Exhibit No.:	
Issues:	Overview of Operations and Facilities, Operating and Maintenance Expense, Commitment to Water Quality and Safety, Improving Water Efficiency and Employee Levels and Compensation.
Witness:	William Andrew Clarkson
Exhibit Type:	Direct
Sponsoring Party:	Missouri-American Water Company
Case No.:	WR-2017-0285 SR-2017-0285
Date:	June 30, 2017

MISSOURI PUBLIC SERVICE COMMISSION

CASE NO. WR-2017-0285
CASE NO. SR-2017-0285

DIRECT TESTIMONY

OF

WILLIAM ANDREW CLARKSON

ON BEHALF OF

MISSOURI-AMERICAN WATER COMPANY

DIRECT TESTIMONYWILLIAM ANDREW CLARKSON
MISSOURI-AMERICAN WATER COMPANY
CASE NO. WR-2017-0285
CASE NO. SR-2017-0285

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BEFORE THE PUBLIC SERVICE COMMISSION

OF THE STATE OF MISSOURI

IN THE MATTER OF MISSOURI-AMERICAN WATER COMPANY FOR AUTHORITY TO FILE TARIFFS REFLECTING INCREASED RATES FOR WATER AND SEWER SERVICE	)))))	**CASE NO. WR-2017-0285** **CASE NO. SR-2017-0286**

AFFIDAVIT OF W. ANDREW CLARKSON

W. Andrew Clarkson, being first duly sworn, deposes and says that he is the witness who sponsors the accompanying testimony entitled "Direct Testimony of W. Andrew Clarkson"; that said testimony and schedules were prepared by him and/or under his direction and supervision; that if inquiries were made as to the facts in said testimony and schedules, he would respond as therein set forth; and that the aforesaid testimony and schedules are true and correct to the best of his knowledge.

W. Andrew Clarkson

State of New Jersey
County of Camden
SUBSCRIBED and sworn to
Before me this 6th **day of** June **2017.**

Mary Beth Hercules
Notary Public

My commission expires:

MARY BETH HERCULES
Notary Public - Notary Seal
STATE OF MISSOURI
St. Louis County
My Commission Expires April 26, 2020
Commission # 96546828

DIRECT TESTIMONY

WILLIAM ANDREW CLARKSON

I. INTRODUCTION

Q. Please state your name and business address.

A. My name is William Andrew Clarkson, and my business address is 727 Craig Road, St. Louis, MO, 63141.

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

A. I am employed by Missouri-American Water Company ("MAWC", "Missouri-American" or "Company") as Vice President of Operations.

Q. Please describe your educational background and work experience.

A. I received a Bachelor of Science degree in Geology in 1985 from Principia College, and an Associate's degree in Applied Science (Water/Wastewater Technology) from Crowder College in 1987. I received a Master's of Business Administration from Virginia Commonwealth University in 1997.

I began my career with American Water Works Company ("American Water") as a Supervisor at Maryland-American Water Company in 1987. In 1991, I was promoted to Operations Manager for Virginia-American Water Company . In 1997, I accepted the position as Project Manager to operate the water system in Buffalo, New York. Subsequently, I accepted a position in St. Louis as a Regional Manager for American Water's market based business. In 2000, I moved to New Jersey-American Water Company as the Manager of the Northern Division before transferring into the role of

Business Development Director for the Northeast Region of American Water in 2003. I was promoted to Director of Network Operations in 2003 for New Jersey American Water. In March 2006, I became the statewide Director of Customer Field Service for New Jersey's operations, and then became the Senior Director for the southern area of New Jersey-American's Field Operations in 2007. In 2008, I was promoted to Director, Customer and Operational Support for American Water's Eastern Division. In 2009, I became American Water Business Transformation program ("BT") lead for customer and field service processes, and later became the BT Business Intelligence Lead responsible for reporting, data conversion and data governance. In 2014, I became the Corporate Director of Asset Performance, and in 2016, I was promoted to my current position.

Q. What are your current employment responsibilities?

A. I am responsible for all of the Company's water and sewer operations across the State of Missouri, including field services, production, maintenance, water quality, environmental compliance and safety. My oversight includes ensuring that our operations team continues to provide high quality water and sewer service and meets MAWC's operational targets.

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

A. The purpose of my direct testimony is five-fold. First, I describe the Company's water and sewer operations and facilities throughout Missouri. Next, I will discuss the Company's commitment to water quality and safety that benefit MAWC's customers. Third, I discuss MAWC's level of operating and maintenance ("O&M") expense in this

case and how it supports the Company's efforts to continue providing high quality water and sewer service in the most cost-effective way to our customers in the long-term. Fourth, I discuss MAWC's programs and commitment to improving water efficiency. Finally, I will support the Company's employee levels and explain MAWC's employee compensation philosophy.

II. OVERVIEW OF OPERATIONS AND FACILITIES

Q. Please describe Missouri American's operations.

A. As of December 31, 2016, MAWC provided water and/or sewer utility service to over 476,000 customers throughout the State of Missouri. The Company's operations are widely dispersed throughout the state. We provide water service to districts ranging in size from St. Louis Metro (largest) to Lakewood Manor (26 customers). We also provide sewer utility service in our Platte County, Warren County, Cedar Hill, Arnold, Stonebridge and Saddlebrooke, Meramec, and Emerald Pointe districts, and more recently the Hickory Hills, Jaxson Estates and Wardsville systems.

Q. Please describe the facilities and property MAWC uses to provide water and sewer service to customers.

A. MAWC's utility plant accounts include land and land rights, structures and improvements, wells, pumping equipment and associated facilities, purification plant and equipment, sludge disposal facilities, transmission and distribution mains, collection pipes, distribution storage facilities, service lines, meters, hydrants and other facilities, including materials and supplies. All of this plant and property is being used for and is useful for providing safe, adequate, efficient, and reliable water and sewer

services to MAWC's customers.

Q. Please describe MAWC's sources of water supply, treatment facilities, pumping equipment and distribution system property.

A. MAWC draws water for our water districts from surface supplies, wells and/or infiltration galleries. About 85% of the total source of supply comes from surface supply and 14% comes from wells and infiltration galleries. The remaining 1% is purchased water. The Company operates 31 distinct public water systems and from the Company's 11 water treatment plants and 66 wells, producing approximately 73 billion gallons from January 1, 2016 through December 31, 2016. The treatment processes include sedimentation and filtration, clarification, disinfection, taste and odor removal, organic chemical absorption, iron and manganese removal or sequestering, pH adjustment, corrosion control, and fluoridation for dental prophylaxis, all in order to meet or exceed the standards of the drinking water regulations of the Drinking Water Branch of the Missouri Department of Natural Resources, the United States Environmental Protection Agency ("EPA"), municipal and county fluoridation ordinances, and a municipal water softening franchise requirement. The Company has in excess of 6,700 miles of transmission and distribution mains ranging in size from 1-inch to 42-inch diameter, 119 water storage tanks, 100 pump stations, and over 43,500 fire hydrants available for public fire service. The total capacity of water storage is approximately 143 million gallons which is strategically located in the service areas for drawdown during peak demand periods and for fire protection services.

Q. Please describe MAWC's sewer operations.

A. MAWC operates 65 sewer systems in the Platte County, Warren County, Cedar Hill, Arnold, Stonebridge and Saddlebrooke, Meramec, Cole County, Hickory Hills, Jaxson Estates, Wardsville, and Emerald Pointe districts. The sewer system facilities consist of approximately 200 miles of collection mains ranging in size from 2-inch to 10-inch diameter, over 5,000 manholes, and 50 lift stations. There are 47 mechanical wastewater treatment plants with capacity to treat over 300,000 gallons of wastewater daily and 13 lagoons that serve our sewer customers.

III. OPERATING AND MAINTENANCE EXPENSE

Q. Please discuss some of Missouri-American's efforts to control O&M costs over the past several years.

A. Missouri-American has successfully controlled costs over the past several years. The Company's 2016 operating expenses were only one percent (1%) higher than 2010 operating expenses (exclusive of the additional O&M expense related to new acquisitions), and we are continuing our cost mitigation efforts. At the same time, there are other cost areas that are increasing - inflation marches on despite our best efforts. Particularly, fuel, power and employee costs, such as wages and group insurance, have increased since the end of the 2016. These increases have somewhat outstripped the continued savings we have achieved in other areas, and they too are included in our rate filing.

Q. What level of O&M expense is the Company seeking in this case?

A. MAWC is seeking recovery of $133 million in O&M expense for the future test period

ending May 31, 2019, which represents about a 2% percent annual increase from 2016 levels. The requested increases in O&M expense over these periods support the Company's efforts to continue providing high quality water and sewer service in the most cost-effective way to our customers in the long-term. The direct testimonies of MAWC witnesses Brian LaGrand and Nikole Bowen discuss MAWC's specific O&M pro forma adjustments in this case.

Q. Why is the Company seeking an increase in O&M expense in this case?

A. As part of the requested revenue requirement in this case, the Company is seeking to enhance its maintenance activities. The Company plans to increase its level of plant maintenance, valve operation, hydrant maintenance and flushing from current levels through the future test year in this case in an effort to establish and sustain a more cost effective level of service for our customers over the long term.

IV. COMMITMENT TO WATER QUALITY AND SAFETY

A. Water Quality

Q. Please discuss Missouri-American's commitment to water quality.

A. MAWC has provided water service to customers for over 130 years. We are acutely aware that water is the only utility product intended for customers to ingest, and that our customers rely on MAWC to provide them with safe and reliable water services. Water quality is of paramount importance to the health and well-being of our customers. Beyond health and safety, we know that MAWC's customers are also interested in the aesthetic qualities of the water we treat and deliver to them. We proactively look for ways to optimize treatment capabilities to continue to improve the

overall quality of drinking water delivered to our customers, and do so in a way that strives to create operational efficiencies that also benefit our customers.

Q. Please discuss MAWC's efforts with respect to water quality.

A. The Company's participation in The Partnership for Safe Water (the "Partnership") program is one demonstration of MAWC's commitment to the health and safety of our customers through the delivery of clean, safe, aesthetically pleasing drinking water. The Partnership is an alliance of six drinking water organizations[1] with a mission to improve the quality of water delivered to customers by optimizing water system operations. Each year, the Partnership recognizes water treatment plants for their optimization and water quality.

MAWC has also partnered with University of Missouri – Rolla and The Water Research Foundation to evaluate the watershed for possible causes of taste and odor issues and to determine best possible treatment methods.

Q. Has MAWC been recognized for its optimization and water quality achievements?

A. Yes. Missouri-American is a participant in the Partnership's water treatment plant optimization program and has repeatedly been recognized for its optimization and water quality achievements. MAWC's six water treatment plants have received Phase III Directors Awards and this year, five[2] of them have been recognized for maintaining

[1] Partnership organizations include EPA, the American Water Works Association ("AWWA"), Association of State Drinking Water Administrators ("ASDWA"), Association of Metropolitan Water Agencies ("AMWA"), National Association of Water Companies ("NAWC") and the Water Research Foundation ("WRF").
[2] The five plants include the Central Plant, North Plant, South Plant, Meramec Plant and Joplin Plant.

the Phase III Directors Award status for fifteen years.

Q. Please describe other ways the Company is demonstrating its commitment to water quality.

A. The Company has enhanced its source water protection program by taking an integrated approach to monitoring its source water quality and evaluating risks to that source using innovative technologies, which support the Company's ability to make more informed decisions regarding treatment and when responding to potential source water contamination events. The integrated approach includes source water quality monitoring panels and a map-based information gathering tool called WaterSuite.

Q. Please describe MAWC's source water quality monitoring panels.

A. The Company installed an online, multi-panel source water quality monitoring device at each of its surface water treatment plants as an effective tool for optimizing treatment decisions and aiding in the detection of potential source water contamination. The sensors in each panel monitor parameters in the source water that include turbidity, pH, oxygen reduction potential, temperature, conductivity and dissolved oxygen,. This equipment will establish baseline water quality data for each parameter and alert water plant operators to certain changes in water characteristics. The Company can use this information to better understand the characteristics of its source water. In addition, a change in the baseline characteristics may indicate an issue that warrants additional investigation.

Q. Please describe WaterSuite.

A. WaterSuite is a map-based tool that collects information about potential sources of

contamination from various sources[3] and pulls it into a database for a defined area of concern. The database is updated on a regular basis to include the latest available information and has search and reporting capabilities, which provides a significant advantage over standard static contaminant assessments. This gives the Company a dynamic tool it can continue to use over time rather than a paper based equivalent that captures only the circumstances present at a point in time. The database provides a larger set of data that is automatically updated on a periodic basis without requiring manual work by MAWC. As a result, MAWC can access more information more efficiently than in the past. The Company can use the monitoring panels and WaterSuite together to better inform its response to a potential contamination event.

B. Safety

Q. Please describe MAWC's overall commitment to safety.

A. Ensuring the health and safety of our employees and protecting our product is a high priority for our Company and is critical to our success. Our colleagues' and customers' safety is the most important thing we focus on every day, and my commitment is to ensure that every MAWC employee chooses safety in every job, every day. Employee health and safety is the responsibility of every MAWC employee, and to that end, every employee strives for safety. A safe workplace increases employee morale, increases our commitment to one another, and in the long=run, makes for a more engaged and productive workforce.

[3] Data sources may include publically available regulatory databases, aerial imagery analyses, and local knowledge.

Q. Is safety an important part of MAWC's operational performance?

A. Yes. Safety is both a Value and a Strategy for MAWC. We ask our employees to place safety first in everything they do. We have a strong commitment to our employees (and their families) to keep them safe.

Q. How do you measure safety performance?

A. The Occupational Recordable Incident Rate ("ORIR") is a key metric we can use to gauge the effectiveness of our safety program. It considers the number of recordable injuries occurring during a specified time frame (e.g., month, quarter, year) and the total number of hours worked by all employees during that same period. American Water establishes a safety target annually to drive continuous improvement (i.e., reduced injury rates). The target is based on a variety of factors, including historical performance and rate of improvement and safety performance data for both utility and non-utility industries. The Company is placing a greater emphasis on employee engagement and providing training as well as better tools and personal protective equipment ("PPE") to employees to improve our safety performance.

Q. What safety initiatives has MAWC implemented to improve its safety performance?

A. In 2015, the Company launched a Near Miss Reporting Program. Near Miss Reporting involves employees reporting a situation that almost resulted in an injury or accident. For example, if a piece of equipment becomes worn outside of a regular maintenance cycle, an employee reports this as a near miss so MAWC can replace the worn part and avoid a potential injury from an equipment malfunction.

In early 2017, we initiated a "Peer to Peer" worksite inspection program where hourly union employees in St. Louis conduct worksite inspections of their peers. Generally, twice a week, groups of two people go to work areas and evaluate the worksite using a checklist of safety items. The team is also provided with a vehicle equipped with personal protective equipment ("PPE") and other equipment to provide employees if they find a deficiency. These worksite inspections are conducted in addition to the safety inspections performed by supervisors and health and safety managers.

MAWC also has active safety committees at all levels, including safety committees at each work location and a statewide Safety Culture Council. The Safety Culture Council includes representatives from all operating areas, including union and management, and meets to discuss statewide topics regarding safety practices and culture. In addition, MAWC also has union and management representatives on a National Safety Council made up of representatives from American Water's utility subsidiaries, which investigates and shares information about good practices and helps to prioritize safety initiatives for the future.

MAWC also continues to evaluate contractors who must submit safety performance information to demonstrate their commitment to a safe work environment. Contractors with poor safety performance or that don't have a safe work program are disqualified from doing business with MAWC.

Q. How did MAWC perform in the Near Miss Reporting?

A. MAWC has seen good progress since the program's inception in 2015 with more employees becoming engaged in the process. The majority of Near Miss Reports are

now corrected by the individual identifying the issue in the first place by resolving the issue when observed or working with the appropriate people to obtain resources where necessary. In total, approximately 90% of all issues are corrected within 30 days of the report.

Q. Please describe how communication fits within MAWC's safety program.

A. Regularly talking about safety keeps safety top of mind and shows our commitment to safety being a part of everything we do every day. We have implemented several types of communication opportunities in addition to fostering discussions within safety committees and councils discussed above.

- Weekly tailgate talks have been and will continue to be a standard part of our safety program.
- A "Show Me Safety" program was launched in 2017 where employees are acknowledged for demonstrating safe work. Part of the program is to make personalized posters of employees with their families that show a personalized safety message to emphasize that going home with no injuries every day is our vision and to share these messages across the Company.
- Near Miss videos that feature examples of safety awareness as told by the employees that recognized it were also added in 2017. It's a great way to share good practices and experiences within MAWC as well as from around American Water's operations.

Q. How does MAWC plan to continue to improve its safety performance?

A. Delivering comprehensive safety training is at the core of MAWC's plan to improve

safety performance. We are implementing a variety of safety initiatives to enhance employee engagement, improve how we communicate with employees about safety and address particular safety concerns, including:

- training that focuses on preventing our most common injuries. For example, we have already delivered five 10-hour long OSHA training classes to approximately 125 employees at our St. Louis service center in 2017, to which we added training on slips, trips and falls, and strains and sprains, which are by far the two injury categories experienced most by our workers.
- a "Certified Safe Worker" program where employees certify they have completed or demonstrated 6 safety actions in areas such as health screenings, CPR/First Aid training, other safety training, pre-job stretching, stopping an unsafe job, submitting safety improvement suggestions and/or practicing safety at home. To assist workers in achieving some of the criteria, MAWC has committed to train all employees on CPR/First Aid by the end of 2017. To date, approximately 155 employees have completed the criteria to become a Certified Safe Worker, exceeding our goal to have twenty percent (20%) of our workforce achieve this status by the end of 2017.

To further develop and support a robust safety training program, we plan to add a safety training coordinator to our team in 2018 to oversee our training program.

Q. Have the recent attacks on utility workers in the St. Louis area changed your approach to worker security?

A. Yes. Recent attacks on utility worker have prompted us to improve our training for worker security. We have scheduled Active Shooter, Verbal Defense and Influence,

and Gang Awareness training for all of our workers, starting with the St. Louis County field personnel. This training will take place on multiple dates throughout the year. The Company's Enterprise Security team is also a charter member of a "Utility Worker Task Force" being formed by St. Louis area utility companies. The Task Force is comprised of the security leads from Missouri American, Spire, Ameren, Charter, AT&T, and MSD. The purpose is to develop strategies and action plans to solve some of our common safety and security problems, including information sharing and notifications regarding incidents that occur in the field. The Company is also developing a "Safe Streets Training" program, which is an initiative to capture the institutional knowledge of some of our more senior field workers and document it in training modules to share with new hires. We are in the process of identifying union personnel, managers, and supervisors to participate in the information sharing sessions.

Q. How has MAWC's commitment to safety benefited MAWC's customers?

A. A strong safety culture is a cornerstone for any high performing organization. A strong safety culture also improves employee morale, as our employees know that we care for them and their families. In turn, MAWC's safety culture illustrates that our employees are thoughtful in their work, which directly benefits our customers, as safety is one part of our high performing culture. Lastly, strong safety performance reduces safety-related incidents and the attendant costs, which also benefits customers.

V. IMPROVING WATER EFFICIENCY

Q. What is water efficiency?

A. In simple terms, water efficiency means using improved practices and technologies to

deliver water service more efficiently. MAWC's efforts to improve water efficiency cover a wide range, and include supply-side practices, such as water loss reduction efforts and improved meter reading, as well as demand-side strategies, such as customer efficiency and public education programs that provides incentives to improve water and energy efficiency. From an operations perspective, improving water efficiency requires achieving a cost-effective mix of prudent investments and improved operations and maintenance management capabilities targeting safety, customer satisfaction, sustainability, and system efficiency.

Q. Please describe some of MAWC's efforts to improve operating efficiency.

A. The Company continually strives to find more efficient and cost effective ways to operate and maintain its business. As part of that effort, we strive to manage our cost structure as efficiently as possible. We use various operational and efficiency reviews to further focus on improving customer service and efficiency of production and field operations. We also leverage the size and scale of American Water to improve transactional efficiencies through increased automation, the adoption of more effective business processes, and a continuous improvement mindset.

A. Reducing Water Loss

Q. Please describe the Company's program to reduce water loss.

A. Reducing water loss is a very complex issue with many contributing factors. To reduce water loss as effectively as possible, we need to address both apparent and real losses to mitigate unaccounted for water ("UFW"). UFW can be defined in a variety of ways

across the water industry.[4] Non-revenue water ("NRW"), however, is consistently calculated by subtracting the number of gallons of water sold from the number of gallons of water treated. To avoid any ambiguity, American Water, based in part on guidance from AWWA, measures its reduction in water loss in terms of NRW rather than UFW.

As of May 2017, MAWC's 12-month rolling average for NRW was 22.7%, which is down slightly from 23.8% at December 31, 2016. While this demonstrates some improvement, it still reflects a loss of approximately 16 billion gallons of water annually. The Company's plan is to take a more proactive approach to reduce apparent and real losses in order to achieve its long-term NRW goal of 15%. The Company's first step toward achieving that long-term goal is to work on improving its NRW by approximately 4% over the next three years. We added one statewide NRW coordinator in 2017 to better focus our efforts on managing apparent and real losses.

Q. Please describe the difference between apparent and real losses.

A. Apparent and real losses make up the two sides of the NRW equation. Apparent losses represent the difference between the gallons of water delivered and the gallons of water billed to customers. This difference can result from a variety of issues, ranging from estimated bills to theft of service. In any event, the water loss is not caused by a leak in the system. Leaks in the system are captured in real losses. Real losses reflect water

[4] The AWWA had begun to discourage the use of the term Unaccounted for Water (UFW) since 2012 because its definition is inconsistent from organization to organization. There are several opportunities for inconsistency. For example, some organizations may deduct the number of gallons lost during a known main break while other exclude gallons lost as a result of main breaks all together.

treated and sent into the distribution system that is not delivered to customers.

Q. What is MAWC doing to improve apparent losses?

A. Apparent losses can be addressed by improving our implementation and execution of billing processes. One fundamental approach to mitigate apparent losses is to reduce estimated reads. An estimated read by definition is a calculated bill based on previous usage for that customer, which is adjusted once an actual read is obtained. Estimates add more steps in an already long meter-to-cash billing process and can often lead to customer inquiries. Even though our statewide actual read rate was relatively high at over 97% in April this year, it still resulted in over 6,700 estimated reads on a monthly basis. Our goal is to achieve 99% or more actual reads, which our conversion to AMI in St. Louis will help us achieve.

We also plan on reviewing and improving our processes related to fire services. MAWC has approximately 9,000 fire services, over 5,900 of which are unmetered (i.e. there is no meter to detect usage on the fire line). If a customer intentionally or inadvertently tapped into a fire service and used that connection for some other use, there would be no record of the water used through that fire service. Consequently, the Company is unable to bill for that usage. We plan to start field investigations of all unmetered fire services to determine if there is any such unauthorized use but we began by focusing on a billing review of all fire services. In 2017, we initiated fire service review activities and started by analyzing all inactive fire service accounts to confirm the service was truly off and then flagged approximately 300 accounts for further investigation. We then initiated onsite inspections of these sites to confirm whether the

fire services are truly active. To date we have completed field inspections of over one-third of the 300 accounts identified.

Q. What is the Company's main break experience and related expense?

A. MAWC had over 2,800 water main breaks across the state during 2016. The volume of breaks alone is not a good indicator of the distribution system's condition so breaks per 100 miles of pipe is the generally accepted metric used in the industry to gauge distribution system performance. On a statewide basis, MAWC experienced an annual average of 43 breaks per 100 miles of pipe in 2016. MAWC's systems experiences roughly two to three times more main breaks per year than the national average, as reported by a 2012 study published by Utah State University.

Oftentimes, however, main breaks are repaired rather than replacing a property unit of main. In that case, the Company incurs an O&M expense for repairing that main. The number of main breaks repaired in any given year can fluctuate depending on a variety of factors, including weather. For example, in 2014 the Company experienced about 1,000 more main breaks and 14 or more breaks per 100 miles than in 2015 or 2016 due to the polar vortex. In order to appropriately capture the level of expense necessary to repair main breaks during any given year, the Company must account for these potential fluctuations. It is doing so in this case by smoothing out variations in expense that may be related to weather and averaging its main break expense over the past three years. Company Witness Nikole Bowen provides additional detail regarding how main break expense is calculated in this case.

Q. What is MAWC doing to improve on real losses?

A. In addition to using ISRS to support the continued accelerated replacement of aging infrastructure in St. Louis County, MAWC is also addressing real losses by enhancing its leak detection efforts throughout the state. We are using acoustic listening devices to conduct surveys of our systems to assist in determining the condition of our buried infrastructure. Last year, three of the districts completed system acoustic leak detection surveys, each of which identified multiple leaks in each system. Most were small leaks on mains and hydrants that had not surfaced and, therefore, would likely have gone undetected and resulted in a failure that impacted service to customers. The Company's ability to proactively address these leaks saves the customers from potential disruptions in service, the Company from losing millions of gallons of treated and pumped water, and both from bearing the increased costs associated with that water loss. In St. Louis County, we have using in-house acoustic leak detection equipment, including leak detection loggers to listen for leaks in the system at night when customer usage is generally at its lowest. This allows us to better identify noise in the system related to leaks as opposed to other usage.

We are also piloting a new technology that uses satellite imaging to identify areas showing high leakage. The technology uses aerial imaging taken from satellite mounted sensors to spot leakage in underground distribution pipes over a large area. The raw imagery is then overlaid on a geographic information system and is processed by unique algorithms. The algorithm detects treated water, by looking for a particular spectral "signature" typical to drinking water. We will then be presented with a leakage graphic report overlaid on a map showing streets and potential problem areas. Other

utilities have had some success using this technology to locate leaks in very large distribution systems. Over 4,000 miles of pipe in the St. Louis district will be surveyed later in 2017 at a fraction of the cost it would take to do the whole system solely with acoustic devices.

Q. Has MAWC implemented any other programs to help reduce water loss?

A. Yes. MAWC uses its integrated geographic information system ("GIS") mapping information as part of its comprehensive review of water main breaks to identify and better prioritize areas with an abnormally high main break frequency over a defined period. Main breaks are not only costly to repair, but could also interrupt service to customers or result in damage to MAWC property, customer property, and city streets. Being able to identify potential problem areas before main breaks occur could avoid catastrophic failures, reducing the cost of repairs, restoration, and damage to other facilities or property.

In addition to proactively identifying and repairing leaks, a key strategy to reduce leaks is to reduce the number of main breaks in the system. Therefore, we are also taking a closer look at how we operate the system through our pressure management program to help us further reduce main break frequency. This entails distributing pressure sensors in the system sensitive enough to detect pressure surges lasting less than a second. The Company integrates that data into the SCADA database to correlate pressure surges caused by pump and valve operation at the plants or at booster stations. This will lead to better, more targeted investment like variable frequency drive ("VFD") equipment or elevated tanks resulting in fewer main breaks.

More proactive leak detection to identify problem areas before main breaks occur, accelerated pipeline replacement program, and controlling pressure surges are all important ways the Company is working to reduce water loss as well as the cost of repairs, restoration, and damage to property. .

B. Advanced Metering Infrastructure

Q. Please describe the Company's advanced metering infrastructure ("AMI") program?

A. Missouri American is currently installing an Aclara AMI system with primarily Badger meters in its St. Louis County system. As of June 13, 2017, the Company has 46,000 meters equipped with the new AMI technology. AMI radio units have been installed on meters currently in service as well as on new meters replacing those that are due for replacement due to their length of service ("LOS"). The AMI program allows remote reading of our meters at customers' homes and businesses. In his direct testimony, Bruce Aiton describes the level of AMI investment planned through May 31, 2019.

Q. Why is MAWC installing AMI technology?

A. The primary drivers for deploying AMI in St. Louis County are to increase meter reading efficiencies and effectiveness and to transition our customers from quarterly to monthly billing. Monthly billing makes it easier for customers to manage household budgets and detect leaks sooner (potentially reducing high bills and costly damage to customers' homes) . Implementation of AMI will allow MAWC to realign its business processes and redeploy personnel previously focused on meter reading to other work. AMI also enhances customer service, improves employee and public safety, and

reduces costs.

Q. How will AMI improve customer service?

A. The implementation of AMI will increase billing accuracy and reduce the likelihood of estimated bills (e.g., due to weather events or other obstacles to accessing customer meters) by automatically providing timely, accurate reads through the network. In addition, re-reads will be reduced due to the human factor being removed from obtaining the actual read. AMI also has the potential to provide customers with a view to their personal consumption more frequently than monthly, allowing them to monitor their usage – be it for conservation purposes or to identify and address unusually high usage. The transition of customers from quarterly to monthly billing not only will make it easier for customers to manage household budgets, it also will allow Missouri-American's St. Louis County residential customers the option of paying bills under the Company's budget billing plan as they transition to monthly billing.[5]

Q. How does AMI improve employee and public safety?

A. Some MAWC employees are still walking meter routes. Having employees in the field reading meters in potentially unsafe environments, inconvenient locations, inclement weather, and exposed to vehicular traffic, animals, and the like, creates an exposure to potential injuries and accidents. Being able to read meters remotely reduces this potential risk, both for injuries to our employees and injuries and damage to third

[5] Missouri-American's residential customers who are on monthly billing have the option of paying bills under the Company's budget billing plan, whereby the total service for the succeeding twelve (12)-month period is estimated in advance, and bills are rendered monthly on the basis of one-twelfth (1/12) of the twelve (12)-month estimate.

parties.

Q. How will AMI affect operating costs?

A. The deployment of AMI will virtually eliminate the need for manual meter reading in St. Louis County – work currently performed by 18 full time MAWC employees. Over the next several years, MAWC will be able to redeploy most of the 18 full time equivalent positions to improve other areas of operations, including leak detection, valve operation, hydrant maintenance and flushing programs, as well as an enhanced training and safety program.

Q. Are there other benefits of the Company's AMI program?

A. Yes. With the implementation of a meter data management system, the Company will be able to more efficiently collect, organize and analyze large quantities of meter data to support its water loss reduction efforts and improved customer billing. AMI data can be used to uncover irregularities that may signal a leak, meter tampering or water theft. AMI is an example of how prudent investment in technology can produce a wide range of operational benefits. AMI will improve safety, meter reading accuracy, and employee efficiency, and it will enable more proactive and progressive customer service. It will enable us to work smarter and improve water efficiency.

Q. How does MAWC protect the data transmitted across the AMI network?

A. All of the meter reads are encrypted before they are transmitted from the meter across the Company owned network of over 400 collectors and ultimately to the Company's meter read collection database.

C. Enhancing Maintenance Activities

Q. Please explain MAWC's planned valve operation program.

A. MAWC has approximately 125,000 production and distribution valves throughout its system and has developed a plan to inspect and operate these valves on a routine basis. MAWC also considers the criticality of its valves in prioritizing their inspection and operation. Accordingly, over the next several years, the Company plans to implement the following inspection and operation schedule for its valves, which will ultimately result in the inspection and operation of approximately 34,000 valves each year.

Valve Size	Inspection/Operation Schedule
≥ 16"	Annual
10" to 14"	Once Every 2 Years
< 8"	Once Every 5 Years

To sustain the proposed program, we anticipate that we will need 13 full-time equivalent ("FTE") positions, seven (7) of which are included in this case. Five (5) positions are now supporting the program and two additional positions will be available through the redeployment of employees as a result of AMI implementation (discussed in greater detail below).

Q. Why is it important to inspect valves regularly?

A. Routine valve inspection and operation minimizes the potential duration and scope of service disruptions when a main break occurs. When the Company repairs a main break, it first has to isolate the area by closing off certain valves. If the nearest valve to the main break does not work, workers will need to continue searching for operable valves in order to stop the flow of water, isolate the main break, and begin making repairs. Every time a valve is found to be inoperable, crews have to expand the

shutdown area and operate another three or more valves to isolate the break. This not only increases the time it takes to repair the main break, but also increases the length of time service to customers may be impacted as well as the potential number of customers whose service is affected because a larger area had to be isolated in order to make the repairs. Through a valve operation program, MAWC will proactively exercise valves to ensure that they are operational if and when they need to be opened or closed and schedule them for repair if they are not working. As explained above, this proactive approach will help to reduce the time it takes to repair a main break as well as to limit the number of customers whose service is affected by the main break.

Q. Please describe MAWC's planned hydrant maintenance and flushing program.

A. MAWC has over 43,000 hydrants throughout its distribution systems. The primary purpose of hydrants is for public safety to suppress fires. It is critical that hydrants be inspected and operated regularly to ensure they will perform as expected in an emergency. Accordingly, MAWC, is planning to implement an annual, instead of bi-annual, inspection program. To do so, it will need approximately 4 additional FTE's, one (1) of which is included in this case through the redeployment of employees as a result of AMI implementation (discussed in greater detail below).

In addition to annual inspections, the Company also plans routine system flushing. Flushing scours pipes to remove sediment, scale, and biofilm and moves high-velocity water through pipes in a single direction to improve hydraulic and water quality conditions. While MAWC performs flushing when needed to resolve a water quality issue, we have not maintained routine flushing program. Consequently, the Company

plans to flush its system annually by flushing every other hydrant in the system each year (rotating the hydrants flushed each year), which is nearly 22,000 hydrants. We estimate that up to 7 additional people are needed to conduct a thorough flushing program in future years, two (2) of which are included in this case through the redeployment of employees as a result of AMI implementation (discussed in greater detail below).

Finally, our hydrant maintenance program also includes routine hydrant painting. Hydrants are one of the few above-ground facilities that we operate throughout our distribution system and therefore, are visible to our customers. If painting is not done consistently, hydrants can develop surface corrosion that not only looks bad but can lead to performance problems in the long term if not addressed. MAWC's plan is to paint each hydrant every 20 years or approximately 2,000 hydrants each year. Some hydrants still contain lead based paint that must be removed and disposed of in compliance with regulatory requirements. Rather than purchase all the necessary equipment to perform this work, the Company plans to engage a third party contractor with hydrant painting experience to perform hydrant painting for MAWC. Company witness Nikole Bowen explains how hydrant painting expense was calculated for the current test year ending May 31, 2018, and the future test year ending May 31, 2019.

Q. How is MAWC using technology to further enhance its preventative maintenance programs?

A. The Company has a geographic information system that integrates hardware, software, and data for capturing, managing, analyzing and displaying all forms of geographically

referenced information. GIS is our primary platform to view various geospatial datasets (hydrants, pipes, valves, pressure gradients, etc.) and is used by employees across the business. Our GIS team has begun to map our valve exercising routes in each district, allowing our employees to exercise valves in a more efficient manner. Distribution crews can use GIS in the field to identify the network of valves needed to isolate water mains for repair or replacement. GIS also allows our employees to update simple inspection fields to initiate a work order and track progress in the Company's Computerized Maintenance Management System ("CMMS") for valves that have been operated during an inspection and need follow up maintenance or replacement.

Q. Is the Company incurring increased operating expense associated with particular plant maintenance?

A. Yes. In 2016, our production staff in St. Louis County notified us that two critical water treatment pipelines had become restricted over the years with lime scale. We estimate that the cleaning program will last seven years and that the Company will incur $572,338 and $577,108 in expense during the current test year and future test year, respectively, with a similar level of annual expense for the remainder of the cleaning program.

Q. Does the Company also anticipate increased operating expenses for its tank-painting program?

A. Yes. The Company has 119 above ground water storage tanks it must maintain. These tanks are critical to the Company's operations for the safe delivery of water and for fire protection. The Company is committed to maintaining these tanks by prioritizing tank

painting through Company and third party inspections. MAWC inspects each tank the third year after painting, the fifth year after painting, and then every 5 years after that. We expect a tank paint coating to last 12 to 15 years and prioritize which tanks to paint based on inspection reports. Based on current tank inspection reports, seven tanks need their interior surface painted and ten need their exterior surface painted from 2017 through the end of the future test year, May 31, 2019.[6] Company witness Nikole Bowen describes how the tank painting expense was calculated in this case.

VI. EMPLOYEE LEVELS AND COMPENSATION

Q. Please discuss how MAWC staffs its business operations.

A. The Company continually strives to find more efficient and cost effective ways to operate and maintain its business. As part of that effort, we strive to manage our cost structure as efficiently as possible, including employee costs. We recognize our duty to staff our business in a manner consistent with the provision of safe, reliable and affordable service. This requires a constant evaluation of the right mix of internal and contract labor, straight time versus overtime, training programs, and replacing labor with technology. We continue to evaluate costs and expenses going forward, always looking for the best solution for the unique and changing challenges we face. A large portion of our cost structure is for labor, and as a position becomes vacant in our organization, we look to the value of that position. We review the overall need for that position and consider, among other things, whether it should be transferred to another

[6] The Company is in the process of or scheduled to paint both the interior and exterior of two tanks in 2017, Tesson Ferry#1 and Kehr's Mill. The Company anticipates painting both the interior and exterior of two additional tanks in 2018, Agency Tank, and Stratmann #2, as well as the exterior only of the Clayton and King Hill #2 tanks in 2018. Finally, in 2019 the Company plans to paint the interior and exterior of three additional tanks, Rockwood, Hazelwood #1, and CP WW #1, as well as the exterior only of the Stonebridge Ground tank.

area, modified, or even eliminated. Cost control and improved business performance are the goals of these efforts. We continue to evaluate the new roles that will be created as new regulatory requirements are promulgated, and the appropriate positions that MAWC will need to optimize new technology and most effectively serve our customers.

Q. Is the Company proposing to redeploy any positions in this case?

A. Yes. The Company will implement AMI over the next several years and expects to complete its implementation in St. Louis County by the end of 2021 or early 2022. Over the next several years, the Company plans to redeploy up to 15 meter readers and up to 6 field service representative ("FSR") positions as it implements AMI in St. Louis County to address important operational needs. By May 31, 2018, the Company will redeploy one (1) meter reader and one (1) FSR position to positions that will enhance the Company's safety training and valve operation programs. By May 31, 2019, the Company will redeploy an additional three (3) meter readers and one (1) FSR position to its valve operation and flushing programs.

	Redeployed Positions as of May 31, 2018	Redeployed Positions as of May 31, 2019
Valve Operations	1	1
Flushing	0	2
Hydrant Maintenance	0	1
Training Coordinator – Safety & Skills	1	0
	2	**4**

Q. What is MAWC's forecasted staffing level in this case?

A. We have identified 696 full time equivalent ("FTE") employees and twelve (12)

temporary summer employees as the appropriate staffing level for the Company's water and sewer operations. The number of employees is based upon each department's and functional area's plans to continue providing safe, adequate, reliable and affordable service to our customers. Service needs and related resource requirements are consistent with meeting regulatory requirements, tariff requirements, industry standards, service requests, customer needs, and providing support to the business operations in the most cost-effective way to best serve the long-term interests of our customers. The direct testimony of Nikole Bowen explains how the Company's labor and labor-related costs were determined.

Q. Please explain why it is necessary to increase MAWC's authorized staffing level.

A. Following the loss of ISRS early in 2016, the Company decided that it would keep the employee complement existing at that time but not fill open positions arising throughout the year as a result of attrition. Consequently, MAWC's employee level reduced from 659 to 641 FTEs through the course of the year. MAWC currently employs 645 FTEs (excluding the 12 temporary summer employees noted above) and expects to reach the requested employee complement of 696 by the end of 2017. These employees will support the Company's enhanced maintenance activities and increased capital investment. A list of positions the Company intends to fill by the end of this year is attached hereto as Schedule WAC-1.

While the Company has been able to provide safe and adequate service to its customers, the Company's requested employee complement balances near term cost control with service levels that, over time, provides more cost-effective water and sewer service to

our customers.[7] This means rather than simply doing what needs to be done to keep the water flowing and to collect and treat sewage, the Company strives to provide safe, reliable and affordable service in the most cost-effective way to best serve the long-term interests of our customers.

Q. Please describe MAWC's approach to employee compensation.

A. Missouri American aims to offer compensation that is on par with that offered by the companies that MAWC competes with for employees so we can attract and maintain committed, dedicated and highly qualified employees. Therefore, MAWC targets its total direct compensation (base and variable compensation) for each role at the Company near the market median (50th percentile) for that role.

Q. Please identify the various employee classifications at MAWC and briefly describe how each group is compensated.

A. There are three classifications of employees at MAWC: union hourly employees, non-union hourly employees, and exempt employees. Union hourly employees receive base pay, overtime pay and possibly shift pay. Non-union hourly employees receive base pay, overtime pay, and are eligible for performance pay. Exempt employees receive base pay but are not compensated for overtime. They, too, are eligible for performance pay. Each classification of employees' total compensation, therefore, includes fixed pay (base pay) and some form(s) of variable pay (e.g., overtime, shift pay, or performance pay).

[7] The Company requested recovery for 693 FTEs in its last rate case.

Q. How is variable compensation provided to exempt and non-union hourly employees?

A. Variable compensation is provided to exempt employees through the Company's Annual Performance Plan ("APP") and Long-Term Performance Plan ("LTPP"). In 2016, the APP was expanded to include non-union hourly employees as well. The direct testimony of MAWC witness Robert Mustich discusses the reasonableness of MAWC's performance pay program.

Q. Please generally describe the purpose of the APP and the LTPP.

A. The plans are designed to provide compensation for operational and financial performance, and to focus plan participants on delivering safe, reliable and affordable water and sewer services.

Q. Does the Company's compensation plan benefit customers?

A. Yes. As I mentioned, the plan is designed to provide compensation for performance and to focus plan participants on delivering safe, reliable and affordable water and sewer service. The compensation plan includes components of financial, operational, and individual measures. The operational components measure performance that can most directly influence customer satisfaction, health and safety, environmental performance, and operational efficiency. Customers derive a direct benefit from our focus on these key measures in the plan. Further, well-grounded financial measures keep the organization focused on improved performance at all levels of the organization, particularly in increasing efficiency, decreasing waste, and boosting overall productivity.

All of these aspects of overall performance benefit customers by rewarding superior performance in every function. This superior performance supporting our improved O&M efficiency is the result of having a workforce that is incented to find smarter, more efficient ways to deliver water and sewer services.

Finally, a financially healthy utility focused on efficiency and customer satisfaction is able to attract the capital investments necessary to provide safe and reliable service and to maintain the technological expertise necessary to operate the company and comply with increasing water quality standards. A financially healthy utility is very much in the interest of MAWC's customers, as it helps ensure MAWC the ability to provide safe and reliable service at the lowest reasonable cost.

Q. Does this conclude your direct testimony?

A. Yes.

Open Positions

Position	FTE	Location	Cost Center	U/NU
GIS Tech	1.0	St Louis	170114	Non Union
Sr Project Eng	1.0	St Louis	170114	Non Union
Sr Project Eng	1.0	St Louis	170114	Non Union
Sr Project Eng	1.0	St Louis	170114	Non Union
Sr Project Eng	1.0	St Louis	170114	Non Union
Engineer	1.0	St Louis	170114	Non Union
Project Mgr Eng	1.0	St Louis	170114	Non Union
Project Engineer	1.0	Parkville	170114	Non Union
Sr Eng Tech	1.0	St Louis	170114	Non Union
Sr ORM Spec	1.0	St Louis	170120	Non Union
Supv Ops II	1.0	St Louis	170106	Non Union
Spec Service Delivery	1.0	St Louis	170106	Non Union
Supervisor Ops I	1.0	St Louis - Prod	170253	Non Union
Supervisor Ops I	1.0	St Louis - Prod	170201	Non Union
Supervisor Ops II	1.0	St Louis - Prod	170201	Non Union
Specialist Ops	1.0	St Louis - Prod	170253	Non Union
Assistant Operator	1.0	St Louis - North Plant	170251	Union
Sub Station Operator Helper	1.0	St Louis- - North Plant	170251	Union
Sub Station Operator Helper	1.0	St Louis - Central Plant	170253	Union
Sr Operator	1.0	St Louis - Central Plant	170253	Union
Operator Helper	1.0	St Louis - North Plant	170251	Union
Utility Worker	1.0	St Louis - Central Plant	170253	Union
Mgr Ops	1.0	St Louis	170206	Non Union
Garage Mechanic Lead	1.0	St Louis	170223	Union
Service Building Janitor	1.0	St Louis	170223	Union
Ops Tech	1.0	St Louis	170206	Non Union
Dist Field Worker	1.0	St Louis	170206	Union
Dist Field Worker	1.0	St Louis	170206	Union
Dist Field Worker	1.0	St Louis	170206	Union
Dist Field Worker	1.0	St Louis	170206	Union
Dist Field Worker	1.0	St Louis	170206	Union
Dist Field Worker	1.0	St Louis	170206	Union
Dist Field Worker	1.0	St Louis	170206	Union
Dist Field Worker	1.0	St Louis	170206	Union
Dist Field Worker	1.0	St Louis	170206	Union
Dist Field Worker	1.0	St Louis	170223	Union
Dist Field Worker	1.0	St Louis	170233	Union
Dist Field Worker	1.0	St Louis	170223	Union
Dist Field Worker - Equipment Operator	1.0	St Louis	170206	Union
Specialist Ops	1.0	Jefferson City	171205	Non Union
Plant Operator	1.0	Jefferson City	171201	Non Union
Utility Worker	1.0	Jefferson City	172706	Non Union

Position	FTE	Location	Cost Center	U/NU
Utility Worker	1.0	Jefferson City	172706	Non Union
Utility Worker	1.0	Jefferson City	172706	Non Union
Utility Worker	1.0	Jefferson City	172706	Non Union
Utility Worker	1.0	Mexico	171006	Union
Service Worker	1.0	Joplin	171121	Union
Plant Operator	1.0	Joplin	171101	Union
Utility Worker	1.0	Tri-County	172806	Non Union
Process Tech	1.0	St Joseph	170301	Union
Utility Person	1.0	St Joseph	170306	Union
	51.0			