

Exhibit No. 211

Staff – Exhibit 211
Testimony of Jarrod J. Robertson
Direct/Rebuttal
File No. WR-2024-0320

Exhibit No.:
Issue(s): *Normalized &
Declining
Residential
Customer Usage*
Witness: *Jarrod J. Robertson*
Sponsoring Party: *MoPSC Staff*
Type of Exhibit: *Direct / Rebuttal
Testimony*
Case No.: *WR-2024-0320*
Date Testimony Prepared: *December 6, 2024*

MISSOURI PUBLIC SERVICE COMMISSION

INDUSTRY ANALYSIS DIVISION

WATER, SEWER, GAS & STEAM DEPARTMENT

DIRECT / REBUTTAL TESTIMONY

OF

JARROD J. ROBERTSON

MISSOURI-AMERICAN WATER COMPANY

CASE NO. WR-2024-0320

*Jefferson City, Missouri
December 6, 2024*

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JARROD J. ROBERTSON
MISSOURI-AMERICAN WATER COMPANY
CASE NO. WR-2024-0320

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1 **DIRECT / REBUTTAL TESTIMONY**

2 **OF**

3 **JARROD J. ROBERTSON**

4 **MISSOURI-AMERICAN WATER COMPANY**

5 **CASE NO. WR-2024-0320**

6 Q. Please state your name and business address.

7 A. My name is Jarrod J. Robertson. My business address is 200 Madison Street,
8 Jefferson City, Missouri 65102.

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

10 A. I am employed by the Missouri Public Service Commission (“Commission”) as
11 a Senior Research/Data Analyst with the Water, Sewer, Gas & Steam Department of the
12 Industry Analysis Division, a member of Commission Staff (“Staff”). My credentials and a
13 listing of cases in which I have filed testimony previously before the Commission are attached
14 to this direct/rebuttal testimony as Schedule JJR-dr1.

15 **EXECUTIVE SUMMARY**

16 Q. What is the purpose of your direct/rebuttal testimony?

17 A. The purpose of my testimony is to describe the method Commission Staff
18 (“Staff”) recommends in normalizing Missouri-American Water Company’s (“MAWC”)
19 residential customer usage, and to sponsor the corresponding billing determinants utilized by
20 the Commission’s Auditing Department in calculating Staff’s annualized revenues, to address
21 the direct testimony of MAWC witness Max W. McClellan, regarding forecasting of future
22 customer usage, and to explain Staff’s analysis of trends in residential customer usage.

1 The calculated normalized residential customer usage data is attached to this Testimony as
2 Schedule JJR-dr2.

3 The method Staff utilized to calculate annual revenues is explained in the direct/rebuttal
4 testimony of Staff witness, Ashley Sarver.

5 **NORMALIZED RESIDENTIAL CUSTOMER USAGE**

6 Q. What is data normalization?

7 A. Normalization is the method utilized to organize data in order to fit into a
8 specific field or standardized form, in this case customer usage represents data. The process of
9 normalization is advantageous as by creating homogenous data sets, it allows for a thorough
10 and unified view for a specific subject and simplifies the data for continued analysis.
11 This adjustment to customer usage affords a comparison between different sets of
12 heterogeneous source data. Customer usage data is derived from individual systems, each with
13 its own particular characteristics, such as location of the system, differences in climate, number
14 of customers on the system, and system-specific water rates which may affect
15 discretionary customer use.

16 Q. Why is it necessary to normalize customer usage data when calculating
17 annual revenues?

18 A. Normalized water usage is one of the main billing determinants the Commission
19 utilizes to establish commodity rates on a going forward basis. In this particular instance,
20 billing determinants are customer usage data utilized to calculate customer's bills or to
21 determine the overall revenue from rates for the entirety of a customer base.
22 Properly normalizing usage levels is important, if normalized usage levels do not correspond to
23 actual usage, the utility may not collect its Commission-authorized revenue. To summarize,

1 if normalized usage levels are too high compared to actual usage, the result will be a lower
2 commodity/usage rate, and the utility may under-earn, meaning the utility may earn less than
3 its Commission-authorized revenue. Likewise, if normalized usage levels are too low, the result
4 would be a higher commodity/usage charge, and the utility may over-earn,
5 meaning the utility may earn more than its Commission-authorized revenues. While there are
6 many variables that determine if the utility collects more or less than its Commission-authorized
7 revenues, it is important to establish a fair commodity/usage charge in order to lessen the effect
8 this aspect has to alter revenues.

9 Therefore, a normalized level of customer usage must be determined in order to properly
10 calculate normalized revenues.

11 Q. In general terms, please explain how the Commission sets rates.

12 A. Generally, in a rate case, the Commission determines an annual amount of
13 revenue the utility requires in order to cover its cost of service, in addition to receiving a return
14 on MAWC's investment. This amount is designated as the revenue requirement, and it is this
15 revenue requirement which is used to calculate rates. For most customers there are two
16 components in a water utility's rate or bill structure; a monthly customer charge, which is a
17 "fixed" rate, and a commodity or usage rate. For some customers, who are "un-metered" a flat
18 rate is calculated that is designed to recover the same revenue as metered customer's rates.

19 Q. How is the monthly customer or fixed rate calculated?

20 A. The customer/fixed rate, is generally calculated by dividing the portion of the
21 water utility's Commission-authorized revenue requirement that is not dependent on usage by
22 the total number of customers. In situations where the resulting calculation concludes in an

1 unreasonably low or high customer charge, some of the cost recovery may be shifted to or from
2 the costs recovered in the commodity charge.

3 Q. Generally, how is the commodity, or usage, rate calculated?

4 A. The commodity/usage rate is calculated by dividing the remaining portion of the
5 Commission-authorized revenue requirement by the normalized customer usage levels.
6 As discussed earlier, if the normalized usage levels do not align properly with actual usage,
7 the utility may not collect its Commission-ordered revenues. And likewise, if normalized
8 customer usage levels are too high, the commodity/usage rate will be lower, and if normalized
9 customer usage levels are too low, the commodity/usage charge will be higher, and the utility
10 may over-collect. While there are many variables that determine if a water utility collects more
11 or less than its Commission-authorized revenues, it is important to establish a fair
12 commodity/usage rate to lessen the effect this aspect has to alter revenues.

13 Q. What data did Staff analyze to compute normalized residential customer usage
14 for the purpose of calculating annual revenues?

15 A. One variable investigated in determining annual revenues is customer usage.
16 In this rate case, Staff gathered data related to residential customer usage on a per-day basis,
17 within specific MAWC service areas (as identified by MAWC as “profit centers”), and/or an
18 entire tariff district, in which MAWC provides metered water service. In the context of
19 information gathering, a service area refers to the data related to an individual service territory
20 or single profit center, while a tariff district refers to the grouping of data related to two or more
21 service areas/territories or profit centers.

22 Q. Where did Staff obtain the residential customer usage data utilized in calculating
23 normalized usage?

1 A. Staff reviewed the historical usage data contained within “2024 GRC – MoPSC
2 0067_Attachment 1(1)” which MAWC provided in its response to Staff Data Request (“DR”)
3 No. 0067. This data provided Staff with monthly customer usage and monthly customer counts,
4 per MAWC service area.

5 Q. Where any service areas excluded from this analysis?

6 A. The Rankin, Monsees, White Branch, and Ironton service areas were excluded
7 from this analysis, as they do not have metered water rates and/or usage data.

8 Q. What method did Staff utilize to normalize residential customer usage in order
9 to calculate MAWC’s annual revenues?

10 A. Staff concluded that the most reasonable method to determine residential annual
11 customer usage it to use a five (5) year average of actual usage for the period January 2019
12 through December 2023 to calculate per residential customer, per day, and per district averages.
13 Averaging the data over the most recent five-year period represents reliable data and provides
14 evidence of recent trends in customer usage. Many variables may influence customer usage,
15 including water rates, installation of more efficient appliances, and changes in discretionary
16 practices, such as reduced lawn sprinkling/irrigation. Usage may also be affected by external
17 factors, such as change in climate. The impact of these factors may change over time; therefore,
18 using the most recent five years of data is a reasonable approach that uses actual data to support
19 an annualized level of usage, while also providing for a reasonable determination of customers’
20 usage habits.

21 Q. Why is utilizing a five-year average to normalize customer usage versus a
22 ten (10) year statistical linear regression analysis, as proposed by MAWC,
23 the appropriate approach?

1 A. Staff's method is a reasonable approach that utilizes actual data to support an
2 annualized level of usage. Averaging the data over the most recent five-year period produces
3 reliable data and evidence of recent trends in customer usage. As discussed earlier,
4 many factors, such as more efficient appliances, conservation, irrigation, and climate change
5 impact water usage. These factors change over time; therefore, using the most recent five years
6 of data provides for a reasonable determination of customers' usage habits, while avoiding
7 using data too old to reflect the current situation. Furthermore, Staff's utilization of each service
8 area's unique data is reasonable because the usage characteristics of each service area are
9 different from the other service areas.

10 Q. Why is focusing on recent usage patterns important?

11 A. It is important to focus on recent usage behavior as rates for MAWC are
12 generally set for a two to four-year period.

13 Q. Regarding the inclusion of customer usage per service area in Staff's
14 calculations, did Staff exclude any service area, other than those without metered rates?

15 A. No.

16 Q. Were any other adjustments made regarding residential customer usage?

17 A. Yes. Staff combined the negative 2021 residential usage data points associated
18 with the Ozark, Stonebridge, Saddlebrook, Tri-States, Emerald Pointe and Woodland Manor
19 systems, and merged them into the Branson Metro system, as those negatives were the result of
20 adjustments made by MAWC in the consolidation of said systems into the
21 Branson Metro system.

22 **RESIDENTIAL CUSTOMER DECLINING USAGE**

23 Q. What method did MAWC utilize to calculate residential customer usage?

1 A. MAWC performed a ten (10) year statistical linear regression analysis.

2 Q. What is a statistical linear regression analysis?

3 A. A linear regression analysis is utilized to predict or define a value to a specific
4 dependent variable based upon the defined value of a known or independent variable. In this
5 case, residential customer usage equates to the dependent variable, while the independent
6 variables are defined by MAWC.

7 Q. What independent variables did MAWC utilize in assigning value to the
8 dependent variable, residential customer usage?

9 A. As discussed on pages 42 through 43 of McClellan's direct testimony,
10 two separate models were developed for St. Louis County (tariff district 1) customer usage and
11 non-St. Louis County (tariff district 2) customer usage. The models use 120 months of monthly
12 data beginning in January 2014 through December 2023. Each regression model utilizes
13 independent variables that can be broken down into four categories to explain monthly use per
14 customer. The four categories are weather, time, COVID-19 and other "monthly indicators".

15 Q. Does Staff have any issues with MAWC's method in estimating
16 customer usage?

17 A. Yes. Staff identified multiple issues within MAWC's analysis.

18 Q. What is the first issue with MAWC's analysis?

19 A. Staff questions using an independent variable related to weather/climate data
20 concerning an individual calendar month in order to explain the effect on a specific billing
21 month's usage.

22 Q. Why does Staff question the validity of using a calendar month's climate data
23 when describing the impact thereof upon a specific billing month's usage?

1 A. A billing month cycle does not necessarily run from the first day of the month
2 to the last day of the month. A billing month's usage may be affected by a climate pattern that
3 spans multiple months. Depending on what date the billing cycle began, a billing month may
4 be impacted by weather from the proceeding or following month, in addition to the current
5 month. For example, while the usage tied to a February monthly bill may be attributed to
6 weather during February, it may be more appropriate to associate this usage with weather in
7 both February and March, if the billing cycle is something other than the first day of February
8 to the last.

9 Staff's averaging method does not attempt to define and report on any usage data tied to
10 a particular month and said month's climate effect. While this climate data is certainly a
11 component of calculating an annual normalized level of usage, it is not necessary to separate
12 this data out in order to perform said calculation of an annual average. Staff's method accounts
13 for both monthly usage data and monthly climate data within its five (5) year average.

14 Q. What is another issue with MAWC's customer usage analysis?

15 A. Another issue relates to the timing of one independent explanatory variable in
16 MAWC's ten (10) year linear regression analysis.

17 Q. What is the independent variable utilized by MAWC that Staff questions?

18 A. Staff questions using the length and/or timeframe that the impact of COVID-19
19 is included in MAWC's statistical linear regression analysis.

20 Q. What specifically does Staff question, regarding the inclusion of the COVID-19
21 independent explanatory variable and subsequent timeframe?

22 A. According to MAWC's testimony and associated workpapers, it appears the
23 independent explanatory variable associated with COVID-19 is accounted for, starting

1 April, 2020 at 100% and through December 2022. Yet, Staff believes the COVID-19 variable
2 should have been removed as early as June 2020.

3 Q. Why does Staff believe June 2020 is a more appropriate removal date for the
4 COVID-19 variable?

5 A. On June 11, 2020, Governor Mike Parson announced¹ that Missouri would
6 fully reopen on June 16, 2020. Therefore, Staff's position is that it is reasonable to remove the
7 impact of COVID-19 from the analysis as of June 16, 2020. In addition, in June of 2020,
8 the United States Department of Labor - Occupational Safety and Health Administration
9 published "Guidance on Returning to Work,"² which assists employers and employees in
10 safely returning to the workplace and reopening businesses. This further supports Staff's
11 position that the impact of COVID-19 should be removed from MAWC's statistical linear
12 regression analysis as of June 2020.

13 Q. Did Staff use any factors to adjust for COVID-19 impact?

14 A. No. Staff did not perform any calculation using specific factors and/or
15 independent explanatory variables, as Staff's five (5) year average includes all environmental
16 impacts, as well as recent usage trends.

17 Q. Are there any remaining issues related to McClellan's direct testimony
18 you wish to discuss?

19 A. Yes. Staff would like to address the differences in the results of MAWC's and
20 Staff's declining usage analysis.

¹ Office of Governor Mike Parson, June 11, 2020, Governor Mike Parson Announces Missouri Will Fully Reopen, Enter Phase 2 of Recovery Plan on June 16, [Press Release]: <https://governor.mo.gov/press-releases/archive/governor-parson-announces-missouri-will-fully-reopen-enter-phase-2-recovery>

² Occupational Safety and Health Administration. (2020, June). *Guidance on Returning to Work*. <https://www.osha.gov/sites/default/files/publications/OSHA4045.pdf>

1 Q. What is the meaning of the term, “declining usage”?

2 A. The term “declining usage” refers to either a reduction in the volume of water
3 per customer used on a daily, weekly, and/or annual basis, and/or a reduction in the total volume
4 of water used.

5 Q. What affect does declining usage have on calculating appropriate revenues?

6 A. If not accounted for properly, an alleged decline in volumetric water
7 consumption may affect the ability for MAWC to meet its Commission-authorized
8 revenue requirement.

9 In summary, normalized usage is one of the billing determinants the Commission
10 utilizes to establish commodity rates, and the process of normalizing customer usage affords an
11 entity the ability to appropriately account for usage. If normalized usage levels do not correlate
12 to actual usage, MAWC may collect more or less than its Commission-ordered revenues,
13 and if normalized usage levels are too high, the commodity/usage rate will be lower,
14 and if normalized usage levels are to low, the commodity/usage rate will be higher. While there
15 are many factors that determine if the water utility collects more or less than its
16 Commission-authorized revenues, it is important to establish a fair commodity/usage rate to
17 lessen the effect this aspect has to alter revenues.

18 Q. What is Staff’s recommendation for addressing the trend of declining residential
19 customer usage and its effect on calculating, and MAWC receiving, its
20 Commission-authorized revenues?

21 A. In this rate case, Staff gathered data related to residential customer water usage
22 on a per day basis, within Tariff District 1 and Tariff District 2 where metered usage
23 data was available.

For its analysis, Staff reviewed historical residential customer water usage data and residential customer counts MAWC provided. Staff determined that the most reasonable method to determine annual customer usage was to use a five (5) year average of usage for the period January 2019 through December 2023.

Q. Why does Staff believe that using a five (5) year average to normalize residential customer usage, as well as analyze trends in customer usage is the most reasonable approach?

A. Staff's approach is reasonable because it uses actual data to support an annualized level of usage. Averaging the data over the most recent five (5) year period represents reliable data and provides evidence of recent trends in customer usage. While many factors affect water usage, these factors change over time; therefore, using the most recent five (5) years of data provides for a reasonable determination of customers' usage habits while avoiding using data so outdated, it no longer reflects the current situation.

Q. Has Staff performed any analysis comparing Staff's five (5) year average versus MAWC's ten (10) year statistical linear regression analysis, regarding normalization of residential customer usage and the ongoing trend of residential customer usage?

A. Yes. Table I, below, presents a comparison of residential customer usage between Staff and MAWC, on an annual residential customer usage volumetric scale:

Table I					
Tariff District 1					
A	B	C	D	E	F
	Annually	Total Annual Decline in Usage	Units	Total Annual \$ (Column D/1000)	Total Annual \$ Per Customer
Staff 5yr Res. Avg Decline/Customer (Actuals)	-1,407	(1,407*319,003) = 448,837,221	448,837,221*7.7604	-\$3,483,156.37	-\$10.92
Co. Predicted 10yr Res. Avg Decline/Customer	-1,000	(1,000*322,271) = 322,271,000	322,271,000*7.7604	-\$2,500,951.87	-\$7.76
	-407		-	-\$982,204.50	-\$3.16
Tariff District 2					
A	B	C	D	E	F
	Annually	Total Annual Increase/Decline in Usage	Units	Total Annual \$ (Column D/1000)	Total Annual \$ Per Customer
Staff 5yr Res. Avg INCREASE/Customer (Actuals)	2302	(2,302*130,609) = 300,661,918	300,661,918*8.3781	\$2,518,975.62	\$19.29
Co. Predicted 10yr Res. Avg Decline/Customer	-600	(600*119,281) = 71,568,600	71,568,600*8.3781	-\$599,608.89	-\$5.03
	1702		-	\$1,919,366.73	\$14.26

1 Q. What does the comparison in Table I between Staff and MAWC's
2 calculations show?

3 A. The above table compares the calculated amount of decline or increase in
4 residential water consumption on an annual scale, and the impact of each in dollars,
5 see bullet points below for a summary of the data:

- 6 • Tariff District 1;
 - 7 ○ Utilizing its five (5) year average, Staff calculated an annual decrease of
 - 8 ~1407 gallons on a per residential customer usage scale;
 - 9 ■ This decrease in annual residential customer usage equates to a
 - 10 decrease in annual revenues of ~\$3,483,156,369;
 - 11 • This decrease in annual revenues equates to \$10.92 less
 - 12 in revenue per customer annually.
 - 13 ○ Utilizing its 10yr linear regression analysis, MAWC calculated an annual
 - 14 decrease of ~1000 gallons on a per residential customer usage scale;
 - 15 ■ This decrease in annual usage equates to a decrease in annual
 - 16 revenues of ~\$2,500,951,868;
 - 17 • This decrease in annual revenues equates to ~\$7.76 less
 - 18 in revenue per customer annually.
- 19 • Regarding Tariff District 1, the difference between Staff and MAWC on an
- 20 annual dollar scale is ~\$982,204,501, and ~\$3.16 less per customer in annual
- 21 revenue.
- 22
- 23 • Tariff District 2;
 - 24 ○ Utilizing its five (5) year average, Staff calculated an annual *increase* of
 - 25 ~2,302 gallons on a per residential customer usage scale;
 - 26 ■ This *increase* in annual residential customer usage equates to an
 - 27 *increase* in annual revenues of ~\$2,518,975,615;
 - 28 • This *increase* in annual revenues equates to an additional
 - 29 \$19.29 in revenue per customer annually.
 - 30 ○ Utilizing its 10yr linear regression analysis, MAWC calculated an annual
 - 31 decrease of ~600 gallons on a per residential customer usage scale;
 - 32 ■ This decrease in annual residential customer usage equates to a
 - 33 decrease in annual revenues of ~\$599,608,887;
 - 34 • This decrease in annual revenues equates to \$5.03 less in
 - 35 revenue per customer annually.

- Regarding Tariff District 2, the difference between Staff and MAWC on an annual dollar scale is ~\$1,919,366,727, and an additional ~\$14.26 per customer in annual revenue.

Q. Regarding the calculated annual change in residential customer water usage for each tariff district, does Staff have an explanation for why Staff and MAWC are somewhat similar regarding Tariff District 1, but vastly different concerning Tariff District 2?

A. Tariff District 1, the St. Louis County and the Pevely Farms service areas, are a much more localized service territory, while Tariff District 2 represents “all other” MAWC service areas throughout the entirety of the state. The affect of the “independent variables” utilized in MAWC’s linear regression analysis would result in a wide range of outcomes between each of the Tariff District 2 service territories, as well as the district overall, due to differences in usage patterns as a result of weather/climate, and differences in discretionary use.

Q. Is there any other data supporting Staff’s five (5) year averaging technique that Staff would like to present?

A. Yes. And with the understanding that a correlation exists between a higher usage per customer per day, and a lower annual average volume of decline per customer. The more customers are using daily, the less the amount of annual decline, or in some cases, an increase in annual usage may occur, much like what the results of Staff’s five (5) year method reveal for Tariff District 2.

The table below, Table II, represents residential customer usage on a per day basis for both Tariff District 1, and 2, from 2019 through 2023:

<u>D1</u>			<u>D2</u>	
	Per Day			Per Day
2023	207.0702		2023	154.8614
2022	206.2013		2022	155.1024
2021	200.9525		2021	152.4711
2020	211.3091		2020	119.1618
2019	197.9667		2019	110.7214

- D1

- This data displays an increase per day per residential customer usage for Tariff District 1, for three (3) out of the four (4) possible data points from 2019 through 2023;
 - 2019 – 2020 = +13.34 gallons per day;
 - 2021 – 2022 = +5.24 gallons per day;
 - 2022 – 2023 = +0.88 gallons per day;
 - 2020 – 2021 = -10.35 gallons per day.

- D2

- This data displays an increase in per day residential customer usage for Tariff District 2, for three (3) out of the four (4) possible data points from 2019 through 2023;
 - 2019 – 2020 = +8.44 gallons per day;
 - 2020 – 2021 = +33.30 gallons per day;
 - 2021 – 2022 = +2.63 gallons per day;
 - 2022 – 2023 = -0.24 gallons per day.

Q. What is Staff's conclusion based on comparisons between Staff's averaging methodology versus MAWC's linear regression methodology?

A. Staff's five (5) year average incorporates more recent data, therefore capturing the most recent trends, while also not including independent variables which may have been accounted for in calculations incorrectly and/or for too long a duration(s).

Q. What is Staff's recommendation?

A. Staff recommends the Commission approve Staff's five (5) year average method in calculating normalized customer usage in order to determine normalized levels of revenues for the utility.

Direct / Rebuttal Testimony of
Jarrod J. Robertson

- 1 Q. Does this conclude your direct / rebuttal testimony?
- 2 A. Yes it does.

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of Missouri-American Water Company's)
Request for Authority to Implement a General Rate)
Increase for Water and Sewer Service Provided in)
Missouri Service Areas)
Case No. WR-2024-0320

AFFIDAVIT OF JARROD J. ROBERTSON

STATE OF MISSOURI)
)
COUNTY OF COLE) ss.

COMES NOW JARROD J. ROBERTSON and on his oath declares that he is of sound mind and lawful age; that he contributed to the foregoing *Direct / Rebuttal Testimony of Jarrod J. Robertson*; and that the same is true and correct according to his best knowledge and belief.

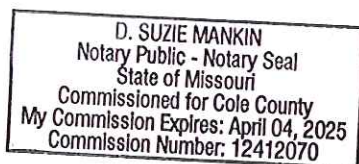
Further the Affiant sayeth not.




JARROD J. ROBERTSON

JURAT

Subscribed and sworn before me, a duly constituted and authorized Notary Public, in and for the County of Cole, State of Missouri, at my office in Jefferson City, on this 26th day of November 2024.





Notary Public

Jarrold J. Robertson

As a Senior Research/Data Analyst, with the Water, Sewer and Steam Department of the Commission Staff Division my core duties revolve around being a Case Manager for small and large company rate Cases, requests for Certificate of Convenience and Necessity (“CCN”) related to acquisitions, mergers/sales, and/or transfer to non-profit, as well as tariff variances filed with the Commission. These duties include, but are not limited to: setting up the case Activities Timeline; authoring Customer Notice(s); coordinating meetings and correspondence between Staff, Office of the Public Counsel (“OPC”), and the utilities; disseminating information between Staff, OPC and the utilities; reviewing and if necessary, revising utilities’ tariff(s), as well as performing rate design and authoring testimony when appropriate. I also hold both a Water Distribution Level – 1 and Wastewater Treatment Level – D, Operations Certification, in order to perform site inspections, where applicable.

Educational Background and Work Experience

Prior to starting at the Commission, in July of 2015, I worked as an Environmental Specialist at the Missouri Department of Natural Resources (DNR) for both the Hazardous and Solid Waste Management Programs, from October 2008 – July 2015. I worked for the University of Missouri, Columbia as a Research Specialist from 1998 – October 2008, in the Agronomy, Animal Science and Biochemistry Departments, respectively.

While at DNR, as Project Manager in both the Hazardous and Solid Waste Management Programs, I analyzed data related to the release/spill of gasoline/petroleum, such as Light Non-Aqueous Phase Liquids (LNAPL) and Non-Aqueous Phase Liquids (NAPL), at Underground/Aboveground Storage Tanks and violations which occurred at Permitted Landfills and Infectious Waste Disposal. The data analysis involved volatile and non-volatile chemical concentration(s), their toxic; carcinogenic; flammability and other health hazards and the subsequent “desired” remedial levels of said chemicals. While with the Hazardous Waste Management Program, I also performed qualitative data analysis of concentration vs time and/or distance and point by point analysis using both the Mann-Kendall and Linear Regression statistical methods.

While at the University of Missouri, I analyzed data as it relates to the genetic and biological study/manipulation of various organisms: maize (corn); bovine and bacteria. I worked on the “Maize Project,” mapping the genetic structure of corn, using Simple Sequence Repeat (SSR) DNA Marker Technique; studied heat stress in bovine using microarray analysis; and in conjunction with the Department of Energy, created mutagenic strains of bacteria by deletion of a single gene or an operon (a cluster of genes) combined with cloning sequence(s) and amplification by way of a Poly Chain Reaction (PCR), to study the bacteria’s possible uses in the natural breakdown of Uranium, as well as a possible alternative energy source due to the bacteria’s ability to break down, and reduce sulfate into energy for mobility; in the Agronomy, Animal Science and Biochemistry Departments, respectively.

Previous Testimony Before the Public Service Commission

Case Number	Company	Type of Filing	Issue
WR-2024-0104	Liberty Water Company, Inc.	Direct & Rebuttal	Normalized Usage
WR-2022-0303	Missouri American Water, Inc.	Direct, Rebuttal & Surrebuttal	Normalized & Declining Usage
WM-2022-0186	Foxfire Utility Company & Ozark Clean Water Company	Rebuttal Testimony	Merger Rationale
SA-2021-0017	Missouri American Water Company, Inc.	Surrebuttal & Live Testimony	General Info & Misc.
WR-2020-0344	Missouri American Water Company, Inc.	Direct, Rebuttal & Surrebuttal	Normalized, Declining Usage & Covid
WR-2017-0343	Gascony Water Company, Inc.	Rebuttal, Surrebuttal, & Live Testimony	Rate Design
WR-2017-0285	Missouri American Water Company, Inc.	Direct, Rebuttal & Surrebuttal	Normalized & Declining Usage
WR-2016-0064	Hillcrest Utility Operating Company, Inc.	Direct, Rebuttal & Live Testimony	Rate Design

Missouri-American Water Company

Case No. WR-2024-0320

Residential Customer Usage Per Day

<u>Service Area</u>	<u>Usage Per Day</u>
Tariff District No. 1*	204.7 gal
Tariff District No. 2**	138.4621 gal

*St. Louis County & Pevely Farm

**All Other