 New Jersey Office of Homeland Security & Preparedness facility, and considered "Critical Infrastructure" by the United States Department of Homeland Security.

The RMWTP is located near the confluence of the Raritan and Millstone Rivers. This locale and the nearby areas of Bound Brook, Bridgewater, and Manville, New Jersey experience severe flooding during significant storm events due to the relative low ground surface elevations in the flood ways adjacent to the two rivers.

Since 2001, the berm/wall perimeter has provided a level of flood protection, but with a minimal margin of safety as noted below. In comparison, near the confluence of the Raritan and Millstone Rivers, the following peak water surface elevations were recorded in the last 14 years:

- September 1999 Tropical Storm Floyd 43.9'
- April 2007 Nor'easter 42.0'
- August 2011 Hurricane Irene 43.6'

Prior to construction of the north side floodwall, the RMWTP was inundated by Tropical Storm Floyd. Following construction of the floodwall in 2000-2001, the plant remained fully operational during the April 2007 Nor'easter and August 2011 Hurricane Irene. The plant avoided the flood damage, cleanup, reduced customer service, and the weeks of work required to return the plant to full production that resulted from Tropical Storm Floyd.

The consequences and risks associated with three significant flooding events in 14 years are too great for this critical water supply facility that is essential to the well-being of the 1+ million people it serves. Resiliency measures are needed to protect against damage from extreme weather events and a changing climate. For example, while the plant operated during Hurricane Irene, there was only an inch to spare at its most upstream berm/wall. A future storm event resulting in a water surface elevation just a fraction of an inch above the top of berm/wall will result in complete inundation of the plant. The overflow of river flooding would likely erode the earthen berm. The ensuing loss of regional water service would be catastrophic, and the safety and health of the dedicated staff operating the facility would be placed in jeopardy with helicopter rescue as the only means of evacuation.

The perilous circumstance experienced during Hurricane Irene, separated by only one inch of floodwater elevation, is a substantial risk going forward and one reason that federal regulations for levees require a minimum "freeboard" above the base floodwater surface elevation. Freeboard is the height between the top of a structure (*i.e.*, berm/wall) and the computed base floodwater surface elevation. It provides a factor of safety against high river flow, potential channel obstructions, wave height, and/or wind action. The berm/wall structure surrounding the plant is similar to a levee. The National Flood Insurance Program (NFIP) regulations, require that levees have a "…minimum freeboard of 3 feet above the water-surface level of the base

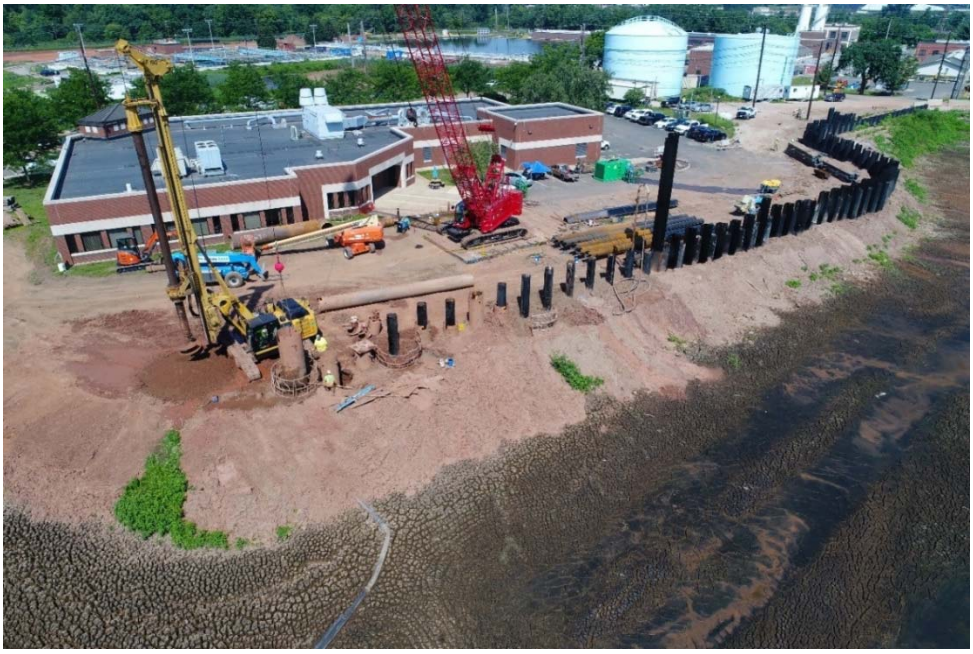
flood must be provided…" There are exceptions, but "…under no circumstances will freeboard of less than 2 feet be accepted."[1]

The 2012 Hydrologic Analysis and Preliminary Flood Risk Assessment (HAPFRA) study computed the 100-year flood event elevation at the RMWTP to be El 43.6 feet. This is greater than the "published value" on the Flood Insurance Rate Map (FIRM) for the County of Somerset, New Jersey, dated September 28, 2007 of El 41.0. The difference is that the HAPFRA used updated statistical data that included the recent significant storm events. Applying the NFIP minimum freeboard to the computed 100-year elevation results in a proposed protective top of structure of El 43.6 + 2 feet = El 45.6.

Although Superstorm Sandy's path and associated precipitation was not as great as the three storm events indicated previously, extreme weather is occurring more frequently in the Raritan River Basin. NJAWC proposes to design and construct a 4-foot increase in the height of the RMWTP berm/wall from El 44 to El 48. This will not only provide the compulsory NFIP freeboard for the computed 100-year storm event, but it will also gain a level of flood risk reduction for the computed 500-year event base flood water surface elevation of El 47.02 feet providing approximately one foot of available freeboard. A progress photo of construction is below:

[1] See, National Flood Insurance Programs ("NFIP") regulations, .Section 65.10.

NEW JERSEY-AMERICAN WATER COMPANY, INC.



Somers Point - South Linwood Station-Well Improvements

A recent Comprehensive Planning Study (CPS) projected a 2025 maximum day reliable supply deficit of 1.42 MGD for the Atlantic County Systems, with the greatest local source deficit in the southern part of the Atlantic County system in the Somers Point area. Currently, due to high levels of iron, manganese and sodium, South Linwood Well No. 7 is used infrequently (last on, first off). Another nearby source, Groveland Avenue Well No. 9, has been out of service for many years due to poor water quality including the presence of radionuclides. The CPS Study recommended construction of an 800-foot sand aquifer well and treatment facility in southern Atlantic County.

The scope under this project is to design and construct a new 800-foot sand aquifer well and treatment facilities with a design capacity of 1,000 gpm at South Linwood

Station, retire Groveland Avenue Well No. 9 and demolish and retire the English Creek 0.2 MG elevated storage tank (note that the English Creek Tank Demolition work was completed under a separate project). English Creek Well No. 15 will remain available as an emergency source of supply.

16. Q. Has the Company included any projects related to asset hardening or resiliency?

A. Yes. Two of these projects are as follows:

1. RM Long Term Flood Control – Please refer to the description provided in my testimony, above.

2. Oak Glen Auxiliary Power – This is included as part of the Oak Glen Treatment plant expansion project. The existing backup generator is insufficiently sized to power all production facility assets in the event of power failure. The new system will include a new 1.25MW standby power generator with automatic transfer switch and related switchgear upgrades to replace the existing unit on site and provide backup power for the entire treatment facility.

17. Q. You mentioned that drinking water regulations are driving the need for several projects. What are these regulations?

A. The regulatory agencies (USEPA and NJDEP) provide detailed regulations governing both primary and secondary contaminants that are regulated. Among the secondary contaminants regulated by both entities, iron removal upgrades for several systems have been implemented. Iron can contribute to corrosion, staining, scaling and sedimentation, all of which have negative customer implications. From the USEPA technical guidance:

> Corrosivity, and staining related to corrosion, not only affect the aesthetic quality of water, but may also have significant economic implications. Other effects of corrosive water, such as the corrosion of iron and copper, may stain household fixtures, and impart objectionable metallic taste and red or blue-green color to the water supply as well. Corrosion of distribution system pipes can reduce water flow. Scaling and sedimentation are other processes which have economic impacts. Scale is a mineral deposit which builds up on the insides of hot water pipes, boilers, and heat exchangers, restricting or even blocking water flow. Sediments are loose deposits in the distribution system or home plumbing.

In addition, the regulatory agencies have issued new guidelines on emerging contaminants. The USEPA manages the Unregulated Contaminant Monitoring Program.[2] The Unregulated Contaminant Monitoring ("UCM") program has progressed and has been updated in several stages. Currently, EPA manages the program directly as specified in the Unregulated Contaminant Monitoring Rule (UCMR). The most current program is managed under UCMR 3, which requires monitoring for 30 contaminants (28 chemicals and 2 viruses) from 2012-2015.

18. Q. What other regulations are driving investment projects?

A. Recently (Spring 2014), the NJDEP issued three guidance documents for resiliency: Asset Management, Auxiliary Power, and Infrastructure Flood Protection Guidance and Best Practices (G&BP). It is around these G&BP that a number of projects have been identified, several of which are included in this Rate Case. As an example, most of the work at the Raritan Millstone plant (discussed above) is Asset Renewal and Resiliency. The Swimming River plant supply and discharge piping improvements

[2] For a brief history of the program, please see http://water.epa.gov/lawsregs/rulesregs/sdwa/ucmr/index.cfm.

since 2012 have improved the facility reliability and resiliency, including the two large Godwin Pumps standby set up and Newman Springs PRV projects. The Canoe Brook and Jumping Brook auxiliary power projects, the purchase of nine portable generator sets (~2.7 MW total capacity) and four portable Godwin Pumps (~10-13 MGD total capacity) in December 2012 are all for resilience purposes.

19. Q. Are the projects about which you are testifying in this proceeding (both recurring and non-recurring investment projects) necessary and prudent in order for the Company to continue to provide safe, adequate and proper utility service?

A. Yes, they are.

WATER STORAGE TANK REINVESTMENT PROGRAM

20. Q. Please describe the Company's Water Storage Tank Reinvestment program ("WSTR"), also referred to as Engineered Coating of Steel Structures.

A. The Company invests millions of dollars each year in its Water Storage Tank Reinvestment program to extend the service life of critical distribution system assets that store water reserves for firefighting and critical treatment plant assets that are used to clean the water delivered to customers. NJAWC owns and operates 187 critical structures to store potable water in distribution systems for fire protection. Another 58 process tanks are used at treatment plants to provide potable water to customers across the state. The integrity of these structures is crucial to protecting public health and providing safe, adequate and reliable water service to customers. Investments in these structures include the replacement of corroded steel

components, safety and security upgrades, and renewal or replacement of existing paint (coating) systems.

The WSTR program entails an inspection of the interior and exterior structure of the tank, a prioritization program to define an annual program, bidding the work to qualified licensed contractors, awarding contracts and scheduling the work, releasing the tank to the contractor for the replacement of corroded steel components, the installation of new safety and security upgrades, and the coating reinvestment work, followed by disinfecting the tank and returning the tank to service.

21. Q. Please describe the service life considerations for water storage tanks in distribution systems.

A. Water storage tanks are generally constructed of steel or concrete, and can be configured as ground level storage tanks, elevated tanks or standpipes. Material of construction and type of tank are dictated by service requirements and cost. Of NJAWC's tank inventory of 245 tanks, 207 are steel and 38 are concrete. If properly designed, constructed and maintained, these tanks can be expected to have service lives of numerous decades despite exposure to harsh environmental conditions. A majority of these tanks are located outside and are exposed to a wide range of air temperature, humidity, water temperatures, wind loading, and seasonal weather conditions. Steel tanks need to be protected from exterior corrosion that can result from the harsh outdoor environment and interior corrosion that can result from the effects of chlorinated water. This is especially true for coastal areas where salt air is highly corrosive to steel surfaces. In general, minor corrosion spots can be repaired;

however, significant corrosion, if left unattended, can lead to structural damage and poor aesthetic conditions. In addition, these failures could potentially result in a breach of the tank, which could lead to contamination of the tank contents from infiltration or worse, tank structural failure. Proper inspection, ongoing routine care to address spot corrosion, and major recoating projects can therefore extend the service life of steel tanks. Concrete tanks are generally more costly to construct than steel but do not require the same level of exterior reconditioning.

22. Q. Please describe the importance of the Water Storage Tank Reinvestment program.

A. Steel tanks require occasional, but significant investment in the coating system. NJAWC utilizes a high-performance engineered coating system on both interior and exterior surfaces of tanks. The service life of the interior and exterior coatings varies depending upon several conditions, but typical high-performance coatings can last up to about 20 years. Installation of new coating systems on existing tanks typically requires removal of existing coatings to bare metal through abrasive blasting and then installation of a new, engineered, three-coat system that will coat the structural metal and extend its useful life. Containment systems are often used to control dust and overspray during blasting and coating installations. Some existing steel structures may have previously been coated with lead-based paint systems. Under those circumstances, the project activities are supplemented with lead abatement efforts to contain, collect, and properly dispose of possible lead-based residuals and other efforts to ensure protection to workers and the environment.

23. Q. Mr. Shields, in this case you and Company Witness Simpson are supporting the adoption of a different approach to the treatment of expenditures incurred for coating steel structures under the Company's Water Storage Tank Reinvestment Program. Could you please describe why these changes are proposed?

A. Yes. It is proposed that tank reinvestment, including Engineered Coating Systems, be fully capitalized, be treated as a capital asset unit of property, and be depreciated consistent with its service life. This change in accounting method, which, as explained in Company Witness Simpson's direct testimony, has been accepted by other states and other regulatory commissions such as Pennsylvania and Indiana, could provide lower rate impacts to the customers - and provide for the ability to fund the growing need to replace aging steel structure coating systems throughout the state. This change is proposed in order to more accurately reflect the optimum utility accounting treatment of these expenditures. As described below and within Company Witness Simpson's direct testimony, the reinvestment in tanks, including the replacement of an engineered steel structure coating system, should be considered a capital improvement asset in its own right, with its own useful life, as a necessary investment required periodically in order for the underlying steel structure to achieve its reasonable useful life. The engineered coating can even extend the useful life of the steel structure, provided it is implemented systematically. It is a major component of steel tanks and should be considered a unit of property similar to other units of property, such as the vents and the ladders. Therefore, the installation of new steel structure coating systems should not be considered a repetitive, year-to-year

maintenance expense because the coating systems improvements are made on each unit of steel property once every 20 or so years.

The coating system is a necessary and key component of each steel tank. This work is not performed to improve how a tank looks. The reinvestment in steel tank assets is done to protect against failure, which could be catastrophic. Without it, the tank would fail in a fraction of its intended service life. The average coating system for a 1 MG tank weighs over seven (7) tons and is so critical it is accounted for in the design loads of the tank. The coating systems have similar service lives as roofs and instrumentation, and have longer service lives than most computer equipment and meters.

The "cleaning" portion of the program described above removes the aging coatings (both internal and external) and any other tuberculation or impurities and provides a sound substrate to which the new coating may be applied. This is a very similar process to that used for cleaning mains. Once the cleaning is completed, additional inspections are performed to ensure the structural integrity of the tank, and any necessary repairs are performed. Once the structural integrity of the tank is assured, the new coating is applied, again in much the same fashion as the lining is applied to a main. Then, just as with a water main, the tank is disinfected, filled and placed back into service.

24. Q. Can engineered tank coatings be compared to other capital projects undertaken by the Company?

A. Yes. As with the Company's water main cleaning and lining program, the Company's ongoing investment in its water storage tanks is designed to maximize the efficient use of capital and to prolong the useful life of critical assets. There is no substantive difference between a water main cleaning and lining project which has long been recognized (appropriately) as a capital investment that prolongs the useful life of a long-lived asset, and a water storage tank cleaning and recoating project which has been treated (inappropriately, in my view) as an ongoing maintenance expense. The purpose and type of work done on the two assets is essentially identical. For these reasons, I believe that capitalization of water storage tank investments and reinvestments is the appropriate approach.

25. Q. Do you believe engineered coating systems will extend the useful life of the tanks?

A. Yes. The engineered coatings have a service life, on average, of twenty years. Coating failure generally occurs after this time period. Coating failure would lead to corrosion of the tank and its eventual leakage. In addition, corrosion of structural supports could weaken the structural integrity of the tank.

26. Q. If the major work discussed above is more appropriately classified as capital investment, then what work would be appropriately identified as maintenance expense?

A. There should be a distinction made between routine steel structure maintenance and the reinvestment discussed above. Interim, touch-up and overcoat efforts such as spot painting, spot repair, overcoating existing paint systems, and power washing, should

be considered maintenance expenses. These efforts occur on a recurring basis as needed and are similar to flushing water mains and installing repair clamps to fix leaks. On the other hand, the investment on average once every 20 years for each steel structure should be considered a unit of regulatory asset property with its own defined service life. It has all of the hallmarks of a capital improvement.

27. Q. Does the IRS or Treasury Department have a position on capitalization vs. expense for engineered costing of steel structures?

A. Yes. Please refer to the IRS "Capitalization v Repairs Audit Technique Guide" dated November 2010, where it sets out that the engineered coating of our steel structures should be treated as a capital project for federal income tax purposes. Company Witness Simpson discusses this guidance within his direct testimony at Exhibit PT-4.

28. Q. Have Engineered Coating Systems proven their value in protecting the investment in tanks?

A. Yes. NJAWC operates 55 tanks built prior to 1960 that have been in service for more than 50 years. Eight tanks have been in service for more than 100 years.

29. Q. How many tanks will reach or exceed a 20-year coating life between 2017 and 2027?

A. A total of 124 tanks either have or will have reached or exceeded a 20 year coating life between 2017 and 2027. These tanks are scheduled for inspection, and based on the results of the inspection, will be scheduled for rehabilitation and reinvestment during this timeframe.

30. Q. How are the engineered coating projects prioritized?

A. Tanks are prioritized based on inspection results and projected service lives. The Company has prioritized the top thirty-three (33) out of 207 tanks that require engineered coating over the next five-year period, which is between six and seven tanks per year. However, notwithstanding this prioritization of the tanks in most urgent need of new coatings, we estimate that we will need to rehabilitate 124 tanks over the next 20 years, using the average of 6 tanks per year.

31. Q. Please discuss the cost to rehabilitate these tanks over the next ten years.

A. Assuming an annual average of $1.5M per tank at a rate of 6 tanks per year, the total cost to rehabilitate these tanks is estimated $90M.

32. Why is capitalization of these costs appropriate?

A. Capitalization will properly apportion costs over the life of the asset. Customers who benefit from the coating will also bear the cost spread over 20 years, which is the useful life of the engineered coating.

33. Q. What factors are taken into consideration when determining this cost?

A. Please note that the detailed tank inspections and subsequent report and recommendations will weigh heavily in determining the actual tank rehabilitation needs and priorities. It is important also to take note of the various geographical differences in tank location, *i.e.*, tanks located along the coastal regions may have a decreased coating life compared to a tank in more remote wooded regions in the central part of the state.

34. Q. Would you anticipate increasing the reinvestment in tanks if this work was capitalized similar to other states?

A. Yes. Allowing capitalization of tank reinvestment projects over time is more equitable to the customer base since the benefits from the rehabilitation projects last for decades. As noted above, capitalization of these costs will properly apportion the costs over the life of the asset. Customers who benefit from the application of the coating will appropriately bear the cost spread over twenty years.

35. Q. Has the Company included capitalization of Engineered Coating Systems in its rate base schedules submitted within this proceeding?

A. Although capitalization is proposed and recommended, steel structure coatings have not been included on rate base addition schedules. The total estimated cost to install a new coating system on each of the NJAWC steel structures over twenty years in current day dollars is in excess of $180 million. The cost estimates were determined and were based upon recent coating costs for various structures of differing styles and capacities. Actual costs were used to develop costs per unit of capacity for both elevated type structures and ground storage type structures. The unit costs varied based upon capacity and were adjusted for inflation and applied to all structures, based upon capacity and type to determine a cost estimate for each structure. For purposes of application for this case, an expense adjustment is being submitted along with other maintenance expenses; please see the testimony of Company Witness Simpson for a more detailed discussion. However, as Company Witness Simpson testifies, the capitalization method described above is preferred, and if this

capitalization method is accepted, future operating expenses could be reduced by the annual normalization amount proposed. The rate base schedules would be revised accordingly.

SHORELANDS

36. Q. Mr. Shields, are you familiar with the Company's acquisition of the Shorelands Water Company?

A. Yes.

37. Q. What are the primary drivers for acquiring the Shorelands Water Company?

A. Generally speaking, the acquisition and merger of Shorelands allows NJAWC to optimize its water supply portfolio in this portion of Monmouth County. More specifically, integrating the Shorelands system into the surrounding NJAWC Coastal North system allows NJAWC to avoid capital projects associated with finished water storage currently planned for the Coastal North system including the following:

- Eliminating the need to replace the Navy Tank ($5m)
- Eliminating the need for the Dual Purpose High/Low Gradient Tank ($3.5m)
- Converting the Union Beach standpipe to ground storage ($5m)

One of the goals of system integration will be consolidation of system gradients. Currently, NJAWC's Middletown gradient has inadequate elevated storage - .400 Million Gallons (MG). By combining NJAWC and Shorelands, the two 375 HGL tanks in the Holmdel part of the Shorelands system would benefit NJAWC's Red Hill

pressure zone. The other two tanks in the Hazlet 185 HGL would benefit the creation of a new Middletown Low and be incorporated as one larger 185 HGL pressure zone, improving control over system flows and pressures and improving operational efficiencies.

Because of the gradient merger activities, the Shorelands acquisition has eliminated the need for replacement of five pressure reducing valves ("PRVs") in the Aberdeen zone and three PRVs in the Middletown zone, with a cumulative avoided cost of $3.3 million.

Two other projects have also been eliminated: this acquisition has increased NJAWC's ability to leverage its Aquifer Storage and Recovery ("ASR") strategy, avoiding the costs for two new Englishtown wells ($3.5 million).Finally, as a consequence of the consolidation of system gradients, NJAWC has been able to eliminate approximately 4 miles of a planned source of supply main (the Raritan-Middlesex main) with avoided costs of approximately $10 million. In total, the acquisition and merger of Shorelands by NJAWC allows NJAWC to completely avoid $29.0 million in capital projects and delay the need for $18.9 million of capital additions into future periods.

In addition, two projects were eligible for deferral as part of the integration. One planned source of supply capital project can be deferred for at least 5 years: the project comprises six ASR wells with projected capital costs of $14.9 million. The

other project defers the need for certain resiliency improvements at the Newman Springs pump station with projected capital costs of $4 million.

All of these projects are projects that would otherwise need to be built, or built sooner, or done more expensively but for this transaction, and those costs would have been prudently incurred and recovered from customers in rates if not reduced, deferred or avoided, so customers will experience a long-term overall benefit in their rates, without adversely impacting water service to either current Shorelands or NJAWC customers. Please see the direct testimony of Company Witness Simpson for a discussion of the rate impacts, and Company Witness Keane's direct testimony for a discussion of the service and operational benefits of this transaction.

38. Q. Are there other benefits associated with consolidating system gradients?

A. Yes, as discussed in Company Witness Keane's testimony, combining gradients results in an overall reduction in the number of gradients that need to be maintained. Consolidation allows for more even distribution of pressures throughout the system, a significant reduction in high pressures and water hammer resulting from PRV failure, along with a reduction in resulting main breaks. Pressure stabilization (in this case lowering pressures throughout a larger region) can result in significant reduction in main breaks, lowers real water losses (from older pipe and service lines) all of which leads to increased customer satisfaction, primarily as a result of fewer disruptions to service form breaks, leaks, etc.

39. Q. Does the integration of the Shorelands's system with NJAWC's system provide benefits to Shorelands' customers as well?

A. Shorelands' customers will benefit from this integration. In fact, what has been described above has resulted in a more efficient system operation. One of the key benefits of combining system gradients is to allow for more stable pressures within a larger geographic area. This is a key driver for maintaining system integrity, managing non-revenue water, reducing leakage and reducing main breaks. In addition, by combining systems, Shorelands's customers benefit from combined stable sources of supply, firm capacity and storage.

HADDONFIELD

40. Q. Mr. Shields, are you familiar with the Company's acquisition of the water and wastewater system assets of the Borough of Haddonfield?

A. Yes. Please note that Company Witness Simpson will discuss the Company's proposed ratemaking treatment, and Company Witness Cuthbert will support the original cost less depreciation of the assets acquired in their respective direct testimonies.

41. Q. Do you believe the Company's proposed acquisition is in the public interest? Please explain your reasoning.

A. First and foremost, NJAWC provides excellent customer service, water quality and reliability. We provide economies of scope and scale that no municipal system can match. This is our sole business—we are not juggling all of the challenges that face municipal officials and local politicians. We run our systems professionally, and for

the long term. We are stewards of an invaluable public resource. We are accountable to our customers and to regulators like the Board of Public Utilities and the DEP. We are also accountable to key stakeholders like the Division of Rate Counsel as well as local, county and state officials. In the end, I believe that the residents of Haddonfield, and all of the customers of NJAWC, will receive better service and reliability than they would under municipal ownership, at just and reasonable rates set by the Board of Public Utilities. Company Witness Forcinito discusses these benefits in more detail within his direct testimony at Exhibit PT-13.

Existing NJAWC customers benefit from this acquisition for a variety of reasons as well. As discussed by Company Witness Forcinito in his direct testimony, this acquisition provides economic, public health and safety benefits to the region as a whole. Under NJAWC ownership, the water system can be integrated into the NJAWC Camden County Main and High Service gradients, the municipal allocations currently held and managed by Haddonfield can be integrated into a diverse regional water supply managed by NJAWC, and as discussed below, $5 million in necessary future investments can be avoided. These benefits clearly support the ratemaking treatment discussed in Company Witness Simpson's testimony.

42. Q. Has NJAWC made investments to improve service reliability in this system?

A. Yes.

43. Q. Please explain.

A. We have implemented a cost-effective solution to low pressure issues numerous Haddonfield customers experienced prior to the Company's acquisition of this system.

With NJAWC's ownership of the system, we have proceeded to connect the Haddonfield system into the Camden County Main Gradient and float the Haddonfield system on the Station Avenue Standpipes, which would provide increased equalization and emergency storage over what is available in the Cottage Avenue Standpipe This has allowed for the removal of the Cottage Avenue Standpipe from service and eliminated the risk of water quality degradation from the aged water in the tank. Absent NJAWC ownership, the Cottage Avenue Standpipe would need to be demolished and replaced with a modern, appropriately-sized elevated storage tank at the cost of approximately $5 million (before considering the costs of the ongoing maintenance needs of such a tank.)

44. Q. What other improvements has the Company implemented in the Haddonfield system?

A. The Haddonfield sewer system was in need of upgrades at two wastewater pumping stations; Coles Mill and Roberts Avenue. Both were subject to NJDEP inspections and had received notices of deficiency and related Notices of Violation for lack of appropriate maintenance. In addition, a new pumping station, Atlantic Avenue, was constructed in order to retire a failing gravity sewer main located behind the

Wedgewood Swim Club which ran adjacent to the Cooper River. Each project represents a significant improvement in reliable, safe wastewater services provided to our Haddonfield customers.

CONSUMPTION AND DECLINING USE

45. Q. Please discuss the challenges posed by the simultaneous trends toward lower per-capita annual consumption and higher seasonal peak demands and its effect on capital improvements.

A. As the testimony of Company Witness Roach clearly shows the declining consumption trend is real and has significant consequences for the Company. In addition, as Company Witness Herbert, Exhibit PT-14, has testified, the Company's current fixed service charges, even as proposed, are significantly below what his cost of service analysis shows are appropriate levels. In the meantime, the Company continues to experience growing peak day demands, particularly in its Coastal service territory. This is an unsustainable pricing model in the long term.

The Coastal North service area, in particular, faces a long-term need of new source of supply, and the primary sources of supply options are expensive: a new reservoir, or a desalinization plant. The Company is engaged in a long-term planning exercise to evaluate these options. In the meantime, NJAWC has requested that a revenue stabilization mechanism ("RSM") be approved in this proceeding. As Company Witness DeStefano explains in more detail in his direct testimony, an RSM is a rate mechanism that has been adopted in many states to eliminate the "throughput

incentive" to water and energy efficiency initiatives and investment. An RSM would make NJAWC indifferent to selling water, recognizing that "normal" weather is a condition that will never likely be achieved, and reduces the adverse impacts of weather for the Company and its customers. Implementation of an RSM will remove a disincentive to promote water efficiency investments, which could, in the right circumstances and over a period of time, defer the need for extensive capital investments to meet incremental peak day demands such as what I described is occurring in Coastal North. Please see Company Witness DeStefano's direct testimony for additional information on this proposal.

LEAD SERVICE LINE REPLACEMENTS

46. Q. Please explain why NJAWC is proposing to undertake full lead service line replacement.

A. At the outset, the Company's treatment and monitoring of water quality in our distribution system and at the customer tap have effectively reduced potential lead exposure from drinking water, and NJAWC has a well-established history of compliance with the Lead and Copper Rule ("LCR"). However, as the research regarding potential exposure to lead has recently developed, the Company has monitored and reviewed it and determined it should take pro-active, cautious steps to further mitigate potential customer exposure to lead in drinking water. A growing body of research has recently begun to suggest that the galvanic corrosion that can occur after a partial lead service line replacement and the physical disturbance of the lead service line have the potential to increase lead levels following replacement for

a period of time. Additionally, the National Drinking Water Advisory Council recommended that the EPA revise the LCR regulations to reflect full lead service line replacement—that is, to require complete and proactive replacement of both the utility and customer segments of service connections that contain lead.

The Company believes that caution requires that all segments of lead in the service line should be replaced. The full LSLR (lead service line replacement) would include both the lead portions owned by the Company and the lead portions owned by the customer/property owner. This work should be done at the same time whenever possible and should be integrated in the Company's water main replacement program.

47. Q. Please describe NJAWC's proposed lead service line replacement program ("LSLR Program").

A. NJAWC has a DSIC program to replace water mains throughout its service areas. The main replacement is prioritized by considering a variety of factors, including the condition of the main, gauged by a combination of leaks or breaks in the line, pressure and flow conditions, and pipe age and material. NJAWC also coordinates with local municipalities to replace mains in conjunction with road projects. It is during this regular main replacement process that NJAWC anticipates replacing the lead service lines. Under the LSLR Program, when the Company encounters lead service lines during a main replacement project, it will proactively replace the lead portion of the service line. This may include Company-owned lead service lines and/or lead goosenecks as well as customer-owned portions of lead service lines.

If only the gooseneck is lead, the Company will replace the service line up to the service shut off valve. If the service line is lead, the Company, with the customer's consent, will replace the entire service line from the main to just outside the customer's premise or to the shut off valve within the customer's premise.

48. Q. Please describe the specific steps the Company proposes to undertake during the replacement process.

A. As we replace existing water mains, we inspect the existing service line connected to the main to determine if it is lead. NJAWC, in the course of main replacement, will excavate to expose each service line and other utilities, to confirm location and to make a determination of size and material of the service line. If the gooseneck or service line is lead then the following general steps are taken.

- The customer is notified of the presence of lead in the service line;
- A telephone notification is sent to all customers within the main replacement project limits;
- The owner of the property is presented with a "Service Line Replacement License" agreement for acceptance or denial. Execution of the license is required to allow crews to work on the subject property;
- Customer/owner (both if different) are provided with "Important Notice about Your Water" and "Lead" fact sheets;
- Necessary permits for water service line replacement and electrical work if required for reestablishing grounding are acquired;

- The lead service line replacement is performed. All lead portions of the lines are replace either: 1) to the foundation (or through the foundation to the interior shut-off valve if possible); or, 2) to the service shut-off valve if only the gooseneck is lead.
- Lines are then flushed in coordination with the customer;
- Post replacement sampling is done; and,
- Customer/owner is notified of sampling results.

The Company has begun to prioritize the known or anticipated presence of lead service lines when prioritizing water main replacement projects.

49. Q. Does the LSLR Program support the Company's ability to continue to maintain compliance with applicable drinking water regulations?

A. Yes. The LCR imposes an obligation on the Company and other drinking water providers to furnish water that is below the lead action level at the customer's tap even if the source of lead originates within the customer-owned service lines and the in-home piping. Consequently, remaining in compliance with applicable drinking water regulations when the Company replaces its mains connected to lead service lines necessarily involves taking steps to address possible sources of lead contamination from customer-owned property.

50. Q. Please describe the Company's full lead service line replacement pilot.

A. The Company worked with 5 homeowners in its Passaic Service Area to perform full lead service line replacements from October 2016 through March 2017. Site-specific

data was obtained for each location, including age and characteristics of lead service line; age, characteristics and materials of construction of interior plumbing; and physical dimensions and layout of indoor plumbing. Base-line samples were taken of the premise water prior to any disturbance of the lead service line. The next day after base-line samples were collected, a contractor performed a full replacement of the lead service line. Immediately following the lead service line replacement, the exterior service line was flushed for 30 minutes followed by 30 minutes of interior plumbing system flushing. Samples were collected immediately following completion of the 60 total minutes of flushing. Follow-up sampling was performed at durations of one day, one week, one month, two months and three months following the lead service line replacement. Sampling results were shared with the customer.

51. Q. Did you provide any additional information to the customer?

A. Yes. We inform the customer that they can further mitigate their potential exposure to lead in drinking water by flushing their kitchen faucet or any other faucet they use for drinking water anytime the water sits motionless for 6 hours or more. We also advise the customer that they can consider using bottled water or using a filter until the sample results are returned. We provide them with a fact sheet that suggests they should look for NSF certified filters that specifically are tested to remove lead.

52. Q. What was the outcome of the pilot?

A. Of the five (5) homeowners' lead service lines that were replaced, all of the lead levels were below the action level in the sample collected after the service line

replacements and subsequent 60 total minutes of flushing. In all of the samples collected after service line replacement (total of 300 samples), only one sample taken was above the action level. The sample was the first liter draw one day after the lead service line replacement and the nine (9) liters collected immediately following were less than the action level.

53. Q. Are you proposing to replace in home plumbing for any customers?

A. No. We are not proposing to replace home plumbing. This would remain the responsibility of the property owner.

LEAD SERVICE LINE REPLACEMENT COSTS

54. Q. Has the Company estimated the cost of replacement for lead service lines?

A. Yes. NJAWC initially estimated that the cost to replace a lead service line would average $3,000-$5,500, when performed in conjunction with a main replacement project. While some replacements may cost more due to specific site constraints, such as long lay length and the presence of rock and large trees that impact the cost of the installation and restoration, NJAWC believes costs will more commonly be at the high end of the initial range.

55. Q. Is the Company's LSLR Program a cost-effective initiative?

A. Yes. Many customers, particularly those in older neighborhoods with populations that face economic constraints that make it difficult or impossible for them to pay for replacement would have a difficult time replacing their user-owned lead service lines on their own. Allowing NJAWC to replace their user-owned lead service lines for

them under its LSLR Program is a reasonable, responsible solution to this problem. Furthermore, the Company will be able to leverage economies of scale to reduce costs and minimize service disruptions related to lead service line replacements. In addition to these efficiencies, NJAWC's ability to coordinate the replacement of Company and customer-owned lead service lines simultaneously will streamline project administration and reduce costs, overall.

56. Q. Does NJAWC intend to pursue state and federal funding sources to offset LSLR Program costs?

A. Yes. NJAWC will seek low cost state and federal funding to the extent funding is available.

57. Q. What ratemaking treatment is the Company proposing for recovery of costs associated with replacement of customer-owed lead service lines?

A. Since the majority of this work will occur during main replacement, the Company is seeking to include the replacement of customer-owned lead service lines for recovery in its DSIC program. See Company Witness Simpson's testimony, Exhibit PT-4, for additional information.

58. Q. Does this complete your testimony?

A. Yes, it does.

Schedule DCS-1

New Jersey American Water Capital Expenditures

ADDITIONS TO UTLITY PLANT IN SERVICE (April 1, 2017 through September 30, 2018)

Project	Description	UPIS Additions Apr 2017 through Sep 2018	In Service Date
I18-260049	2016 Large Energy User Program (LEUP)	947,333	07/13/17
I18-210002	Haddonfield - Atlantic Ave Lift Station	4,854,410	08/31/17
I18-210005	Haddonfield - Roberts Ave. Sewer Lift Station	2,189,914	08/31/17
I18-120046	Fire Rd Well 10 Replacement	932,554	08/31/17
I18-210004	Haddonfield - Coles Mill Sewer Lift Station	2,827,273	08/31/17
I18-150058	Wyoming Tank Roof Rehabilitation	2,914,237	09/30/17
I18-120042	Galloway Township High Service Grad	2,933,049	09/30/17
I18-230008	Tea Berry Ct Sewer Lift Station	6,418,829	09/30/17
I18-260010	Springfield Well Upgrades	745,107	09/30/17
I18-150085	West Orange Reservoir Improvements	1,006,871	10/31/17
I18-130100	Evergreen Tank Improvements - Mt Holly	1,593,552	11/30/17
I18-260083	Hummocks Mobile Advanced Oxidation Process (AOP) Demo	1,722,076	11/30/17
I18-180050	36-inch CI - Rumson Place - Little Silver	2,606,737	12/31/17
I18-230013	Adelphia Wyckoff Mills Sewer Replacement	1,778,084	12/31/17
I18-120041	Coastal South Automation & Control Upgrades Phase 4	789,069	12/31/17
I18-120045	Crest Haven Garden State Parkway Crossing - Cape May Court House	690,901	12/31/17
I18-130088	Delaware River Regional Water Treatment Plant Gas Chlorine to Hypochlorite Conversion Project	4,818,425	12/31/17
I18-180052	EchoShore TX 24" Middletown - Transmission Main Leak Monitoring Equipment	333,751	12/31/17
I18-130108	EchoShore TX TriCounty Moorestown - - Transmission Main Leak Monitoring Equipment	354,000	12/31/17
I18-180051	Hubbard Ave Transmission Main Replacement	1,434,131	12/31/17
I18-190030	New Egypt Well	3,688,447	12/31/17
I18-150046	North Automation & Control Upgrades Phase 2	3,864,613	12/31/17
I18-180044	Oceanport Creek Crossing	1,862,461	12/31/17
I18-250075	Raritan Millstone WTP Phosphoric Acid Feed Improvements	3,522,601	12/31/17
I18-130044	Southwest Automation & Control Upgrades Phase 1	1,514,052	12/31/17
I18-190031	Howell-to-Lakewood Trans Phase 1	14,000,000	12/31/17
I18-130050	Southwest Automation & Control Upgrades Phase 2	2,680,892	03/30/18
I18-130055	Harrison High Service Gradient Project	1,423,367	03/31/18
I18-150003	Baltusrol Source of Supply Improvements	1,000,000	03/31/18
I18-260058	Canal Road Water Treatment Plant Basin 3 Lamella Plate Settlers Expansion	750,000	03/31/18
I18-130105	Delaware River Regional WTP Lime Slaker	2,100,375	03/31/18
I18-260040	Glenside Ave Booster Replacement	2,351,518	03/31/18
I18-190037	Howell Well 3 Improvements	887,380	03/31/18
I18-170008	Oxford Station Treatment Upgrades	2,516,641	03/31/18
I18-250080	Canal Road Water Treatment Plant Sodium Hypochrloite Tank & Feed System Replacement	750,000	03/31/18
I18-150013	Canoe Brook Water Treatment Plant 2300 V Power to 4160 Conversion Project	1,700,000	03/31/18
I18-180053	Asbury Park Main Replacements (Rt. 71)	4,231,264	03/31/18
I18-130106	Mt. Holly Cleaning and Lining Phase 2	3,299,037	03/31/18

Project	Description	UPIS Additions Apr 2017 through Sep 2018	In Service Date
I18-250093	Raritan Millstone Water Treatment Plant Head House Crawlspace Rehabilitation	1,381,281	03/31/18
I18-190041	Lakewood Facility Relocation Phase 1	3,000,000	03/31/18
	Post - Test Year Projects		
I18-190009	Oak Glen Water Treatment Plant Expansion	25,893,682	04/30/18
I18-180043	Rumson-Sea Bright Transmission Main	5,110,656	05/31/18
I18-250060	Raritan Millstone Water Treatment Plant - Raw Water Pumping Improvements	14,678,477	06/30/18
I18-230010	Lakewood - Sunset Road Sewer Upgrades	8,207,889	06/30/18
I18-190023	Lakewood - Sunset Road Water Treatment Plant Expansion	15,636,948	06/30/18
I18-150084	Short Hills - Permanent Canoe Brook VOC Treatment System	10,000,000	09/30/18
I18-190004	Lakewood - Oak Street Treatment Improvements	11,108,309	09/30/18
I18-250013	Raritan Millstone Long Term Flood Control Project	37,410,037	09/30/18
I18-120022	Somers Point - South Linwood Station-Well Improvements	5,000,000	09/30/18
TOTAL Investment Projects		231,460,230	

RP-18-A	Mains - New	5,554,792	various
RP-18-B	Mains - Replaced/Restored	68,701,793	various
RP-18-C	Mains - Unscheduled	3,250,000	various
RP-18-E	Hydrants, Valves, and Manholes - New	1,655,436	various
RP-18-F	Hydrants, Valves, and Manholes - Replaced	12,361,343	various
RP-18-G	Services and Laterals - New	14,704,601	various
RP-18-H	Services and Laterals - Replaced	14,962,555	various
RP-18-I	Meters - New	1,482,879	various
RP-18-J	Meters - Replaced	21,538,536	various
RP-18-K	ITS Equipment and Systems	2,315,907	various
RP-18-L	SCADA Equipment and Systems	978,999	various
RP-18-M	Security Equipment and Systems	1,000,000	various
RP-18-N	Offices and Operations Centers	6,600,440	various
RP-18-O	Vehicles	4,945,999	various
RP-18-P	Tools and Equipment	2,337,208	various
RP-18-Q	Process Plant Facilities and Equipment	21,122,847	various
RP-18-S	Engineering Studies	1,657,240	various
DV-18	PROJECTS FUNDED BY OTHERS	21,908,621	various
TOTAL Recurring & Developer Funded Projects		207,079,196	

TOTAL GROSS CAPITAL EXPENDITURES	438,539,425	