Exhibit No.:	_____
Issue(s):	Residential Usage
Witness/Type of Exhibit:	Mantle/Rebuttal
Sponsoring Party:	Public Counsel
Case No.:	WR-2017-0285

REBUTTAL TESTIMONY

OF

LENA M. MANTLE

Submitted on Behalf of the Office of the Public Counsel

MISSOURI-AMERICAN WATER COMPANY

CASE NO. WR-2017-0285

January 17, 2018

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of Missouri-American Water Company's Request for Authority to Implement General Rate Increase for Water and Sewer Service Provided in Missouri Service Areas.	))))	Case No. WR-2017-0285

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 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 17th day of January 2018.

NOTARY PUBLIC NOTARY SEAL STATE OF MISSOURI

JERENE A. BUCKMAN
My Commission Expires
August 23, 2021
Cole County
Commission #13754037

Jerene A. Buckman
Notary Public

My Commission expires August 23, 2021.

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REBUTTAL TESTIMONY

OF

LENA M. MANTLE

MISSOURI AMERICAN WATER COMPANY

CASE NO. WR-2017-0285

INTRODUCTION

Q. Please state your name and business address.

A. My name is Lena M. Mantle. My business address is P.O. Box 2230, Jefferson City, Missouri 65102. I am a Senior Analyst for the Office of the Public Counsel ("OPC").

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

A. Yes, I am.

Q. What is the purpose of your rebuttal testimony?

A. In this testimony, I will show the Commission why it should not accept the analysis and residential base usage proposed by Missouri American Water Company's ("MAWC") witness Gregory P. Roach. I also recommend the Commission use Staff's normalized usage contained in its Cost-of-Service report by Staff Expert/Witness Jarrod J. Robertson to calculate normalized residential class usages.

Q. Would you briefly describe the reasons the Commission should not adopt MAWC's residential usage normalization?

A. There are at least three reasons why the Commission should not adopt MAWC's normalization of residential base usage:

1) The results are counter-intuitive;
2) The data used in the analysis is inconsistent; and
3) MAWC's analysis is conducted on a limited number of data points.

The Commission should not adopt MAWC's normalization of residential non-base usage for at least the following two reasons:

1) The data problems that exist for the base usage analysis cast doubt on the accuracy of the non-base usage; and
2) The analysis on the non-base usage is done at an annual level that masks the customers' true response to weather.

Q. Would you briefly explain why the Commission should adopt the Staff's normalized residential usage?

A. OPC is recommending the Commission adopt Staff's normalized usage because Staff's analysis includes normalization of both base and non-base usage. In addition, the data used by Staff in its analysis is recent data which, although it may contains errors, seems to be consistent.

REBUTTAL OF MAWC WITNESS ROACH

Q. What results of Mr. Roach's analysis on the residential base usage do you find counter-intuitive?

A. Mr. Roach states his analysis shows there is a continuing decline in residential base water use across all MAWC districts of an average of 3.715 gallons per day.[1]

Q. Would you explain how this result is counter-intuitive?

A. According to Mr. Roach's analysis on average each residential customer uses 3.715 gallons less water today than they did yesterday, 7.43 gallons less than they did two days ago, 52 gallons less than they did two weeks ago and over 100 gallons less than they did a month ago.

To further illustrate why Mr. Roach's result is counter-intuitive, consider Mr. Roach's discussion of the average gallons used per toilet flush from his direct testimony. According to the results of Mr. Roach's analysis, this equates to a

residential customer with a pre-1994 toilet that uses 3.5[2] gallons less, or flush one less time today than they did yesterday. His result, if correct, shows the average customer would flush two times less than they did two days ago, 15 times a day less than they did two weeks ago and 28 times less than they did a month ago. Also, according to Mr. Roach's analysis, residential customers with toilets manufactured after 1994,[3] would have to flush their toilets 6 times less than they did the day before, 12 times less than they did two days ago, 32 times less than they did a month before, and 62 times less than they did a month ago.

While the residential customer uses water for multiple purposes in addition to flushing the toilet, the above examples illustrates how the results of Mr. Roach's analysis of residential base usage are counter-intuitive.

Q. Is there anything else that raises doubt regarding the results of Mr. Roach's analysis?

A. Yes. Mr. Roach includes a table on page 8 of his direct testimony with results from his analysis for the total company and for each of the three districts that make up MAWC. Base usage analyses were conducted independently for each of the districts and the total company. However, the input data for the total company is the average usage per customer of all of the districts. Because the analysis for the total company is conducted on the combined data from the three districts, if the input data was good and the usage was modeled correctly, the results of the total company analysis should be an average of the three districts and, because 84% of MAWC customers are in the east district, the total company decline should be very close to the results of the analysis of the East District.

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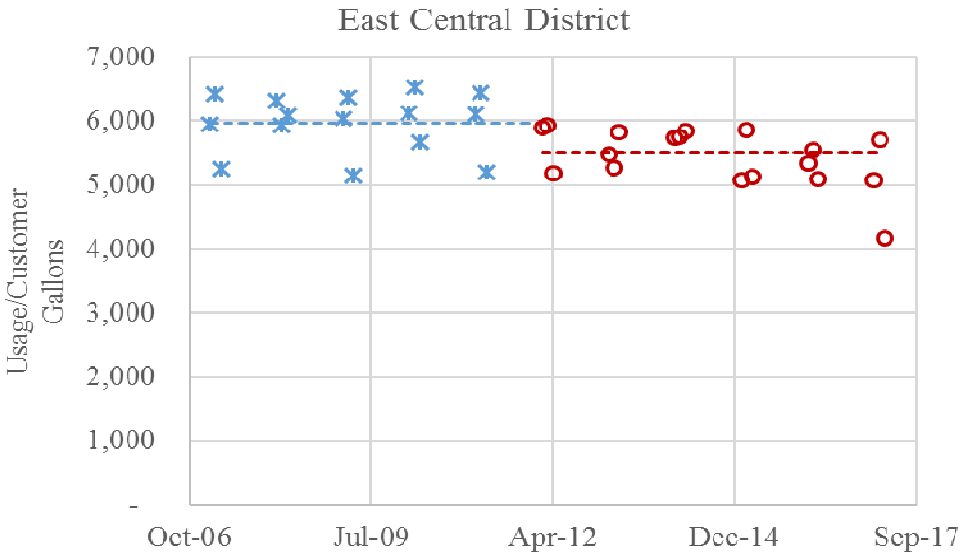
[1] Roach direct, pg. 4:2
[2] Roach direct, pg. 20:23 "a pre-1994 toilet, which typically used from 3.5 to 7 gallons per flush"
[3] Roach direct, pg. 20:23 "a toilet manufactured after 1994 must use no more than 1.6 gallons per flush"

However, the results do not meet this reasonableness check. Mr. Roach's analysis shows that for the total company, the average decline in usage per day per customer is 3.72 gallons.[4] The results of his district specific analysis show a lesser decline in each of the three districts. The decline estimated by Mr. Roach is 2.50, 3.68 and 3.65 gallons per customer per day for its Southwest, Northwest, and East districts respectively. None of the district specific analyses show a decline as great as Mr. Roach describes in his testimony for the total company. His analysis is counter-intuitive because the results shows that the usage of the average MAWC customer is decreasing at a faster rate than the usage of the average customer of any of its three districts.

Q. Next you state that the data set used by Mr. Roach in his residential base usage analysis is inconsistent. Would you please explain?

A. As I explained in my direct testimony, my review of ten years of historical usage showed a distinct drop in use per customer in the base usage months from 2011 to 2012. Beginning in 2012, the usage remained fairly constant with the exception of April 2017. This can be seen in the graph for the East Central District below.

[4] 3.715 rounded up to 3.72



This graph shows a distinct difference in the usage per customer between the base usage months of 2011 and 2012. Mr. Roach's analysis did not differentiate between the pre- and post-2012 usage per customer data. It also shows that the use per customer for April 2017 was considerably below the usage per customer of the other base usage months.

Q. What is the result of using data from 2008 through 2017 as Mr. Roach did in his analysis?

A. Because the data from 2007 through 2011 is obviously higher than the more recent usage data, a regression analysis such as the one Mr. Roach conducted would show a continuous decline through the time period. The presence of a very low data point at the end of the data series results in a model that estimates an even greater decline.

Analysis is only as good as the input data that is used. Due to obvious data problems, such as a shift in the data series and such as the presence of obvious outliers, the Commission should not adopt MAWC residential base usage normalization.

Q. Your third point is that there are too few data points in Mr. Roach's analysis. Would you explain?

A. Mr. Roach used the annual average of what he determined were "base usage months" for ten years of 2008 through 2017. For example, the graph previously provided shows the average usage per customer for the billing months of February, March, and April for each year from 2007 through 2017. Mr. Roach did not use the actual monthly usage which would have given him 30 data points. Instead he averaged the usage per customer for the three months and ran a regression over 10 data points – one data point for each year. In addition, Mr. Roach added a variable to his regression model for the 2014 data point reducing the degrees of freedom in his analysis to eight. Degrees of freedom indicates how much independent information goes into a parameter estimate. The higher the degrees of freedom the more likely the analyst is to obtain precise estimates. While good models can be developed with eight degrees of freedom, the low degrees of freedom combined with the data problems shown above, raises grave concerns regarding Mr. Roach's analysis.

Q. Why did Mr. Roach add a variable to his regression analysis for the 2014 base usage value?

A. According to MAWC's response to OPC data request 8001.1, the variable was added to account for unusual residential customer base usage due to the "polar vortex" that occurred that winter. In other words, a variable was added to the modelling of the non-weather sensitive usage to account for weather.

Q. Did Mr. Roach add a variable to account for the obvious outlier data for April 2017?

A. No, he did not. Mr. Roach included a variable to account for the higher base usage in 2014 but not for the lower base usage in 2017 resulting in an analysis that

with a model with good statistical measures of fit but outcomes that do not make sense.

Q. You stated that good models could be estimated using a few good data points. Would you feel confident of Mr. Roach's analysis if it only used data since 2012?

A. No. While a good model could be developed with a few points of good data, my review did not show that the post-2012 data is good data. What my reviewed showed is that the data from before 2012 is different from the post-2012 data.

As to the quality of the billing usage data, OPC witness Dr. Geoff Marke, in his rebuttal testimony, describes inconsistencies in water billing and usage data and findings from *Staff's Report Regarding the Investigation of Missouri-American Water Company ("MAWC") with Respect to MAWCs Faulty Meter and Negative Reserve Balance issues as Disclosed during Rate Case No. WR-2015-0301*.[5] For these reasons all of MAWC's usage data is suspect.

Q. Knowing that there were issues with the billing usage in the last case, did MAWC make any adjustments to the usage data before it filed this case?

A. According to MAWC's updated responses to OPC data requests 8001 and 8002, MAWC only adjusted the residential usage in three months – a cancel/rebill adjustment in May and June 2013 and January 2016.

Q. Up to this point in your testimony you have been providing rebuttal to Mr. Roach's calculation of normalized residential base usage. Do you have the concerns with respect to Mr. Roach's analysis of the residential "weather sensitive" usage?

A. Yes. The data issues that I just described in the residential base usage leads me to be concerned regarding both the base and weather sensitive "non-base" usage.

Q. You stated that Mr. Roach's analysis on the non-base usage is done at an annual level that masks the customers' true response to weather. Why is that a concern?

A. Mr. Roach's analysis of non-base usage tries to tie annual measures of weather to annual non-base usage. This type of model assumes that customers' usage habits change, or respond, to annual differences in weather rather than change based on daily or weekly weather fluctuations. This is not a reasonable assumption. While water usage may not respond to daily fluctuations in weather to the degree of electric and natural gas usage, it is not reasonable to assume that customers respond on an annual basis. If there is a response to weather, it is likely that water usage is reflective of weather (heat and amount of rainfall) over a time period of days or weeks.

Q. Is there data available to make that determination?

A. Not that I am aware of. However, billing month information does exist. This level of accurate usage data could give a better measure of how usage responds to weather.

Q. Why is modeling at an annual level a concern if the usage rates are the same all year?

A. If the response is linear, i.e. the usage change is the same for a one degree change in temperature at 75 degrees as it is at 90, then there is no concern. However, if the response is non-linear, i.e., the change in usage is different between 75 and 76 degrees than the change in usage between 90 and 91 degrees, then there is a concern. No analysis has been conducted to know whether or not customers' water usage response to heat and amount of rain is linear or non-linear.

[5] WO-2017-0012

RECOMMENDATION TO ORDER STAFF'S USAGE ANALYSIS

Q. Does OPC have a recommendation of what residential usage should be used to calculate normalized revenues and on which to do rate design?

A. Yes. OPC recommends the Commission use the residential normalized usage as calculated by Staff to calculate normalized revenues.

Q. Why?

A. Staff used a five year average for all usage, base and non-base over the time period that shows the most consistent data for base usage for MAWC's East and Southwest districts which constitutes 92% of MAWC's residential customers. This is the data, other than the usage for April 2017 that is most consistent.

Q. Does this conclude your direct testimony?

A. Yes, it does.