Exhibit No.: _____
Issue(s): Usage Normalization/RSM
Witness/Type of Exhibit: Mantle/Cross-Rebuttal
Sponsoring Party: Public Counsel
Case No.: WR-2024-0320

CROSS-REBUTTAL TESTIMONY

OF

LENA M. MANTLE

Submitted on Behalf of the Office of the Public Counsel

MISSOURI-AMERICAN WATER COMPANY

FILE NO. WR-2024-0320

January 10, 2025

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CROSS-REBUTTAL TESTIMONY

OF

LENA M. MANTLE, P.E.

MISSOURI AMERICAN WATER COMPANY

CASE NO. WR-2024-0320

Q. What is your name?

A. Lena M. Mantle.

Q. Are you the same Lena M. Mantle who filed direct/rebuttal testimony in this case?

A. Yes, I am.

Q. Why are you filing cross-rebuttal testimony?

A. In this testimony I will respond to the direct/rebuttal testimony of Staff witness Jared Robertson which shows that the usage of MAWC's residential customers is not declining but increasing. I adopt Staff's methodology for determining normalized residential usage with a modification of using a three-year average instead of a five-year average. Using the workpapers of Staff witness Ashley Sarver, this change increases normalized residential usage by $5,847,126 thus reducing MAWCs revenue increase by that same amount.

Residential Usage per Customer is Not Declining

Q. Is it Staff witness Mr. Robertson's direct/rebuttal testimony that residential usage per customer is declining?

A. I am not sure. He titled the second section of his testimony RESIDENTIAL CUSTOMER DECLINING USAGE[1] and seems to imply on subsequent pages that residential customer usage is declining. However, the results of his analysis that he provides in his testimony as Table I[2] shows that the annual average usage is

[1] Page 6.
[2] Page 12.

increasing in Tariff District 2 ("District 2").[3] He shows in his Table II[4] that the average daily usage in Tariff District 1 ("District 1" or "D1")[5] has increased from 198 gallons per day per customer to 207 gallons per day over the past five years; an increase of 4.5%. In Tariff District 2 ("D2"), the average daily usage per residential customer has increased from 111 gallons to 155 gallons per day or an increase of 38.7%.

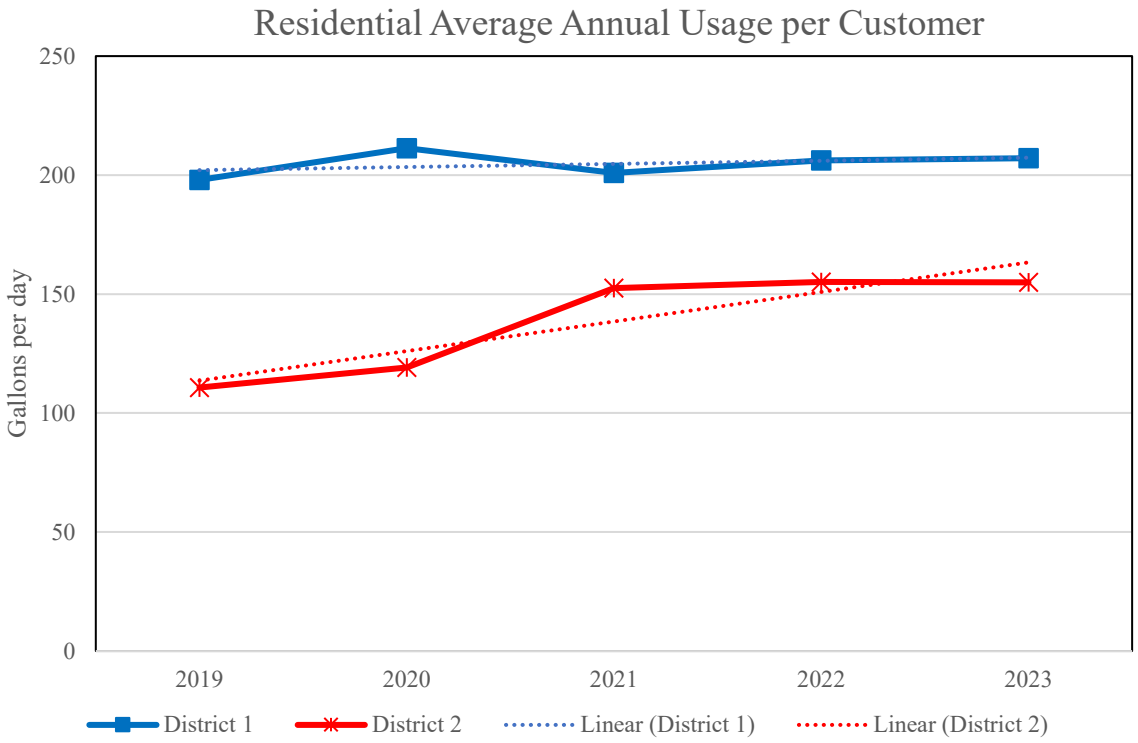
So, while his testimony may or may not be that residential usage is declining, the results of his analysis shows that it is actually increasing.

Q. Given the apparent ambiguity with Mr. Robertson's testimony, did you do any analysis to discern whether or not the annual average usage of the residential customer class is declining or increasing?

A. Yes. I looked at the historical usage and custom number data in Mr. Robertson's work paper "WR-2024-0320 Normalization-Declining Usage FILING." To discern whether residential usage was increasing or declining, I graphed the average daily usage per customer. Figure 1 below is a graph of the residential annual average daily usage per customer for the five years of 2019 through 2023 that Mr. Robertson used in his analysis.

[3] Tariff District 2 consists of MWAC's non-St. Louis County customers.
[4] Page 14.
[5] Tariff District 1 consists of MAWC's St. Louis County customers.

Figure 1



Q. What is important to notice in this figure?

A. Actual annual average usage per customer did not decline over these five years. In fact, the usage in District 2 shows a considerable increase since 2019 supporting the information Mr. Robertson provided in his Figure II.

A simple trend line as shown by the dotted lines in Figure 1 shows for District 1 that the annual average usage is slightly increasing over the five years and, for District 2, the usage is markedly increasing across these five years.

Q. How did Mr. Robertson's analysis compare to the usage analysis provided by MAWC's revenue normalization witness, Max W. McClellan?

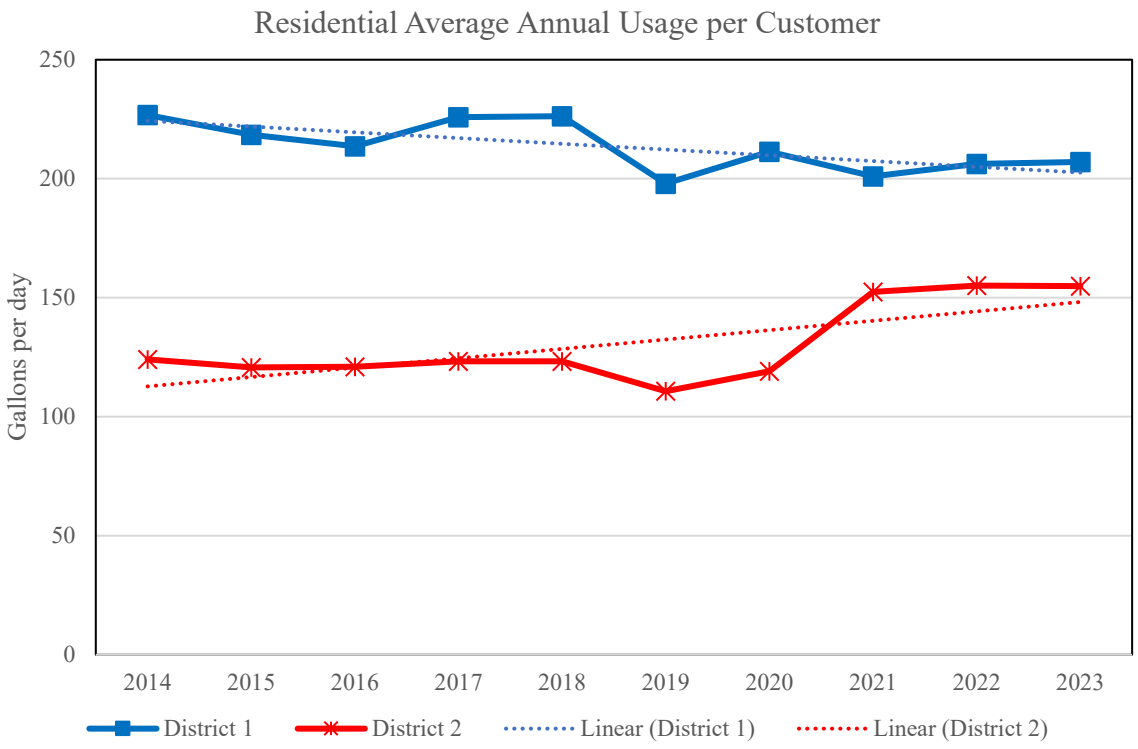
A. Unlike Mr. Robertson, Mr. McClellan did expressly make the claim that MAWC's average residential usage was declining. He based his claim on the results of his regression analysis.[6]

Q. How does that make sense given the data shows usage is increasing?

A. It does not make sense. However, the key to understanding the difference between what Mr. Robertson developed for Staff and what Mr. McClellan developed for MAWC is to understand the respective time periods over which each expert reviewed for trends. Mr. McClellan used data from 2014 through 2023 and a model specification that gave results that usage is declining. Figure 2 below shows the annual average daily usage per residential customer over the ten years Mr. McClellan used.

[6] Page 44.

Figure 2



Q. What is important to notice in this figure?

A. In the ten-year time period of 2014 through 2018, the annual usage in District 1 dipped in 2015 and 2016 but increased in 2017 and 2018 to the same level as it had been in 2014. The annual average usage dipped in 2019 but it has remained fairly constant since 2019.

The data in Figure 2 shows that the annual average usage of District 2 was constant over the five years of 2014 through 2018 that were added in this graph. It did take a slight dip in 2019 but since 2021 has remained fairly constant.

Q. What do trend lines through these data points show?

A. For District 1, the addition of the five previous years of data result in a declining trend line. For District 2, the trend line is markedly increasing – a distinct difference from the results of Mr. McClellan's analysis.

Explanation of Difference Between Staff and MAWC Positions

Q. Does Mr. Robertson explain why MAWC's normalization shows declining usage when in fact the annual average usage is increasing?

A. He does not.

Q. Can you explain why MAWC's witness McClellan's normalization models show declining usage despite the data provided by Mr. Robertson?

A. For District 1, it is predictable that a model would estimate declining usage since half of the data points (2014 through 2018) do show a decline in usage and the annual average usage in 2014 was higher than the average usage in 2023. Had Mr. McClellan used data as far back as 2009, the model is likely to have estimated a greater decline.

To demonstrate how the choice of the time period impacts the measure in the change of usage over time, I looked at how much change a regression model with just one variable – time[7] - would estimate given the annual average usage across three time periods: 2009 through 2023, 2014 through 2023, and 2019 through 2023. Table 1 below provides the results of this analysis. Schedule LMM-CR-1 provides the graphs of these three time periods showing the estimated trend line.

Table 1
Simple Trendline Predicted Change in Usage over Time
District 1

Time Period	Change Variable (Gallons/Day/Year)	
2009 – 2023	-3.288	Declining Usage
2014 – 2023	-2.417	Declining Usage
2019 - 2023	1.310	Increasing Usage

[7] Mr. McClellan's model was much more complicated than these simple trendline regressions. These examples are provided to show how the amount of data used can affect the results of a regression model not to give exact measures of declining or increasing usage.

These results show that using the annual usages for 2009 through 2023 for District 1, the estimated change in daily usage per year is a decline of 3.288 gallons per year per customer. When the annual usages for 2014 through 2023 are used, the model estimates daily usage will decline 2.417 gallons per year per customer. If the annual usages for 2019 through 2023 was used, the model estimates that daily usage is increasing by 1.310 gallons each year.

All three of these trendlines included the same data for 2019 through 2023. What was different was the addition of years prior to this time period with the results swinging from declining usage using 15 years of data to increasing daily usage using the most recent five years of data – a swing of 4.598 gallons per year per residential customer.

Q. You have discussed Mr. McClellan's results for District 1. How does his results for District 2 compare to Staff witness Robertson's testimony?

A. Surprisingly, Mr. McClellan's model for District 2 estimates that usage will decline over time.

Q. Why is this surprising?

A. This is counterintuitive given the data used by Mr. Robertson (Figure 1) and the additional data Mr. McClellan added to that data (Figure 2) that shows that annual average usage over ten years has definitely increased. His results are inconsistent with what the data shows.

Q. Do you believe the regression output from Mr. McClellan's models are incorrect?

A. I have no reason to believe that there is a problem with the calculations. A regression model is just a mathematical analysis that takes the independent variables prescribed and minimizes the difference between the independent variables (*e.g.* weather, time, COVID-19) and the dependent variable (usage). The

resulting regression model does not determine what the appropriate independent variables are.[8]

Q. Is Mr. McClellan's testimony regarding statistics regarding the accuracy of a regression model[9] incorrect?

A. Mr. McClellan appropriately described the various statistics that can be used to judge the accuracy and fitness of the model. As Mr. McClellan states, these statistics judge the accuracy and fitness of the data that was input to fit to a string of data points. However, these are just tools that the analyst should use. The true determination of the appropriateness of independent variables is the responsibility of the analyst.

Q. Mr. McClellan poses several questions that should be asked to determine whether a statistical regression model accurately describes the relationship that a chosen set of independent variables has with the dependent variable. One of the questions he poses is "Do the impacts on the dependent variable that the model describes make logical sense?"[10] Does Mr. McClellan's model for District 2 make logical sense?

A. No. The model result that usage is declining in District 2 does not make sense given that data shows that the annual average usage for residential customers in District 2 is increasing in the most recent five years.

Q. Do you have an explanation why the model would provide this result?

A. Mr. McClellan included fifteen different independent variables in his model to try to explain usage. These variables interact. The "Jan" variable is impacted by the "Intercept" term. There is likely some play between the two weather variables that were included in the modeling.

[9] Pages 38 – 40.
[10] Page 41.

For District 2, I strongly suspect that the COVID-19 variable Mr. McClellan included skewed the results of the model.

Q. Would you explain why you believe the COVID-19 variable resulted in a negative trend term that Mr. McClellan states shows declining usage?

A. The COVID-19 variable was included to attempt to capture what he believed was a short-term impact on usage due to the COVID-19 pandemic. According to Mr. McClellan's testimony, this variable was zero for the years 2014 through 2019 and 2023. In 2020, 2021, and 2022 the variable was between zero and one.[11] Mr. McClellan's District 2 model shows a positive impact for this variable, *i.e.* absent COVID, usage would have been much lower. If the data points for 2020, 2021, and 2022 were adjusted down by the amount of this variable removing the effect of the COVID-19 pandemic, the 2023 usage data point would show as a high data point – an outlier compared to all the other data points. Having three lower data points (2020, 2021, and 2022) and just one high data point out of the ten years of his analysis would have led to the nonsensical result that usage was declining over this time-period.

Q. Mr. Robertson did not include an adjustment for the COVID-19 pandemic in his normalization. As you described previously, Mr. McClellan did. Based on your review of this data, how did the COVID-19 pandemic affect residential annual average usage?

A. Even though residential customers spent more time at home during the pandemic, it is not apparent from the annual average usage data that there was an impact on usage. Looking at the data points for District 1 in Figures 1 and 2, there is a slight increase in the usage in 2020. However, there had been a similar increase in usage between 2016 and 2017. It is illogical to assume that the increase was due solely to the pandemic since a similar increase occurred just three years earlier when there

[11] Page 43.

was no pandemic. The also data shows that in 2021, during the midst of the pandemic, usage dropped again in an amount similar to the drop in usage 2015. Therefore, while the usage did increase in 2020 and then fall in 2021 during the height of the pandemic, the changes were not different than changes in residential usage in this district in prior years. The data does not support the assumption that customers in this district used more water during the pandemic.

For District 2, there was a large increase in annual average usage 2021 but the usage continued to increase, albeit at a much lesser rate, in 2022 and 2023. If usage did increase in District 2 due to the pandemic, the impact has become normal for that district and therefore it would be inappropriate to remove this impact from the usage used to determine normalized revenue.

Q. Another question that Mr. McClellan posed was "<u>Does the model represent reality?</u>"[12] Which usage normalization model, Staff's or MAWC's, reflects reality better?

A. Staff's simple model better represents reality. The residential data shown in Figures 1 and 2 does not show that COVID-19 had a short-term impact on usage[13] so therefore MAWC's models for residential usage do not represent reality. In addition, MAWC's models show that residential usage per day per customer is declining when the data shows that, while in the past it was declining, it has recently leveled off and shows that usage is slightly increasing. Staff's simple method of averaging over this time period when usage has been leveling off is a better representation of reality than MAWC's complicated method.

[12] Page 40.
[13] Mr. McClellan set the COVID variable to zero up to April 2020 and after December 2022, in effect modeling a response to COVID that only impacted usage over that time period (Page 43). If this was an accurate assumption, usage would have fallen in 2023 to the amount in 2019.

Responding to Staff's Argument that MAWC Did Not Appropriately Model Weather

Q. Staff Witness Jared Robertson points out MAWC did not use weather variables that align with the billing month usage in its regression models.[14] Do you agree with Mr. Robertson?

A. Yes. Two of the variables included in Mr. McClellan's regression model pertain to weather; specifically, precipitation and cooling degree days ("CDD").[15] It is logical that the amount of rain and how hot it is affects water usage. However, to accurately capture the impact of weather on usage, the weather variables (*i.e.* precipitation and CDD variables) need to be estimated by appropriately matching each usage data point with the correct weather. Mr. McClellan states that he uses a weighted average of current calendar month and lagged month precipitation and CDD in his models.[16]

Q. Is this a logical assignment of weather to usage?

A. No. The customers' usage does not match weighted calendar months. In practice, usage used in Mr. McClellan's analysis is from a billing month, not a calendar month.

Q. Would you explain the difference?

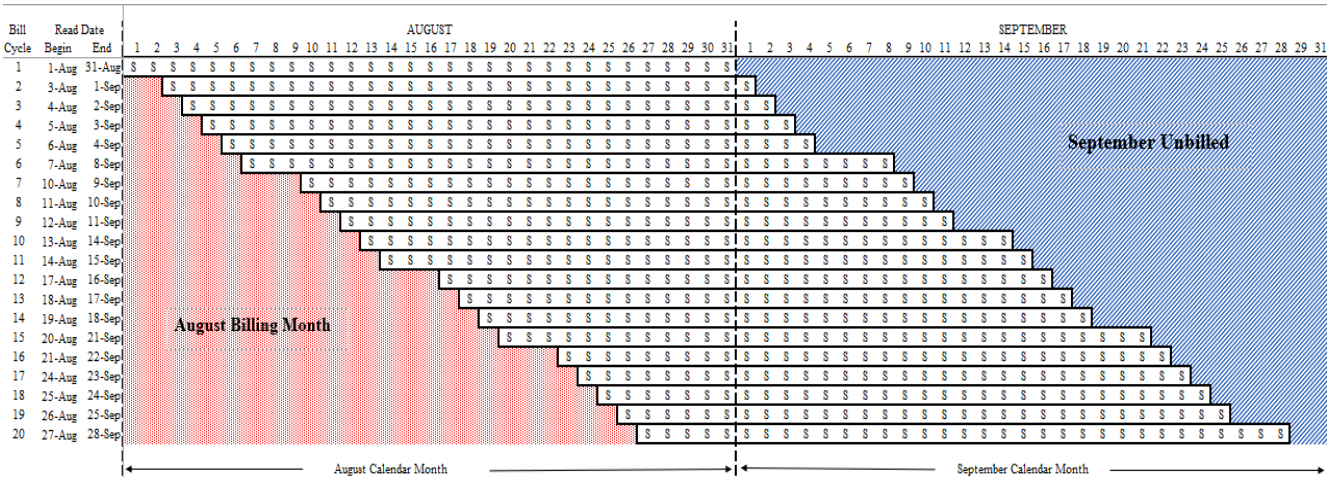
A. Billing month usage is the aggregation of billing cycle usage that is recorded on different dates throughout the calendar month. The beginning and ending date for the reading defines a billing cycle. There are typically approximately 20 billing cycles in each month. This began when meters were read by meter reader employees of the utility. Each meter reader had a certain route that they followed each day. The sum of the usage recorded each day by all the meter readers was the

[14] Pages 7 – 8.
[15] If the daily mean temperature ((daily high temperature + daily low temperature) ÷ 2) is greater than 65, then the cooling degree days for that day is the daily mean temperature minus 65. If the daily mean temperature is below 65, CDD is zero for that day.
[16] Page 42. Mr. McClellan does not specify the weights used to calculate the average and did not provide workpapers showing his calculation.

billing cycle usage since the date that route was last read. While the installation of Advanced Metering Infrastructure ("AMI") meters has replaced manual meter readers, usage is still reported on a similar billing cycle basis.

A sum of the usage across all the billing cycles is the billing month usage. A graphical representation of a generic September billing month comprised of 20 billing cycles is shown below in Figure 3.

Figure 3
Billing Month Example



This figure is a representation of a September billing month. A larger, easier to read reproduction is attached as Schedule LMM-CR-2. In this figure, the white blocks with an "S" represent the usage of the billing month. Each row is a billing cycle. The usage in the lower left is included in the August billing month. The usage to the upper right is called the "September unbilled" usage and will be included in the October billing month.

The very first billing cycle has usage over the time period of August 1 through August 31. The weather in September has no impact on the usage during this billing period. It is considered September billing month usage because the bill was rendered in September. It would be illogical to use September weather or a lagged weather variable that incorporates any weather in September to explain the

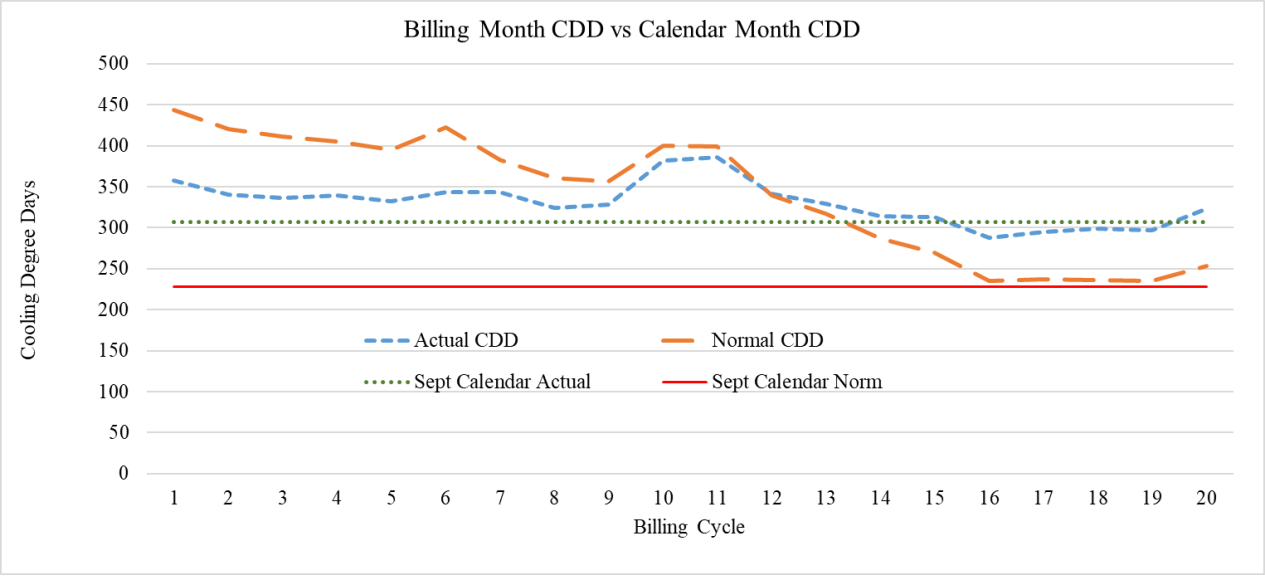
usage in this billing cycle. Billing cycle 20, the last billing cycle, includes usage for the last five days of August but most of the usage occurs in September. A weighted weather variable that includes weather from the first 26 days of August would not be a good explanatory variable for this billing cycle either.

A lagged variable that includes weather for both August and September will not match the weather that influenced usage in any of the billing cycles.

There are also problems with using calendar month actual and normal weather to normalize usage for weather for a billing month. In the example provided in Figure 3, the calendar month actual weather had CDD of 307 and the normal CDD was 228. This represents that the calendar month of September was warmer than normal. A normalization adjustment based on the calendar month would be a decrease to actual usage. However, that is not the case for any of the billing cycles.

Figure 4 below, shows the inappropriateness of using a calendar month weather adjustment to usage of the billing cycles.[17]

Figure 4



[17] This graph and the data used in the example are also provided in the attached Schedule LMM-CR-3.

The flat lines in this graph are the calendar month actual (small dots) and normal (solid line) for the September calendar month. The dashed lines above show for each of the billing cycles, the actual CDD (smaller dash) and normal CDD (longer dash) for each of the billing cycles.

It shows that the actual weather for billing cycle 1 (358 CDD) was cooler than the normal (444 CDD). The correct normalization adjustment to this billing cycle's usage would be to increase the usage in this billing cycle. However, if September calendar month weather is used, the billing cycle usage would be decreased since the September calendar month weather was warmer than normal.

In this example, there is no billing cycle that has the same adjustment as the September calendar month. This is why it is inappropriate to use calendar month data in a regression to explain the usage of a billing month.

Q. Is there a way that weather can appropriately be accounted for in regression analysis?

A. Yes. To appropriately account for weather for a billing month, the weather variables need to be calculated based on the read dates of the billing cycles in each billing month.

Q. Does Staff's methodology take weather into account appropriately?

A. Staff's methodology assumes that any deviation due to weather is accounted for by averaging the annual average usage over the five years.

Q. Is this an appropriate assumption?

A. Yes, for two reasons. Staff is using annual data not billing month or calendar month data. Therefore, the swings from warmer than normal to cooler than normal across the months of year mute the impact of weather.

Staff's methodology assumes that the impact of weather is "normalized" through the averaging process. This is appropriate since the usage data shows that

the annual average usage is leveling off. Weather is not causing large swings in annual average usage per customer per day.

Q. Is it acceptable to normalize on an annual basis to determine normalized usage?

A. Yes. There is no need for monthly normalized usage to determine normalized revenue. Annual average usage per customer per day is acceptable for revenue normalization and rate design since the rate charged customers does not vary for different time periods or seasons.

Normal Annual Average Residential Usage per Customer per Day

Q. Since Mr. McClellan's models do not make sense, do you agree with Mr. Robertson then that a five-year average of the annual average usage is a good normal usage to use to determine normalized revenues?

A. I agree that a simple average is adequate. However, the data shows that the annual average usage has remained fairly constant for both districts over the last three years. As Staff witness Amanda McMellan explains in her testimony, normalization adjustments are used to reflect a utility's current annual level of operating revenue.[18] Since the residential usage data shows that usage has remained fairly constant from 2021 through 2023, I recommend that a three-year average be used instead of a five-year average.

Q. What is the impact of this change on Staff normalized revenue estimation?

A. Normalized revenues at current rates should be higher than Staff estimated. Table 2 below shows the impact of using a three-year average instead of Staff's five-year average.

[18] Page 7.

Table 2
Impact of Using 3 Year vs. 5 Year Average

	5 Year Average Staff		3 Year Average OPC	
	District 1	District 2	District 1	District 2
Avg Daily Usage/Cust	204.7	138.5[19]	204.7	154.1
Annual Usage/Cust[20]	74,767	50,573	74,782	56,302
# of Customers[21]	322,970	121,048	322,970	121,048
Rate per 1,000 gal	$7.7604	$8.3781	$7.7604	$8.3781
Normal Revenue[22]	**$187,393,389**	**$51,288,995**	**$187,431,265**	**$57,098,246**
Difference			**$37,876**	**$5,809,250**

For District 1, the five-year average daily usage per customer is almost the same as the three-year average. The difference is rounding past the first decimal point.[23] This reflects the consistency of the annual average usage in District 1 over the past five years.

For District 2 the average usage increases in 2019 and 2020 and then becomes consistent as shown in Figures 1 and 2 above. If a five-year average is used as recommended by Staff, the assumption is adopted that the average usage going forward is going to decline even though it has actually been increasing over these five years. There is nothing in the data that leads me to believe that this is probable. The best indication of the future is the recent past. Because usage has been fairly consistent over the three years of 2021 through 2023, it is most appropriate to use a three-year average.

[19] Staff's workpapers show that it used 139.1235 to calculate normalized revenue. The actual 5 year average was 138.462 as used in this table.
[20] Avg Daily Usage/Customer x 365.25.
[21] Ashley Saver workpaper "WR-2024-0320 Water Meter Count and Residential."
[22] Annual Usage/Customer x # of Customers x Rate per 1,000 gallons.
[23] The five-year average of the annual average usage was 204.700 and the three year average is 204.741.

Importance Of Using Correct Normalization

Q. Should the Commission use MAWC's residential normalized usage to determine a normalized current revenue and billing determinants to be used in rate design?

A. No. Mr. McClellan's regressions, while having the appearance of sophistication and the statistical measurements of a good fit, provide results that are illogical and do not reflect reality. In addition, the weather variables used are imprecise. A review of the data shows consistent usage for the last three years of annual average usage data for the residential class. Therefore, a sophisticated model is not needed to estimate normalized usage.

Q. Should the Commission use Staff's five-year average residential usage to normalize revenues?

A. No. A review of the data shows consistent usage for the last three years of annual average usage data for the residential class. Therefore, the Commission should use a simple three-year average to determine normalized current revenue and billing determinants for future rates.

Q. Why is it important to get the usage correct?

A. I have attached, as Schedule LMM-CR-4, a whitepaper that I wrote titled "*Importance of Normalizing Usage in a Rate Case*" that explains the importance of correctly normalizing usage in a general rate case.

Q. Would you please summarize this whitepaper?

A. An accurate measure of the normal current revenue is important in determining the amount of increase needed to revenues in a rate case because the amount of increase in rates is the difference between the cost-of-service that is set by the Commission and the current revenues that have been normalized.

Rate Increase = Normalized Cost-of-Service – Normalized Current Revenues

If normalized current revenues in this equation are too high, then the revenue increase will not be enough resulting in rates that will not recover the normalized cost-of-service. This will make it more difficult for MAWC to earn the return on equity used to set the normalized cost-of-service. If the normalized current revenues are too low, then rates are increased above the normalized cost-of-service set by the Commission thus harming customers that are required to pay bills that sum to more than the normalized cost-of-Service. This relationship is shown in Table 3 below.

Table 3
Importance of Correct Normalized Revenues

	Normalized Cost-of-Service	Normalized Revenues	Increase
Appropriate Revenues	$100	$80	$20
Revenue too high	$100	$85	$15
Revenue too low	$100	$75	$25

Therefore, in balancing the interests of both MAWC and its customers, it is important to calculate normalized revenues that are reflective of the normalized usage.

Staff Testimony Regarding MAWC's Request for a Rate Stabilization Mechanism

Q. Staff witness Michael J. Abbott states the negative impact of a Rate Stabilization Mechanism ("RSM") for customers would be realized when customers undertake actions to improve water efficiency to lessen their water bills.[24] Yet you show above that residential usage is not declining but perhaps increasing a bit or holding constant. Does this mean that a RSM would be beneficial to customers?

A. No, it would not. The RSM would not just come to play in rectifying the change in revenues due to increasing or decreasing average usage. Most of the detriments to

[24] Page 8.

customers that I explained in my direct/rebuttal testimony would still exist if the Commission allowed MAWC the RSM it is requesting and average usage increased. Rather than explain each of these detriments, I will list them in this testimony and provide the page number of my direct/rebuttal testimony where I provide details on the detriment.

1. Customers do not have control over weather impacts. (page 15)
2. Customers do not have control over the efficiencies of the fixtures that are available or government-mandated standards. (page 16)
3. Customers who cannot reduce their usage have to pay more through the RSM for revenues to MAWC since customers that can reduce their usage have lower bills. (page 17)
4. A RSM will not guarantee customers that MAWC will properly operate, maintain, and invest in its water systems. (page 17)
5. A RSM will send mixed signals to customers. (page 18)
6. Production costs could increase to the point where the RSM would be a charge even though excess revenue was collected. (pages 21 – 23)
7. The RSM treats customers as if they are homogenous. (pages 24 – 28)
8. Revenue shortfalls are treated differently than revenue excesses (pages 28 – 31)

Increasing residential annual average usage is not a good justification for the Commission to approve a RSM for MAWC

Q. Does this conclude your cross-rebuttal testimony?

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 LENA M. MANTLE

STATE OF MISSOURI)
) **ss**
COUNTY OF COLE)

Lena M. Mantle, of lawful age and being first duly sworn, deposes and states:

1. My name is Lena M. Mantle. I am a Senior Analyst for the Office of the Public Counsel.

2. Attached hereto and made a part hereof for all purposes is my cross-rebuttal testimony.

3. I hereby swear and affirm that my statements contained in the attached testimony are true and correct to the best of my knowledge and belief.

Lena M. Mantle
Senior Analyst

Subscribed and sworn to me this 9th day of January 2025.

TIFFANY HILDEBRAND
NOTARY PUBLIC - NOTARY SEAL
STATE OF MISSOURI
MY COMMISSION EXPIRES AUGUST 8, 2027
COLE COUNTY
COMMISSION #15637121

Tiffany Hildebrand
Notary Public

My Commission expires August 8, 2027.