BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

Application of California-American Water Company (U210W) for Authorization to Increase its Revenues for Water Service by $55,771,300 or 18.71% in the year 2024, by $19,565,300 or 5.50% in the year 2025, and by $19,892,400 or 5.30% in the year 2026.	A.22-07-001 (Filed July 1, 2022)

REBUTTAL TESTIMONY OF DAVID MITCHELL

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REBUTTAL TESTIMONY OF DAVID MITCHELL

I. BACKGROUND

Q1. Please provide your name and business address.

A1. My name is David Mitchell. I am a General Partner at M.Cubed. My business address is 5358 Miles Avenue, Oakland, CA 94618.

Q2. Have you previously provided your qualifications in this proceeding?

A2. Yes, they were included in my Direct Testimony served on July 1, 2022.

II. PURPOSE OF TESTIMONY

Q3. What is the purpose of your testimony?

A3. The purpose of my testimony is to address recommendations made by the Public Advocates Office ("Cal Advocates") as it relates to (1) forecasts of customers, (2) forecasts of water sales per customer, (3) forecasts of total sales, (4) design of rates and charges, and (5) adoption of a revenue decoupling mechanism.

III. SALES FORECAST

Q4. Did you prepare the sales forecast for California-American Water Company (California American Water) for this General Rate Case (GRC)?

A4. Yes, I did. It is contained in the report *California American Water Sales Forecast: 2022 General Rate Case*, prepared by M.Cubed, June 2022. I also prepared the sales forecast for California American Water's 2019 GRC (Test Year 2021).[1]

Q5. Have you reviewed Cal Advocates' sales forecast recommendations?

A5. I have. They are contained in Chapter 1 of the report prepared by Cal Advocates witness Herbert Merida -- *Report on the Results of Operations: Water Consumption, Rate Design and Special Results 10, 12, 17, 18, 19, and 20, California American Water Company General Rate Case Application 22-07-001 Test Year 2024*, dated April 13, 2013.[2]

Q6. Can you please briefly describe the approach used by Cal Advocates to forecast California American Water's sales for Test Year 2024?

A6. Cal Advocates used a sectoral water demand forecasting approach. This approach separately estimates sales for each customer class (e.g., residential, commercial, industrial, etc.) and then sums these class-level sales to get total expected sales for the service area. Class-level sales are forecast as a use rate multiplied by a forecast of the number of customers in the class. Conceptually, the method is very simple. For example, if the expected number of customers in a class is 100 and these customers are expected to use, on average, 500 units of water per year, the class-level forecast would be 50,000 units of water. However, applying the method can be complicated, particularly with respect to forecasting use rates.

Q7. Is this approach commonly used to forecast urban water demand?

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[1] A.19-07-004, Exh. CAW-07, *Direct Testimony of David Mitchell*, dated July 1, 2019, Attachment 2, M.Cubed (2019), *California American Water Sales Forecast: 2019 General Rate Case*. Additionally, I have prepared the sales forecasts for California Water Service Company's previous three GRCs; San Jose Water Company's previous two GRC's and I will prepare the one for its current GRC; and I am preparing the sales forecast for Golden State Water Company's current GRC.

[2] I assume the date on the report is a typographic error. For the purposes of my testimony, I hereafter reference this report as "Cal Advocates Operations Report".

A7. It is. The approach is described in detail in Billings and Jones (2008), a seminal text on forecasting urban water demand.[3] I will note that I also used a sectoral water demand forecasting approach to prepare California American Water's sales forecast for this and the previous GRC. An advantage of the approach is that preparing accurate near-term forecasts of the expected number of customers, particularly in regions that are largely built out and growing slowly, is usually straightforward to do. The challenges come with accurately forecasting the use rates that will be multiplied by the customer forecasts. Use rates are not static, but dynamic, depending as they do on many changing factors, such as on-going conservation, marginal water costs, state, regional, and local water use regulations, weather and hydrology, and the state of the economy. Billings and Jones (2008) suggest developing sectoral water demand forecasts in two steps:

> The first step, which leads to the reference forecast, involves extrapolating current customer use rates based on current conservation loading and [water] rate levels. The second step, which leads to the final demand forecast, adds (or subtracts) adjustments, such as estimates of water savings from future conservation or impacts of changes in [water] rate levels. For water conservation, estimates of water savings are usually informed by end-use models of indoor water use. Analysts typically calibrate impacts of [water] rate changes with water-demand elasticities. In the second stage, the forecaster may also consider the impact of adjustments to other basic parameters from the first stage.[4]

They devote 16 pages in their textbook on a simplified example illustrating the two steps and another six chapters on best practices for forecasting future use rates that account for changes in technology, employment, prices, conservation, weather, and other factors.[5]

The Commission also has recognized the dynamic nature of usage rates in sales forecasts. In D.16-12-026, it emphasized the need for updating forecast methodologies that "take

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[3] Billings, Bruce R., and Clive V. Jones. 2008. Forecasting Urban Water Demand, Second Edition. American Water Works Association: Denver. See Chapter 5 "Simple Forecasting Methods and Reality Checks," pp. 65-81.

[4] Ibid., p. 81.

[5] Ibid. Chapters 7-12.

into account changed water consumption patterns during and following drought years" and that account for the impact of long-term conservation.[6] In D.20-08-047, the Commission identified the following specific factors that should be addressed in sales forecasts:[7]

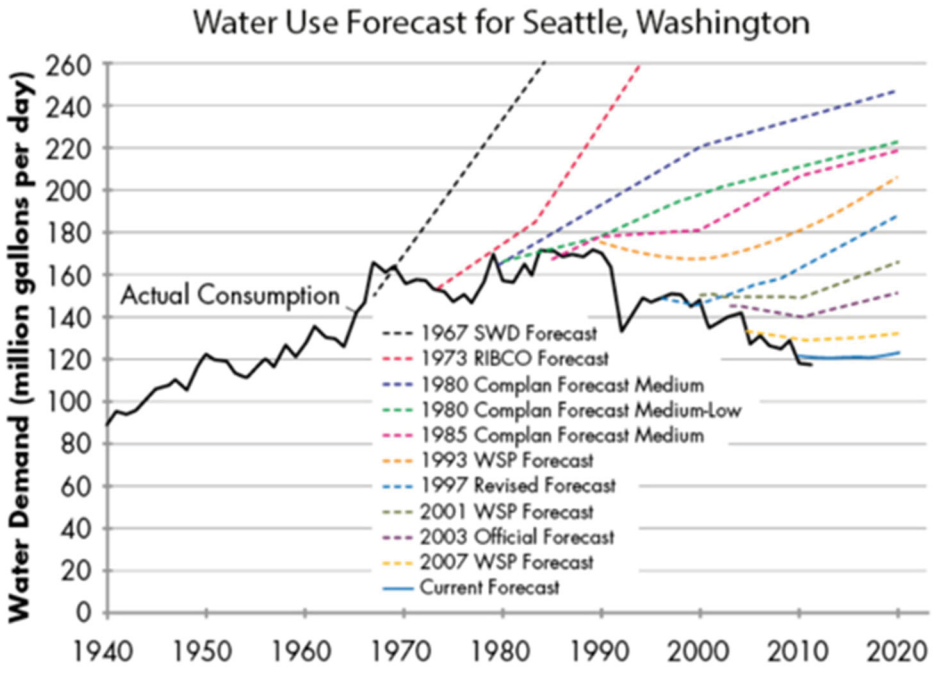
1. Impact of revenue collection and rate design on sales and revenue collection.
2. Impact of planned conservation programs.
3. Changes in customer counts
4. Previous and upcoming changes to building codes requiring low flow fixtures and other water-saving measures, as well as any other relevant code changes.
5. Local and statewide trends in consumption, demographics, climate, population density, and historic trends by ratemaking area.
6. Past sales trends.

Q8. Does Cal Advocates account for these factors in its sales forecast recommendations?

A8. No, it does not. It recommends using the simple average of usage for the previous 5, 4, or 2 years, depending on service area and customer class.[8] A simple average is a static number and therefore invariant to all of the dynamic factors the Commission identified in D.16-12-026 and D.20-08-047 that it deemed important to forecasting future water use rates. Consequently, Cal Advocates' recommended sales forecast gives no consideration to (1) the impact of future revenue collection and rate design on sales, (2) the impact of planned conservation on sales, (3) the ongoing effect of building and plumbing codes on water use, (4) ongoing trends in consumption, (5) the effect of future weather on sales, or the influence of future drought on sales, as required by D.16-12-026 and D.20-08-047. In essence, it has assumed that the best predictor of future use rates are past use rates. This

[6] D.16.12-026, p. 31.
[7] D.20-08-047, pp. 50-51.
[8] Cal Advocates Operations Report, pp. 6-7.

was the dominant forecasting paradigm used by water utilities until recently and it has proven to be highly inaccurate. This approach is what gave rise to the cautionary "porcupine" graphic (reproduced below) prepared by Seattle Public Utilities demonstrating the repeated failure of its demand forecasts.[9]



Q9. If basing future water use on past average use has not proven to be a very accurate forecasting method, why does Cal Advocates recommend it?

A9. In its report, Cal Advocates asserts that with respect to residential water use, "a five-year or two-year average more accurately reflects the usage trends based on economic and other factors."[10] With respect to non-residential usage rates, Cal Advocates asserts "it is more reasonable to use different durations (a two, four, or five-year average) of historic usage to either capture more recent trends or to avoid recent anomalies from overly influencing the recorded averages."[11] Both statements are nonsensical. If a negative trend

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[9] Seattle Public Utilities Official Yield Estimate and Long-Range Water Demand Forecast, June 2018.

[10] Cal Advocates Operations Report, p. 6.

[11] Ibid., p. 8.

in usage is expected to continue, the future usage rate would necessarily be lower. Likewise, if a positive trend is expected to continue, the future usage rate would necessarily be higher. A forecast incorporating the trend would be expected to perform better than one that ignored it. A forecast based only on past average usage, by definition, ignores any ongoing trend. To claim that a forecast based on a simple average accounts for the effects of an ongoing trend reveals a profound misunderstanding of what an average is and what a trend is.

Essentially, Cal Advocates has recommended stopping after the first step of the two step forecasting approach described in Billings and Jones (2008). They have prepared a reference forecast that reflects what water sales in the Test Year would be if nothing changed other than the number of customers. They have disregarded the critical, and more difficult, second step of adjusting the reference forecast for expected changes in the dynamic factors that drive changes in water use.

Q10. Doesn't California American Water also utilize average usage rates to forecast water use in some sectors?

A10. It does. It uses the average usage for the previous three years to forecast Industrial, Miscellaneous/Other, and Sales for Resale usage. It does this for two reasons. First, usage in these three sectors is highly idiosyncratic and erratic. In most cases, there are no identifiable patterns to the usage. In such cases, an average provides a reasonable forecast. Second, these sectors account for a very small share of California American Water's total water sales. In 2021, for example, these sectors accounted for only 2.5% of total sales. But in the sectors that comprise the vast majority of water sales – residential, multi-family, commercial, and public authority – California American Water uses sophisticated statistical models to forecast water use.

Q11. Why does Cal Advocates recommend using a five-year average in some cases, a four-year average in other cases, and a two-year average in still other cases?

A11. That is a good question. Cal Advocates does not put forward any rationale or decision rule in their report for when one should use a five-year average versus a four-year average versus a two-year average to forecast the future usage rate. It appeared to be completely subjective. That is what I thought at first, anyway. But then my colleagues and I examined it more closely and a very disturbing pattern emerged. First, we discovered that sometimes Cal Advocates chose to use California American Water's use rate forecast while other times they chose to use a simple average. I thought this strange because in their report they assert that California American Water's forecast does not follow Commission guidelines (which is untrue, as I show below).[12] Next, we noticed that the only times they used California American Water's usage rate forecast was if it exceeded the average usage rates they were proposing. This was done without exception. In every instance, Cal Advocates selected whichever value was largest. This is shown in the following tables for the Residential and Commercial customer classes. The highlighted cells in the tables indicate the forecast recommended by Cal Advocates. So, it turned out they had a decision-rule after all: use a simple average to forecast the use rate unless California American Water's forecast is higher, in which case use California American Water's forecast. In all my career (which spans more than 30 years), I have never run into such a blatant manipulation of a forecast to achieve a specific result. This is the clearest case of juking the stats I have ever encountered.[13]

The arbitrariness of their methodology is astounding. For example, they use a 2-yr average for Meadowbrook Residential, but a 5-year average for Meadowbrook

12 Ibid, p. 6.

13 Juking the stats is a term of art which refers to the manipulation of statistical information to produce a desired outcome. The term was popularized in the television show *The Wire* which used it to describe the manipulation of data by the Baltimore Police to make crime statistics and arrest rates appear better than they actually were.

Commercial. Similarly, they use a 2-year average for Ventura, but a 5-year average for the other Southern Division districts. Also notice for Monterey Main, Central Satellite, and Larkfield, they propose using a five-year average for Residential, but California American Water's forecast for Commercial. For Duarte and San Marino, it's the opposite: they propose using California American Water's forecast for Residential, but a five-year average for Commercial. This sort of cherry picking is a hallmark of bad forecasting practice.

2024 Test Year Residential Use Rate Forecasts
(CCF/Service/Year)

Revenue System #	Name	Period For Average	Average Usage Rate	California American Water Forecast	Cal Advocates Forecast
RS010	San Diego County	5-yr	102	98	102
RS020	Monterey County Main	5-yr	59	56	59
RS025	Central Satellite Systems	5-yr	134	133	134
RS030	Monterey - Chualar	5-yr	187	188	188
RS310	LAC Baldwin Hills	5-yr	158	161	161
RS320	LAC Duarte	5-yr	187	200	200
RS330	LAC San Marino	5-yr	228	229	229
RS350	Meadowbrook	2-yr	207	184	207
RS400	Ventura County	2-yr	195	183	195
RS450	Sacramento	5-yr	129	132	132
RS500	Larkfield	5-yr	104	100	104

2024 Test Year Commercial Use Rate Forecasts
(CCF/Service/Year)

Revenue System #	Name	Period For Average	Average Usage Rate	California American Water Forecast	Cal Advocates Forecast
RS010	San Diego County	5-yr	704	687	704
RS020	Monterey County Main	5-yr	338	339	339
RS025	Central Satellite Systems	5-yr	709	763	763
RS030	Monterey - Chualar	5-yr	150	200	200
RS310	LAC Baldwin Hills	5-yr	340	342	342
RS320	LAC Duarte	5-yr	1,069	1,029	1,069
RS330	LAC San Marino	5-yr	593	569	593
RS350	Meadowbrook	5-yr	1,596	1,425	1,596
RS400	Ventura County	2-yr	1,099	1,076	1,099
RS450	Sacramento	5-yr	711	753	753
RS500	Larkfield	5-yr	359	367	367

Q12. Did Cal Advocates do this only with the use rate forecast, or did they also do it with the customer count forecast?

A12. They generally did it with both forecasts. Below, I show the Residential and Commercial service growth factors recommended by Cal Advocates. There are two exceptions where they used California American Water's forecast even though the average growth rate was higher. One is Monterey Main, which is under a service connection moratorium, so projecting service growth doesn't make sense.[14] The other is the Duarte Commercial forecast, where they select California American Water's forecast even though the five-year average growth rate is slightly higher. Other than these two instances, they select whichever yields the highest rate of service growth.

2024 Test Year Residential Service Growth Forecasts
(New Services Per Year)

Revenue System #	Name	Period For Average	Avg Growth Rate	California American Water Forecast	Cal Advocates Forecast
RS010	San Diego County	5-yrs	100	106	106
RS020	Monterey County Main	5-yrs	23	0	0
RS025	Central Satellite Systems	5-yrs	0	0	0
RS030	Monterey - Chualar	5-yrs	0	0	0
RS310	LAC Baldwin Hills	5-yrs	1	2	2
RS320	LAC Duarte	2-yrs	8	3	8
RS330	LAC San Marino	5-yrs	19	36	36
RS350	Meadowbrook	2-yrs	3	2	3
RS400	Ventura County	5-yrs	7	8	8
RS450	Sacramento	2-yrs	693	0	693
RS500	Larkfield	5-Yrs	(11)	0	0

[14] They also try to play "gotcha" with California American Water by pointing out that California American Water has projected zero service growth in Monterey for this rate case but positive service growth in the Central Division Pure Water Monterey Groundwater Replenishment Project proceeding (Cal Advocates Operations Report, p. 6). But the latter forecast is a long-term forecast premised on the lifting of the service connection moratorium on the Monterey Peninsula whereas the rate case forecast is a short-term forecast premised on the moratorium still being in place.

2024 Test Year Commercial Service Growth Forecasts (New Services Per Year)					
Revenue System #	Name	Period For Average	Avg Growth Rate	California American Water Forecast	Cal Advocates Forecast
RS010	San Diego County	5-yrs	4	3	4
RS020	Monterey County Main	5-yrs	0	0	0
RS025	Central Satellite Systems	5-yrs	1	0	0
RS030	Monterey - Chualar	5-yrs	0	0	0
RS310	LAC Baldwin Hills	5-yrs	0	0	0
RS320	LAC Duarte	5-yrs	5	4	4
RS330	LAC San Marino	5-yrs	4	3	4
RS350	Meadowbrook	2-yrs	1	1	1
RS400	Ventura County	5-yrs	2	4	4
RS450	Sacramento	2-yrs	166	15	166
RS500	Larkfield	2-yrs	1	1	1

Q13. Is it ever the case that Cal Advocates recommends either a lower service growth or usage rate forecast than California American Water?

A13. No. In every service area and in every customer class, Cal Advocates recommends a higher service growth and usage rate forecast than California American Water.

Q14. In your experience, is this unusual?

A14. It is very unusual. In fact, I have never encountered it before. Bear in mind that when you add up the number of service areas and customer classes for which forecasts are required, there are well over 100 separate forecasts. The odds that two unbiased forecasts would result in one always being higher than the other must be extremely small, negligible even. However, based on my review of the evidence, I do not think Cal Advocates' forecast is unbiased. They have purposely generated a higher sales forecast than California American Water's by cherry picking when to deviate from their average use rate and average growth rate methodology in favor of California American Water's forecast.

Q15. Did Cal Advocates also argue for a higher forecast than California American Water's in the previous GRC?

A15. No. In the previous rate case, Cal Advocates argued that California American Water's forecast model produced a forecast that was too high.[15] Now they are arguing that California American Water's forecast methodology produces a sales forecast that is too low.[16] However, here's the thing: California American Water used the same forecasting methodology in both rate cases.[17] This begs the question how can California American Water's forecast methodology be systematically biased upward in one instance and systematically biased downward in another? I would argue it can't. It is Cal Advocates that is flip-flopping, not California American Water.[18]

Q16. In the last rate case, did Cal Advocates conclude that California American Water's forecasting methodology followed Commission guidance?

A16. Yes. On page 2-15 of its report on California American Water's sales forecast for Test Year 2021 it states:

> M.Cubed's analysis appears to comply with the Commission guidance discussed above. However, there are a few assumptions in M.Cubed's analysis that overlooked key facts and warrant downward adjustments to California American Water's forecasts.[19]

And again on page 2-22 it states:

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15 A.19-07-004, Rose, Suzie, *Report and Recommendations on Revenues, Rate Design, and Special Requests, Application 19-07-004*, February 14, 2020. See, for example, pages 2-15 to 2-22. At the end of the day, however, their recommended "improvements" to California American Water's forecast model resulted in a difference of just six-tenths of one percent between the two forecasts.

16 Cal Advocates Operations Report, pp. 6-11.

17 Mitchell Direct Testimony, July 1, 2022, Attachment 2 - M.Cubed (2022), *California American Water Sales Forecast: 2022 General Rate Case*, p. 2.

18 It has been suggested that with an M-WRAM Cal Advocates has an incentive to advocate for a higher forecast since this would result in lower rates being adopted. Absent the WRAM, if the sales do not materialize ratepayers avoid the utility's unrecovered costs.

19 A.19-07-004, Rose, Suzie, *Report and Recommendations on Revenues, Rate Design, and Special Requests, Application 19-07-004*, February 14, 2020, p. 2-15.

> In developing its sales forecast for Test year 2021, California American Water generally utilizes an econometric model that considers numerous factors known to influence water consumption. California American Water's methodology for developing its demand forecasts generally comports with Commission guidance.[20]

The downward adjustments Cal Advocates proposed proved to be very minor and their recommended forecast differed from California American Water's by only six-tenths of one percent.[21]

Q17. How did California American Water's 2021 Test Year forecast compare to actual 2021 water sales?

A17. The forecast was largely accurate. Companywide forecasted sales differed from actual sales by less than 4%.[22] To provide some context for assessing this performance, we compared it to the average forecast performance for all California urban water suppliers.[23] These suppliers prepare Urban Water Management Plans (UWMP) every five years. In their 2015 plans they forecasted their 2020 sales and in their 2020 plans they reported their actual 2020 water uses. We compiled these data and calculated the mean absolute percentage error (MAPE) of the forecasts. To prevent outlier errors from biasing the results, we removed the largest 5% of the forecast errors in the UWMP dataset before calculating the average forecast error. For residential sales, the average error was 20% while for commercial sales, it was 34%. California American Water's forecast performance was hugely better than this. Granted, the UWMP forecasts were five-year out forecasts while California American Water's were three-year out forecasts.

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20 Ibid., p. 2-22.

21 Ibid., p. 2-22.

22 The forecast of 2020 sales differed from actual 2020 sales by less than 3%.

23 California water code defines an urban water supplier as a utility providing water for M&I purposes to not less than 3,000 connections or making annual deliveries of not less than 3,000 acre-feet. There are approximately 400 urban water suppliers that meet these criteria.

Nonetheless, the increased time horizon is not enough to account for the five to eight-fold difference in forecast performance.

Q18. How did the 2021 Test Year service forecast compare to actual 2021 services?

A18. The forecast was accurate. Companywide services differed from actual services by less than 2%. By California American Water Division, forecasted services differed from actual services by 1.6% in the Central Division, by 1.8% in the Southern Division, and by 2.1% in the Northern Division.

Q19. Did California American Water use the same methodology to forecast services in the current rate case as it did in its 2019 rate case?

A19. Yes. With the exception of Larkfield and Sacramento, the forecasts are based on a linear model of historical service growth between 2015 and 2021. In the case of the Larkfield and Sacramento districts, the single-family residential service forecasts are based on projections of new housing prepared for California American Water by the Gregory Group. For the Larkfield district, this new housing construction is being driven by the on-going recovery from the 2017 Tubbs Fire. In the case of the Sacramento district, the new housing construction is due to the Riolo Vineyards development in the southern part of Placer County and the Rio Del Oro development in Rancho Cordova.

Q20. Cal Advocates has recommended a higher service forecast than California American Water. Do you agree with this recommendation?

A20. No. As I just noted, California American Water's service forecast methodology has generally produced accurate forecasts. Cal Advocates is recommending service growth rates that are significantly higher than what has occurred historically. Consequently, compared to California American Water they project 1.2% more services in the 2024 Test Year; 1.7% more services in the 2025 Attrition Year; and 2.2% more services in the 2026 Attrition Year. As noted in Mr. Pourtaherian's testimony, it appears that Cal Advocates

has not properly accounted for one-time acquisitions in their service forecast methodology.[24]

I ran a side-by-side comparison of the two forecast approaches to see which performed better. I compared forecasts of 2022 services using Cal Advocates' recommended approach to that of California American Water's. This is shown in the following two tables. Cal Advocates' recommended forecast approach generates a forecast error four times larger than California American Water's. California American Water's forecast method produced the better forecast. It is clear that Cal Advocates' method is over-predicting services, particularly in California American Water's Northern Division.

2022 Service Forecast Using Cal Advocates' Service Growth Rates					
Division	District	Forecast	Actual	Error	% Error
Central	Monterey	39,669	39,817	-148	-0.4%
Central	Central Satellite Systems	903	899	4	0.5%
Central	Chualar	191	195	-4	-2.1%
Southern	Baldwin Hills	6,301	6,221	80	1.3%
Southern	Duarte	8,005	7,481	524	7.0%
Southern	San Marino	14,514	14,453	61	0.4%
Southern	San Diego	21,903	21,690	213	1.0%
Southern	Ventura	21,197	21,141	56	0.3%
Northern	Sacramento	63,679	60,126	3,553	5.9%
Northern	Larkfield	2,476	2,337	139	6.0%
Northern	Meadowbrook	1,734	1,724	10	0.6%
	Total	**180,573**	**176,084**	**4,489**	**2.5%**
Central		**40,763**	**40,911**	**-148**	**-0.4%**
Southern		**71,920**	**70,986**	**934**	**1.3%**
Northern		**67,889**	**64,187**	**3,702**	**5.8%**

[24] Rebuttal Testimony of Bahman Pourtaherian, Section III.I.

2022 Service Forecast Using California American Water's Service Growth Rates					
Division	District	Forecast	Actual	Error	% Error
Central	Monterey	39,735	39,817	-82	-0.2%
Central	Central Satellite Systems	899	899	0	0.0%
Central	Chualar	193	195	-2	-1.2%
Southern	Baldwin Hills	6,254	6,221	33	0.5%
Southern	Duarte	7,516	7,481	35	0.5%
Southern	San Marino	14,492	14,453	39	0.3%
Southern	San Diego	21,903	21,690	213	1.0%
Southern	Ventura	21,201	21,141	60	0.3%
Northern	Sacramento	60,724	60,126	598	1.0%
Northern	Larkfield	2,477	2,337	140	6.0%
Northern	Meadowbrook	1,731	1,724	7	0.4%
	Total	**177,126**	**176,084**	**1,042**	**0.6%**
Central		**40,827**	**40,911**	**-84**	**-0.2%**
Southern		**71,366**	**70,986**	**380**	**0.5%**
Northern		**64,933**	**64,187**	**746**	**1.2%**

Q21. Cal Advocates has recommended a higher sales forecast than California American Water. Do you agree with this recommendation?

A21. No. As I explained above, Cal Advocates methodology basically generates a reference sales forecast based on water consumption in the previous 2-5 years.[25] Cal Advocates has not completed the critical second step of adjusting the reference forecast for expected changes in the factors that will cause usage rates to change over time, such as changes to water rates, ongoing conservation, changes in codes and regulations, differences in weather, or possibility of drought. Unless the Commission believes the next five years will be just the same as the last five years, it should be deeply skeptical of the approach Cal Advocates has recommended.

As with services, I ran a side-by-side comparison to assess relative forecast performance. I compared forecasts of 2022 total sales produced using Cal Advocates' approach versus

[25] I am being generous in my description of their approach by setting aside for the moment their obvious manipulation of the forecast to increase the projected level of sales.

California American Water's approach. The results using Cal Advocates' approach are shown in the next table and the results using California American Water's approach are shown in the two tables after that. Even though this is just a one year out forecast, the companywide forecast error using Cal Advocates' approach is over 10%. The forecast does especially poorly in California American Water's Southern Division, where the error is 13.6%.

2022 Sales Forecast (CCF) Using Cal Advocates' Forecast Methodology					
Division	District	Forecast	Actual	Error	% Error
Central	Monterey	3,767,106	3,735,851	31,255	0.8%
Central	Central Satellite Systems	139,141	134,576	4,565	3.4%
Central	Chualar	36,830	42,198	-5,368	-12.7%
Southern	Baldwin Hills	1,156,775	1,010,398	146,377	14.5%
Southern	Duarte	2,328,553	1,880,149	448,404	23.8%
Southern	San Marino	3,962,126	3,551,422	410,704	11.6%
Southern	San Diego	4,114,597	4,091,727	22,870	0.6%
Southern	Ventura	6,049,271	4,971,699	1,077,572	21.7%
Northern	Sacramento	12,607,913	11,578,385	1,029,528	8.9%
Northern	Larkfield	334,357	296,703	37,654	12.7%
Northern	Meadowbrook	438,750	395,367	43,383	11.0%
	Total	**34,935,419**	**31,688,474**	**3,246,945**	**10.2%**
Central		**3,943,077**	**3,912,625**	**30,452**	**0.8%**
Southern		**17,611,322**	**15,505,394**	**2,105,928**	**13.6%**
Northern		**13,381,020**	**12,270,456**	**1,110,564**	**9.1%**

The forecasts using California American Water's forecast model are provided in the next two tables. The first provides the forecast when the model's drought adjustment factor is turned off. In that model run, the companywide forecast error is 7.3%. This is better than Cal Advocates' forecast, but still not very good for a one year out forecast.

The reason the forecast performs poorly is that it does not utilize all the information available in 2021 to forecast sales in 2022. In particular, it doesn't incorporate drought effects into the forecast, something that D.16-12-026 correctly noted sales forecasts need

to do. Based on hydrologic and reservoir conditions in 2021, it was clear that drought restrictions would carry into 2022 and that these restrictions would impact water sales. California American Water's forecast model has a drought adjustment factor built into it that estimates these effects. When the drought adjustment factor is turned on, the companywide forecast error decreases to 1.4%, which is a good outcome for a one year out sales forecast, and a seven-fold improvement over the forecast based on Cal Advocates' methodology.

Cal Advocates' forecasting method is incapable of accounting for drought effects because it is based on static average usage rates. The usage rates in California American Water's forecast model, by contrast, are conditional averages that adjust according to how factors that drive urban water use –water rates, conservation, weather, and drought – are expected to change. I think this provides a clear example of why forecasts based on proper statistical models of water use should be preferred to forecasts based on static averages.

2022 Sales Forecast (CCF)
Using California American Water's Forecast Methodology
With Drought Adjustment Factor Turned Off

Division	District	Forecast	Actual	Error	% Error
Central	Monterey	3,698,434	3,735,851	-37,417	-1.0%
Central	Central Satellite Systems	134,712	134,576	137	0.1%
Central	Chualar	36,933	42,198	-5,265	-12.5%
Southern	Baldwin Hills	1,152,709	1,010,398	142,311	14.1%
Southern	Duarte	2,179,011	1,880,149	298,862	15.9%
Southern	San Marino	3,955,999	3,551,422	404,577	11.4%
Southern	San Diego	4,093,994	4,091,727	2,268	0.1%
Southern	Ventura	5,908,686	4,971,699	936,987	18.8%
Northern	Sacramento	12,068,574	11,578,385	490,189	4.2%
Northern	Larkfield	337,618	296,703	40,914	13.8%
Northern	Meadowbrook	424,222	395,367	28,855	7.3%
	Total	**33,990,891**	**31,688,474**	**2,302,417**	**7.3%**
Central		**3,870,079**	**3,912,625**	**-42,546**	**-1.1%**
Southern		**17,290,399**	**15,505,394**	**1,785,005**	**11.5%**
Northern		**12,830,413**	**12,270,456**	**559,958**	**4.6%**

2022 Sales Forecast (CCF) Using California American Water's Forecast Methodology With Drought Adjustment Factor Turned On					
Division	District	Forecast	Actual	Error	% Error
Central	Monterey	3,555,259	3,735,851	-180,592	-4.8%
Central	Central Satellite Systems	118,184	134,576	-16,392	-12.2%
Central	Chualar	33,872	42,198	-8,326	-19.7%
Southern	Baldwin Hills	1,096,632	1,010,398	86,234	8.5%
Southern	Duarte	1,991,573	1,880,149	111,424	5.9%
Southern	San Marino	3,561,657	3,551,422	10,236	0.3%
Southern	San Diego	3,836,320	4,091,727	-255,407	-6.2%
Southern	Ventura	5,295,204	4,971,699	323,505	6.5%
Northern	Sacramento	11,065,756	11,578,385	-512,630	-4.4%
Northern	Larkfield	302,013	296,703	5,310	1.8%
Northern	Meadowbrook	391,877	395,367	-3,490	-0.9%
	Total	**31,248,347**	**31,688,474**	**-440,127**	**-1.4%**
Central		**3,707,315**	**3,912,625**	**-205,310**	**-5.2%**
Southern		**15,781,387**	**15,505,394**	**275,992**	**1.8%**
Northern		**11,759,646**	**12,270,456**	**-510,809**	**-4.2%**

Q22. Cal Advocates asserts that California American Water's forecast does not account for all of the specific sales forecast factors listed in D.20-08-047.[26] Do you agree with this assertion?

A22. I absolutely do not. California American Water's forecast accounts for all of the factors in D.20-08-047, as I will show below. Before doing that, however, I would like to make two observations. First, Cal Advocates provides no evidence whatsoever to back up their assertion. That is because their assertion is baseless, as I am about to show. Second, this is about as clear a case of a pot slandering a kettle as one is likely to run across. As I have thoroughly documented above, Cal Advocates' forecast method is incapable of accounting for the factors in D.20-08-047 because it relies on static simple averages to predict future water use. This means that it is implicitly assuming either future use is

[26] Cal Advocates Operations Report, page 6.

unrelated to the factors in D.20-08-047 or these factors can reasonably be expected to be the same in the Test Year as they were in the period over which the averages were formed. Neither assumption is tenable.

As I discussed above, in D.20-08-047, the Commission listed the following specific factors that should be addressed in sales forecasts:[27]

1. Impact of revenue collection and rate design on sales and revenue collection.
2. Impact of planned conservation programs.
3. Changes in customer counts
4. Previous and upcoming changes to building codes requiring low flow fixtures and other water-saving measures, as well as any other relevant code changes.
5. Local and statewide trends in consumption, demographics, climate, population density, and historic trends by ratemaking area.
6. Past sales trends.

I will address these one by one.

1. Impact of revenue collection and rate design on sales and revenue collection.

California American Water's forecast model explicitly incorporates the effects of rates into the forecasts it generates. We clearly documented this in our sales forecast report:[28]

> The model's price variable is specified as the average price paid by customer i in period t. The average price is calculated as customer i's commodity charge, inclusive of quantity-based surcharges and surcredits, divided by the number of units purchased. In the case of the non-residential customer classes, this is the same as the posted rate, plus any surcharges and surcredits, since a uniform rate per unit is charged regardless of quantity purchased. This is not the case for the

[27] D.20-08-047, pp. 50-51.

[28] Mitchell Direct Testimony, Attachment 2, M.Cubed (2022), *California American Water Sales Forecast: 2022 General Rate Case*, p. 10.

> residential customer class (or the multi-residential class in the Monterey District). Residential rates use an increasing-block rate design where the rate paid depends on the amount of water purchased. As a consequence, the residential price variable is not independent of observed purchased quantities and standard regression methods will not yield consistent estimates of the marginal effect of price on water use. A naïve regression approach would likely estimate a positive relationship between price and quantity – i.e., an upward sloping demand curve. But this is merely a consequence of endogeneity between price and water use – the more that is purchased, the higher the price that is paid per unit, and hence it appears as though consumers increase their consumption in response to a higher price, contrary to the law of demand.
>
> To deal with the endogeneity of the residential price variable, an instrumental price variable is constructed, and instrumental variables regression techniques are used to estimate the residential models. Following the guidance in Billings and Jones (2008), the price instrument is the average price paid by the median water user.

Moreover, in my supplemental direct testimony, I clearly state that we revised the sales forecast to account for changes in California American Water's proposed rate design under its Water Resources Sustainability Plan (WRSP):[29]

> Yes. We made two changes to the forecasts provided in our June 2022 sales forecast report. First, we updated the forecasts to incorporate drought response information from 2022. This is consistent with D.20-98-047 which ordered that sales forecasts in future rate cases address, among other things, incorporate local and statewide trends in consumption, demographics, climate, population density, and historic trends by ratemaking area, as well as D.16-12-026, which required IOUs to incorporate drought information into their sales forecasts. These updates are documented in a Technical Memorandum, dated January 23, 2023, which is attached to my testimony as Attachment 2.
>
> Second, we reduced the sales forecasts for the Northern and Southern Division districts by slightly more than 1% to reflect changes to the rate design that are part of California American Water's decoupling proposal. The results of the sales and bill impact simulations we ran using the proposed rate designs and the rate designs in California American Water's original filing provided the basis for the second adjustment.

[29] Supplemental Direct Testimony of David Mitchell, dated January 27, 2023, pp. 26-27.

2. Impact of planned conservation programs.

California American Water's forecast model incorporates trend terms to capture the effects of ongoing planned conservation programs. We clearly documented this in our sales forecast report:[30]

> The model includes an annual trend term that captures any longer-term deterministic trend in average water use after controlling for weather, drought, COVID, and rate effects. The model's trend picks up the effect of time-variant unmeasured variables, including passive conservation due to plumbing codes and appliance standards, utility-sponsored conservation, changes in household size and income, and changes in the business environment.

3. Changes in customer counts.

California American Water's forecast model incorporates expected changes in customer counts. We clearly documented this in our sales forecast report:[31]

> The service forecasts for each district are provided in Tables 3 through 13. With the exception of the Larkfield and Sacramento districts, these forecasts were generated by projecting forward 2021 services using the average rate of change in the number of services between 2015 and 2021.
>
> In the case of the Larkfield and Sacramento districts, the single-family residential service forecasts are based on projections of new housing prepared for California American Water by the Gregory Group. For the Larkfield district, this new housing construction is being driven by the on-going recovery from the 2017 Tubbs Fire. In the case of the Sacramento district, the new housing construction is due to the Riolo Vineyards development in the southern part of Placer County and the Rio Del Oro development in Rancho Cordova. Service forecasts for the other customer classes in these two districts are based on the average rates of change in the number of services between 2015 and 2021.

30 Mitchell Direct Testimony, Attachment 2, M.Cubed (2022), *California American Water Sales Forecast: 2022 General Rate Case*, p. 10.

31 Ibid., p. 5.

4. Previous and upcoming changes to building codes requiring low flow fixtures and other water-saving measures, as well as any other relevant code changes.

California American Water's forecast model incorporates trend terms to capture the effects of passive conservation related to building codes and plumbing fixture standards. This is clearly documented in our sales forecast report:[32]

> The model's trend picks up the effect of time-variant unmeasured variables, including passive conservation due to plumbing codes and appliance standards, utility-sponsored conservation, changes in household size and income, and changes in the business environment.

5. Local and statewide trends in consumption, demographics, climate, population density, and historic trends by ratemaking area.

This is a bit of a catch-all. Nonetheless, California American Water's forecast model captures these effects. I've already documented that the model incorporates trend terms to capture the effects of time-variant changes in active and passive conservation. The trend terms also capture shifting demographic and population density effects. Additionally, the service forecast captures population density effects through changes in the relative proportion of services for single- and multi-family housing.

California American Water's forecast model explicitly incorporates climate and weather effects. We clearly documented this in our sales forecast report:[33]

> Seasonal [i.e., climate] and weather effects are modeled as continuous functions of time through the use of Fourier series harmonics. This enables billing data to

32 Ibid., p. 10.
33 Ibid., p. 6.

> be precisely matched to weather data based on meter read dates which improves the accuracy and precision of the model's estimated weather coefficients.
>
> Weather effects are modeled as deviations from their expected value. For example, precipitation in January appears in the model as the difference between realized and expected precipitation in January. Weather effects are thereby made independent of seasonal effects. This allows the model to predict the change in average water use when rainfall or temperature are above or below their expected values.
>
> The model allows for interaction between the weather and seasonal components. Thus, weather effects can be allowed to vary over the year. For example, the model can be used to test whether the response in average water use to deviations in expected rainfall or temperature differ by season.

Additionally, the model explicitly accounts for the effects of drought on water use. We clearly documented this in our sales forecast report:[34]

> Two drought periods are specified in the model with dummy variables that take the value of one during the drought period and zero otherwise. The first spans 2015 and 2016 when local and state water use restrictions were implemented in response to severe drought and adverse water supply conditions. The second covers the period following Governor Newsom's July 23, 2021, call for a 15 percent voluntary reduction in water use and runs to the end of the estimation period (December 31, 2021).

Additionally, California American Water's sales forecast uses Monte Carlo simulation to explicitly account for Test Year drought sales risk:[35]

> The drought response semi-elasticities can be used to simulate sales risk due to drought water use restrictions. This was done based on the estimated responses to the 2015-2016 and 2021 drought water use restrictions as well as the weighted average of these two responses. The results are summarized in Table 23.
>
> The results are used to estimate the likely reduction in total annual sales should drought water use restrictions be in place in the Test Year. The amount of reduction varies by district and customer class. Overall, total sales are roughly 5 to 10 percent lower than the baseline forecast when looking at the weighted

[34] Ibid., p. 9.
[35] Ibid., p. 24.

> average response, and 5 to 15 percent lower than the baseline forecast when looking at the maximum response.

Additionally, the model captures the effects that Covid-related shelter-in-place orders had on both residential and non-residential water uses:[36]

> The model includes two dummy variables corresponding to the adoption of COVID-related shelter-in-place orders and the widespread rollout of vaccines. The first variable takes the value of one from April 1, 2020, through December 31, 2020, and zero otherwise. Shelter-in-place orders were broadly in place by the third week of March 2020. Meter reads starting April 1 would therefore include at least one to two weeks of water use after these orders had taken effect. The second variable takes the value of one from January 1, 2021, through the end of the estimation period (December 31, 2021), and zero otherwise. Vaccines began to be widely administered in early 2021 and many schools resumed in-class instruction in the second half of 2021. Both factors would be expected to impact residential and commercial water uses. The two COVID variables are designed to capture changes in water use as responses to the pandemic evolved.

6. Past sales trends

I've already documented that the model incorporates trend terms to capture the effects of time-variant changes in sales.

Q23. Please summarize your recommendation regarding which forecast the Commission should adopt for Test Year 2024.

A23. It is my recommendation that the Commission adopt California American Water's proposed Test Year 2024 sales forecast. The Commission should disregard the alternative forecast put forward by Cal Advocates for the following reasons:

- California American Water's forecast is based on sophisticated statistical models of sector-level water use. As I have shown above, it follows the Commission's forecast guidelines contained in D.16-12-026 and D.20-08-047; it is based on the

[36] Ibid., p. 27.

same methodology used in the previous rate case which produced accurate companywide forecasts of Test Year 2021 service counts and sales levels; and in a head-to-head test forecasting one year ahead 2022 sales, it outperformed Cal Advocates' recommended approach by a very wide margin.

- Cal Advocates has recommended the Commission use an overly simplistic forecasting method based on static average usage rates to forecast California American Water's 2024 Test Year sales. Their recommended approach does not follow the Commission's own forecast guidelines in D.16-12-026 and D.20-08-047, nor does it follow forecasting best practices outlined in standard texts, such as Billings and Jones (2008). Cal Advocates applies its methodology inconsistently and cherry picks service growth and water usage rates which results in inflated sales and service forecasts.

IV. RATE DESIGN

Q24. Have you reviewed Cal Advocates' rate design recommendations?

A24. I have. They are contained in Chapter 2 and associated attachments of the report prepared by Cal Advocates witness Herbert Merida -- *Report on the Results of Operations: Water Consumption, Rate Design and Special Results 10, 12, 17, 18, 19, and 20, California American Water Company General Rate Case Application 22-07-001 Test Year 2024*, dated April 13, 2013.[37]

Q25. Did you assist California American Water in the development of the rates and charges it has proposed in this rate case?

A25. I did. My firm, M.Cubed, developed a bill impact model that we then used to evaluate the impact on customer water use and bills of alternative rate designs and service area

[37] I assume the date on the report is a typographic error. For the purposes of my testimony, I hereafter reference this report as Cal Advocates Operations Report.

consolidations in California American Water's Northern, Central, and Southern Divisions. The bill impact models for each Division are based on bill tabulations for 2021 and are calibrated to replicate the underlying assumptions of the rate designs currently operative in each Division. The bill impact model is presented, and analysis results are summarized in Attachment 3 of my direct testimony.[38] In their report, Cal Advocates states that "California American Water based its rate design on four years of customer-level single family monthly billing data spanning 2015-2018."[39] This is not the case with respect to the analysis done by M.Cubed. The bill impact model we developed to analyze the impact of alternative rate designs on customer water use and bills is based on 2021 monthly billing data.

Additionally, my firm, M.Cubed, assisted California American Water during its 2019 GRC with the recalibration of the block widths in its residential increasing block rates (IBR) to more accurately reflect current residential water usage levels. California American Water's current rate designs were reviewed and adopted by the Commission as part of California American Water's 2019 GRC. The new rates and charges, including the updated block widths, were implemented on March 4, 2022.

Q26. Is California American Water proposing changes in the percentage of revenue requirement recovered from monthly service charges in this GRC?

A26. It is. It is continuing the transition it started in its 2019 GRC to recover a higher percentage of revenue from service charges in accordance with D.16-12-026. In that decision, the Commission set a floor of 40% revenue recovery from service charges and a ceiling of 50% and directed Class A utilities to phase in the higher service charges

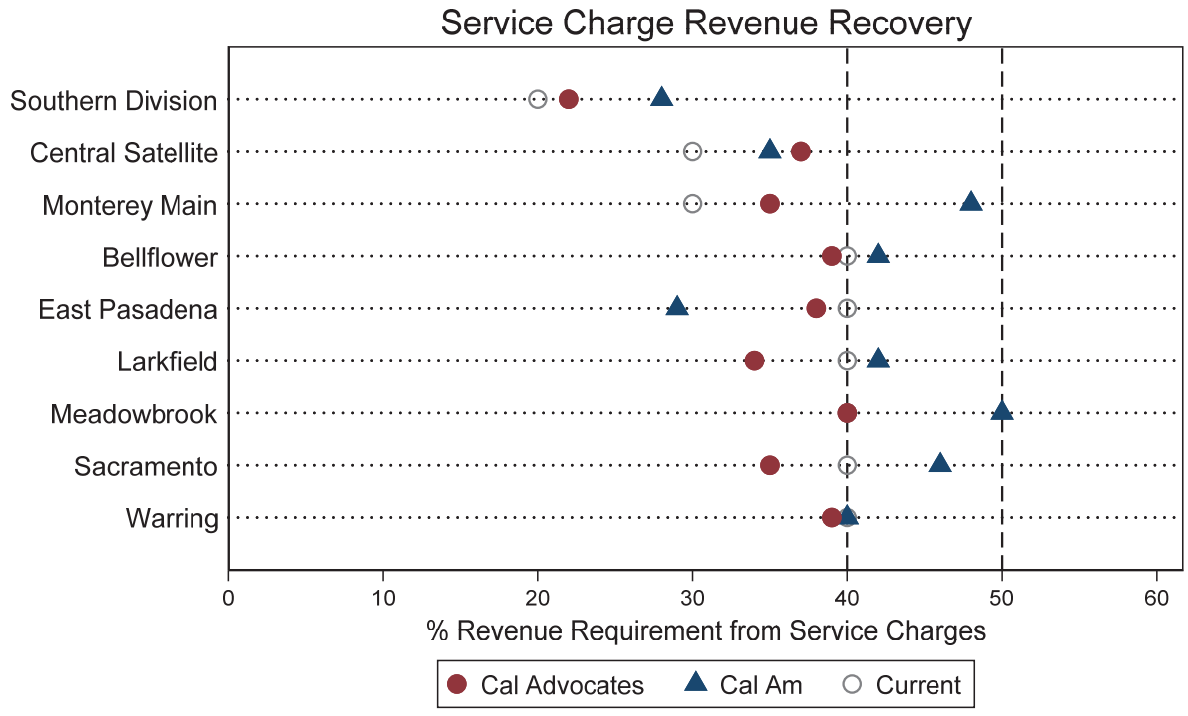
[38] See Mitchell Direct Testimony.

[39] Cal Advocates Operations Report, p. 27.

through one or more rate cycles.[40] California American Water started adjusting its service charges in its 2019 GRC.

Q27. Cal Advocates is recommending recovering a significantly lower percentage of the revenue requirement from service charges than California American Water. Do you agree with this recommendation?

A27. No, I do not. Cal Advocates' is recommending service charge revenue recovery percentages that fall below the floor set by the Commission in D.16-12-026 in every California American Water rate area except Meadowbrook. As shown in the following figure, in five of California American Water's nine rate areas, they are proposing to reduce service charge revenue recovery from its current 40% level (per D.16-12-026) to somewhere between 34-39%.[41]



[40] D.16-12-026, pp. 56-57.

[41] Cal Advocates Operations Report, p. 22, Table 2-1.

It is very bizarre. In their report Cal Advocates states "the Commission also indicated that service charges should increase in a gradual transition," and then in five instances they recommend reducing service charges from the floor set by the Commission.[42]

Q28. Does Cal Advocates explain why they are recommending setting service charge revenue recovery below the floor set by the Commission in D.16-12-026, particularly in the five California American Water rate areas where service charges already have been transitioned to that floor?

A28. No. They simply state that in "accordance with the fixed charge range recommended in D.16-12-026, the Commission should adopt Cal Advocates' TY 2024 rate design for California American Water's Divisions and service areas."[43] And then in Table 2-1 of their report they propose service charge revenue recovery percentages that fall below the floor established in D.16-12-026 in eight of nine California American Water rate areas. As I said, it is very bizarre.

Q29. In your professional opinion, has California American Water put forward a reasonable rationale for the service charge revenue recovery percentages it is proposing?

A29. Yes. Under the WRSP rate design, California American Water is proposing to recover 35-50% of its fixed costs from monthly service charges, the remainder being recovered from volumetric charges. By rate region, the fixed cost recovery percentages are:

- Central Satellite Systems: 35%
- Southern Division, Sacramento: 45%
- Larkfield, Meadowbrook, Monterey Main: 50%

42 Ibid., p. 22.
43 Ibid.

These percentages continue the gradual increase in fixed cost recovery called for in D.16-12-026 in which the Commission states:[44]

> We believe that current monthly or [sic] service charges may not collect a sufficient amount of fixed costs and therefore result in greater dependence on quantity revenues to collect the remainder of fixed charges. The result is increasing shortfalls in revenue recovery.

As shown in the figure above, California American Water's proposal would result in six of nine California American Water rate areas falling within the service charge revenue recovery range set in D.16-12-026 and three of nine rate areas falling below it, one of which is Central Satellite. The other two, Southern Division and East Pasadena, have very high purchased water costs which is why the proposed fixed cost recovery does not put them over the 40% service charge revenue recovery floor set in D.16-12-026. If California American Water were to recover 40% of its revenue requirement in these two rate areas, it would result in a significant reduction in quantity rates and thus reduce the financial incentive to conserve water. D.16-12-026 plainly states that "it is vital that quantity rates provide strong incentives for conservation."[45]

Q30. Is California American Water proposing changes to the IBR block widths in this GRC?

A30. It is proposing to transition recently acquired systems within its Southern Division (East Pasadena, Bellflower, and Warring) to residential IBR rate designs if they do not already have them.[46] But with regard to its established systems, it is not proposing changes to the block widths that were adopted in the last rate case. The new block widths have only

44 D.16-12-026, p. 56.
45 Ibid.
46 Direct Testimony of Bahman Pourtaherian, pp. 47-49.

been in effect since March of last year. Changing them again so soon would likely result in unnecessary customer confusion.

Q31. In every district, Cal Advocates is recommending significant changes to the IBR block widths proposed by California American Water. Do you agree with their recommendations?

A31. I do not. The biggest change Cal Advocates is proposing is to set in every system the width of the first block to 6 CCF.[47] Currently, the widths of the first block in California American Water's established systems vary from a low of 4 CCF (Monterey Main) to a high of 11 CCF (Southern Division). Cal Advocates' justification for the change is their assertion that "California American Water's proposed tier breakpoints do not conform to the Commission's guidance on the necessary water quantity for basic service."[48] This assertion appears to be motivated by D.20-07-032, which adopted 6 CCF per household per month as the essential service level for water service.[49] *Cal Advocates Operations Report*, footnote 68, cites page 22 of the decision as the basis for setting the width of the first block to 6 CCF. In doing so, they conveniently ignore their own testimony in the proceeding, which the Commission summarized on the following page of the decision:[50]

> While Cal Advocates supported a household, rather than per capita, approach to setting an essential usage figure, they also believed that it may "be more appropriate to rely on an estimate of median winter water demand that is calculated from the company's actual single-family residential customer data (by district, where applicable)" instead of assigning a single statewide figure for essential water service. Cal Advocates claims to have analyzed data showing that an essential water service quantity of 600 cubic feet could over- or under-estimate actual indoor demand by 200 cubic feet or more for approximately 35% of the single-family residential connections reviewed by Cal Advocates.

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47 Cal Advocates Operations Report, Attachment 2-2.
48 Ibid., p. 28.
49 D.20-07-032, p. 97, Conclusion of Law #18.
50 Ibid., p. 23.

Importantly, D.20-07-032 does not address setting IBR block widths in relation to essential water service. It only establishes 6 CCF per household per month as the level of essential water service. It is silent on the question of whether and how this should inform the widths of the blocks in IBR rate designs.

On the other hand, D.20-08-047, which Cal Advocates appears to have overlooked, does address this question. In that decision, the Commission states:[51]

> While we will not require a specific methodology, we direct the investor owned utilities to provide analysis in their next GRC to determine the appropriate Tier 1 breakpoint that is not lower than the baseline amount of water for basic human needs. **This analysis for establishing a baseline should consider and not be set below both the EIU of 600 cubic feet per household per month, as stated in the Affordability Rulemaking (R.18-07-006) and the average winter use in each ratemaking district**. (Emphasis added)

Thus, in D.20-08-047, the Commission directed investor owned utilities not to set the width of the first block of a residential IBR lower than 6 CCF or average winter use, whichever is greater. As shown in the following three tables, average winter use is less than or equal to 6 CCF only in Monterey Main.[52] In every other rate area, average winter use is greater than 6 CCF and thus Cal Advocates' recommendation to set the width of the first block of California American Water's residential IBRs to 6 CCF is contrary to Commission guidance in every rate area except Monterey Main.

51 D.20-08-047, pp. 76-77.

52 Average winter use is calculated as average residential use in December, January, and February.

Northern Division Residential Average Winter Use
(CCF/Month/Meter)

	District			
	Larkfield	Meadowbrook	Sacramento	Total
Year				
2017	5.9	11.5	6.9	7.0
2018	6.7	11.0	7.6	7.7
2019	6.2	9.6	7.3	7.3
2020	6.1		7.0	6.9
2021	5.9	10.5	7.2	7.2
Total	6.1	10.6	7.2	7.2

Central Division Residential Average Winter Use
(CCF/Month/Meter)

	RMA		
	Central Satellite	Monterey Main	Total
Year			
2017		4.0	4.0
2018	6.8	4.4	4.4
2019	5.8	4.1	4.1
2020	8.7	4.1	4.2
2021	7.7	4.4	4.5
Total	7.1	4.2	4.2

Southern Division Residential Average Winter Use
(CCF/Month/Meter)

	District					
	Baldwin Hills	Duarte	San Diego	San Marino	Ventura	Total
Year						
2017	10.5	11.1	7.3	13.5	10.7	10.3
2018	12.1	13.5	7.9	16.6	13.6	12.3
2019	10.1	10.7	6.9	12.5	10.2	9.7
2020	11.3	12.3	7.4	15.5	12.6	11.5
2021	11.4	12.7	7.5	15.5	13.3	11.7
Total	11.1	12.1	7.4	14.7	12.0	11.1

California American Water's current widths for the first block of its residential IBRs either align with or slightly exceed average winter use except in Larkfield and Meadowbrook. In Larkfield, average winter use is slightly more than 6 CCF and the current width of the first block is 5 CCF, which aligns with median winter use in Larkfield.[53] In order to comply with Commission guidance, it would need to be increased to 6 CCF. However, in D.18-12-031, the Commission authorized the consolidation of Larkfield with the other Northern Division service areas and ordered Cal Am to gradually unify Larkfield's and Sacramento's rate designs. Larkfield's current tier widths were adopted by the Commission to further the unification process, which is why Cal Am did not propose changes in this rate proceeding.[54]

In Meadowbrook, average winter use is between 10 and 11 CCF and the current width of the first block is 5 CCF.[55] It would need to be increased to 11 CCF in order to comply with Commission guidance. However, similar to Larkfield, in D.16-12-014 the Commission authorized the consolidation of Meadowbrook's rate design with Sacramento's. California American Water requested deferring this consolidation so that it could more gradually adjust Meadowbrook's rates. The Commission approved this as part of the settlement with Cal Advocates in D.21-11-018. Meadowbrook's new rate design has only been in place since March 2022, which is why California American Water has not requested making changes to the block rate design.[56]

Q32. The width of the first block in Monterey Main is 4 CCF. Do you recommend increasing it to 6 CCF?

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53 Median winter use in Larkfield is 5 CCF, which comports with Cal Advocates' recommendation in the Affordability Rulemaking (R.18-07-006) for determining the essential level of service, as quoted above.

54 See the Rebuttal Testimony of Bahman Pourtaherian for further discussion of this issue.

55 Median winter use in Meadowbrook is 8.6 CCF.

56 See the Rebuttal Testimony of Bahman Pourtaherian (p. 38) for more detail on Meadowbrook's rate design.

A32. The current width of the first block of Monterey Main's residential IBR aligns with its average winter use and is greater than its median winter use, which is 3.5 CCF.[57] Although the Commission's guidance is to set the width of the first block to either average winter use or 6 CCF, whichever is larger, I do not think setting the first block width to 6 CCF in Monterey Main would be appropriate for two reasons. First, 6 CCF per month is the 80th percentile of winter use in Monterey Main. The vast majority of households use less than 6 CCF in the winter, and thus, by extension, less than 6 CCF for indoor purposes.[58] Second, the Monterey peninsula is in a condition of extreme water scarcity and currently there is a moratorium on new service connections. Increasing the width of the first block to 6 CCF would reduce incentives to conserve water and put additional pressure on the region's limited water supplies. For both of these reasons, I would strongly caution against increasing the width of the first block of Monterey Main's residential IBR.

In my assessment, the only rate area where the width of the first block is truly out of alignment with Commission guidance is Meadowbrook, and this will be remedied once Meadowbrook's rates are consolidated with Sacramento's. One could argue that the first block in Larkfield should be increased from 5 to 6 CCF, but doing so will not have an appreciable effect on customer water use or bills. Given that new block widths have been in effect for little more than a year, it seems unwise to me to adjust Larkfield's again so soon. The width of the first block in Monterey Main should not be changed to 6 CCF for the reasons I stated above. The widths of the first rate block in all other California American Water rate areas align with D.20-08-047 requirements.

57 Again, I note that in the Affordability Rulemaking (R.18-07-006), Cal Advocates recommended using median winter use for determining the essential level of water service.

58 Winter residential water use is primarily, though not exclusively, comprised of indoor uses.

If the Commission were to follow Cal Advocates' recommendation to set the width of the first block to 6 CCF in all of California American Water's rate areas, only Monterey Main would be in alignment with D.20-08-047 requirements. All other California American Water districts would not conform with the Commission's guidance on setting the width of the first residential rate block.

Q33. Cal Advocates is recommending significant changes to the IBR rate step-ups proposed by California American Water. Do you agree with their recommendations?

A33. I do not. Based on my assessment of their report, Cal Advocates has not properly evaluated the impact their recommendations would have on water consumption, customer bills, and revenue recovery. Additionally, although they repeatedly claim in their report that they have proposed revenue neutral rates, I do not believe this to be the case for reasons I will explain below. [59]

Before I discuss how I come to these two conclusions, let me explain what is meant by the IBR rate step-ups and marginal water price so that we are clear on terminology. The step-up refers to the percentage change in the commodity rate between one block of the IBR and the next. For example, if the rate in the first block is $2.00 per CCF and the rate in the second block is $3.00 per CCF, the step-up in the rate from block 1 to block 2 is 50%. The marginal price the customer faces depends on which block their consumption ends in. If it ends within the first block in the above example, the marginal price would be $2.00 per CCF. However, if it ends within the second block, the marginal price would be $3.00 per CCF. Thus, at the margin, customers may face very different rates for service depending on which block their consumption ends in.

Cal Advocates describes the rate step-up somewhat differently. They express the step-up as a percentage of what they term the Standard Quantity Rate (SQR). In their

[59] Cal Advocates Operations Report, pp. 1, 27, 30, 31, 33, 34, 35, 38, 39, and 40.

formulation, the SQR is the uniform commodity rate that if applied to the residential sales forecast would, along with the monthly service charges, recover the revenue requirement allocated to residential customers. For example, in Table 2-8 of their report, they recommend setting the rate in Larkfield's first block to 85% of what they calculate is the SQR, setting the rate in the second block to the SQR itself, setting the rate in the third block to 115% of SQR, and setting the rate in the fourth block to 191% of SQR.[60] This is equivalent to saying the rate would step-up 17.6% from block 1 to block 2, 15% from block 2 to block 3, and 66% from block 3 to block 4.

The way Cal Advocates develops their recommended IBRs is to first calculate the SQR for the service area. They calculate the SQR by dividing the residential volumetric revenue to be collected by the residential sales forecast.[61] Next they scale up or down the SQR to set the rate customers will pay for water in each block of the IBR. The SQR scaling factors are set so that when the resultant rates are multiplied by the sales forecast, they generate the same amount of volumetric revenue as the SQR did. This simply requires a bit of algebra to find the right scaling factors.

Cal Advocates asserts that this approach ensures revenue neutrality, meaning their proposed IBR rates would generate the same revenue as would be the case if customers instead paid the SQR for all units of consumption. This is incorrect because their method ignores the most fundamental tenet of economics, the Law of Demand.[62] Their method

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[60] Ibid., p. 30.

[61] Ibid., p. 28.

[62] The Law of Demand is a fundamental principle in economics that states that as the price of a good or service increases, the quantity demanded of that good or service will decrease, and conversely, as the price of a good or service decreases, the quantity demanded of that good or service will increase, all else being equal. The empirical basis for this principle comes from numerous studies and observations of consumer behavior over time. These reactions to price changes can be seen in a wide range of goods and services, from food and clothing to housing and transportation. The Law of Demand is a central concept in economics and is critical in understanding how consumers make purchasing decisions and how businesses set

assumes that residential customers will demand the same amount of water whether they pay the SQR or they pay a higher or lower rate than the SQR.[63] For example, in the case of Larkfield they have assumed that customers whose consumption ends in the fourth block will demand the same volume of water if the marginal rate they have to pay is set to the SQR or 191% of the SQR. Likewise, they have assumed that customers whose consumption ends in the first block will demand the same amount of water if the marginal rate they have to pay is set to the SQR or 85% of the SQR. In actuality, customers in the first case will demand less and customers in the second case will demand more. How much more or less depends on the elasticity of demand, which measures how sensitive customer demand is to changes in the marginal price.

Whether overall residential sales will be higher or lower under the IBR pricing regime depends on three things: (1) the rate step-ups relative to the alternative uniform rate, (2) the elasticity of demand, and (3) the distribution of sales across the blocks of consumption. The Commission's presumption is that a well-designed IBR pricing regime will reduce overall demand relative to a uniform pricing regime (e.g., pricing all units of water at the SQR).[64] This is the entire basis for having an IBR in the first place, and why the Commission frequently refers to IBRs as "conservation" rates. If an IBR generated the same level of sales as the SQR, there would be no reason for its use; it would simply be a form of price discrimination without any offsetting benefit.

We have a good sense of how sensitive California American Water's residential demands are to changes in the marginal price of water. We estimated residential price elasticities

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prices. It is one of the most widely accepted principles in economics and has been supported by extensive empirical research. It is incontrovertible that the Law of Demand applies to residential water service (Griffin, 2016; Billings and Jones, 2008; Renzetti, 2002; Bauman, Boland, and Hanemann, 1998, Kahn, 1988).

63 At least they are consistent in their methodology because the method by which they generated their recommended sales forecast also ignores the Law of Demand, as I discussed above.

64 The Commission directed Class A water utilities to design IBRs to reduce residential demand by 1-2% per year. See D.08-02-036, pp. 10-13.

for each California American Water rate area econometrically as part of developing the sales forecast.[65] Cal Advocates could have availed itself of these estimates to analyze the impact of its recommended rates on residential sales and water bills, or it could have adopted elasticity estimates from the voluminous literature on this topic.[66] Either approach would have been better than assuming that demand is perfectly inelastic, which apparently is what Cal Advocates did. I can find no evidence in their report showing that they accounted for price effects when evaluating the impact of their recommended rate designs on sales volume and customer bills.

To give a better sense of why this matters, consider the difference in the IBR for Larkfield between California American Water's and Cal Advocates' rate proposals. California American Water has proposed setting the rate in the fourth block to 119% of SQR while Cal Advocates has proposed setting it to 191% of SQR, or 60.5% higher. I estimate Larkfield's residential price elasticity is -0.343.[67] All else equal, customers in the fourth block would be expected to demand about 15% less water under Cal Advocates' IBR than under California American Water's.[68] A similar calculation shows that customers in the first block would be expected to demand about 4% more water under Cal Advocates' IBR proposal than under California American Water's proposal. Across Larkfield's entire distribution of residential sales, I estimate that Cal Advocates'

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[65] Mitchell Direct Testimony, Attachment 2, M.Cubed (2022), *California American Water Sales Forecast: 2022 General Rate Case*, p. 11, Table 15.

[66] Griffin (2016) and Baumann, Boland, and Hanemann (1998) provide good summaries of the literature on residential water demand.

[67] Mitchell Direct Testimony, Attachment 2, M.Cubed (2022), *California American Water Sales Forecast: 2022 General Rate Case*, p. 11, Table 15.

[68] The expected demand adjustment can be approximated using a constant elasticity of demand function in which case the percentage adjustment is $(1.91SQR/1.19SQR)^{-.343} - 1 = -15.0\%$.

IBR proposal would reduce expected sales by 3.8% relative to California American Water's.[69]

This is why I conclude that Cal Advocates' recommended IBRs are not revenue neutral as they repeatedly claim throughout their report. Their proposed IBRs will be revenue neutral to their calculated SQRs only if demand for residential water service is perfectly inelastic. However, this assumption violates the Law of Demand. In actuality, demand can be expected to be lower under the IBR pricing regime they have proposed, and the revenue generated by these rates will diverge from the Test Year revenue requirement.[70] The problem with Cal Advocates approach is that they treat quantity demanded and price as independent variables when in fact they are interrelated. While it is simpler to calculate rates by assuming quantity demanded is independent of price, the result one gets is invariably wrong.

Unlike Cal Advocates, California American Water did account for the effect of the residential rate design on expected residential sales, customer bills, and revenue requirements. This analysis is contained in Attachment 3 of my Direct Testimony. Additionally, when California American Water proposed changes to the rate design as part of the WRSP, it adjusted the sales forecast in response to the expected impact these changes would have on residential water use.[71]

Q34. Cal Advocates provides average residential bill comparisons in Tables 2-9, 2-14, and 2-19, of their report based on the revenue requirements proposed in California American Water's application. Do you agree with these comparisons?

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69 I used 2021 customer bills to simulate the distribution of residential water use and the expected change in residential sales under each rate design.

70 Additionally, lower water sales translate to lower water production costs and thus lower revenue requirements. Cal Advocates' rate setting methodology assumes revenue requirements are invariant to rate design, which is not true.

71 Supplemental Direct Testimony of David Mitchell, p. 26.

A34. I do not. Although the tables purport to show the average monthly residential bill under each rate design, that is not what they actually show.[72] What they show is the bill at average residential usage, which is not the same thing. To calculate the average bill, you use a bill tabulation and calculate the bill for every residential customer under the proposed rates and charges, considering meter size, CAP discount, and water usage. Once all the bills have been calculated, you take the average. You know you have calculated the average bill correctly if when it is multiplied by the total number of residential bills, the result is equal to total residential revenue from rates and charges.

The bill at average residential usage is calculated by determining the volume charge for average usage and then tacking on a service charge (typically for a 5/8" meter). The volume charge for average usage depends on what average usage for the service area is and the breakpoints and rate step-ups of the IBR rate design.

The average bill and the bill at average usage can be very different, particularly under non-linear rate designs, such as IBRs. It is quite possible for average bills to be similar under two different IBRs and yet for the bills at average usage to be very different. This is because average usage generally provides a poor characterization of the distribution of residential water use and, hence, residential bills. In Larkfield, for example, bills of residential customers with 5/8" meters that were within +/- 1 CCF of average usage accounted for only 13% of total residential bills and 12% of total residential water use in 2021.[73] Thus, comparing bills at average usage only tells you how bills for a very narrow slice of the water use distribution compare. This is not good enough when you are evaluating non-linear rate designs because bills outside of this narrow band of

[72] Additionally, it appears that the labeling in Table 2-9 is incorrect, or the bill amounts were transposed between the California American Water and Cal Advocates columns because bill amounts shown for California American Water are lower than the amounts shown for Cal Advocates and yet the table states that Cal Advocates' rates result in lower bill amounts.

[73] The same is true for Sacramento, a much larger service area.

consumption could be radically different depending on where breakpoints are located and how rates scale with water use.

To illustrate what I mean, I used the 2021 bill tabulation for Larkfield to calculate the average bill and the bill at average usage under California American Water's and Cal Advocates' proposed rates and charges.[74] The percentage difference in the bill at average usage was more than two times larger than the percentage difference in the average bill.[75] The bill at average usage is not sufficient for comparing bill differences under non-linear rate designs. Cal Advocates' analysis only tells us how bills within a very narrow band of consumption compare, it doesn't tell us how bills outside this band of consumption compare or how bills compare on average.

Q35. Aren't Class A utilities required to include in notices to customers of proposed rate changes how the bill at average usage will change between the current rates and the proposed rates?

A35. Yes. That is a public noticing requirement. But as I said, it is not a sufficient statistic for understanding the impact of the rate change on the distribution of customer bills. In order to fully understand the impacts of its proposed rate designs, California American Water evaluated changes in 1) the average residential bill, 2) the average bill for non-CAP residential customers, 3) the average bill for CAP residential customers, 4) the average bill for five different consumption ranges separately for CAP and non-CAP residential customers, 5) the average bill for non-residential customers, and 6) rate-design induced changes in water demand. It undertook a comprehensive assessment of the impact on bills

[74] I used the meter charges in Attachment 2-1, the Tier breakpoints in Attachment 2-2, and the commodity rates in Attachment 2-3 (California American Water) and Attachment 2-4 (Cal Advocates), applied to the consumption quantities and meter sizes in Larkfield's 2021 bill tabulation.

[75] The bill at average usage for a non-CAP customer with a 5/8" meter was $74.42 under California American Water's rates and $67.49 under Cal Advocates', a difference of 9.3%. The average bill was $97.76 under California American Water's rates and $93,57 under Cal Advocates', a difference of 4.3%.

and water use for each rate alternative it considered.[76] Cal Advocates only provides a comparison of bills at average usage, which is necessary for public noticing, but is not sufficient for understanding the impacts of a proposed rate design involving non-linear quantity charges. Moreover, their calculation of bills at average usage is done incorrectly as demonstrated in Mr. Pourtaherian's testimony.[77]

Q36. Please summarize your recommendation regarding which rate designs the Commission should adopt for Test Year 2024.

A36. It is my recommendation that the Commission adopt California American Water's proposed rate designs. The Commission should disregard the alternative rate designs put forward by Cal Advocates for the following reasons:

- California American Water conducted detailed analysis of its proposed rates using sophisticated bill impact models that explicitly account for the interrelationship between quantity demanded and price of water service. It used the results of this modeling to propose rate designs that struck a reasonable balance between the competing objectives of (1) revenue recovery/stability, (2) conservation, and (3) affordability.

- California American Water's rate designs align with the Commission's guidance on setting rates and recovering revenue contained in D.16-12-026 and D.20-08-047.

[76] Direct Testimony of David Mitchell, Attachment 3.
[77] Rebuttal Testimony of Bahman Pourtaherian, pp. 30-34.

- Cal Advocates' proposed rate designs do not follow Commission guidelines, either with respect to revenue recovery from service versus commodity charges or with respect to the design of residential IBRs.

- Additionally, Cal Advocates has failed to provide a valid assessment of the impacts of its proposed rate designs on customer water use, bills, and revenue recovery. The analysis it did provide is predicated on assumptions about consumer behavior and the interdependence of quantity demanded and price that are demonstrably incorrect. It mischaracterizes its analysis of impacts on bills at average usage as an analysis of average bill impacts. In doing so, it misrepresents bill impacts based on a narrow and non-representative band of consumption as the average bill impact for each California American Water service area.

V. REVENUE DECOUPLING MECHANISM

Q37. Have you reviewed Cal Advocates' recommendations regarding California American Water's Special Request #1 as it relates to adoption of a revenue decoupling mechanism?

A37. I have. They are contained in the report prepared by Cal Advocates witness Richard Rauschmeier -- *Report and Recommendations on California American Water's Special Request #1, California American Water Company General Rate Case Application 22-07-001 Test Year 2024*, dated April 13, 2023.[78]

Q38. Can you briefly summarize Cal Advocates' recommendations contained in this report?

A38. Cal Advocates recommends that the Commission deny California American Water's request to decouple its revenue from sales via its proposed Essential Service Balancing Account (ESBA) and instead authorize California American Water to implement the so-

[78] For the purposes of my testimony, I hereafter reference this report as Cal Advocates Special Request #1 Report.

called Monterey-Style Water Revenue Adjustment Mechanism (M-WRAM).[79] Its recommendation is based on five assertions regarding the effects of revenue decoupling under the Water Revenue Adjustment Mechanism (WRAM) that operated from 2008 to 2021. The five assertions are:

1. WRAM has no significant impact on consumption
2. WRAM has very significant impact on customer bills
3. WRAM harms all ratepayers
4. WRAM is not necessary to promote conservation
5. WRAM does not protect low-income customers

Q39. Do you agree with Cal Advocates' assessment of the WRAM or its recommendation that the Commission adopt the M-WRAM rather than California American Water's proposed ESBA?

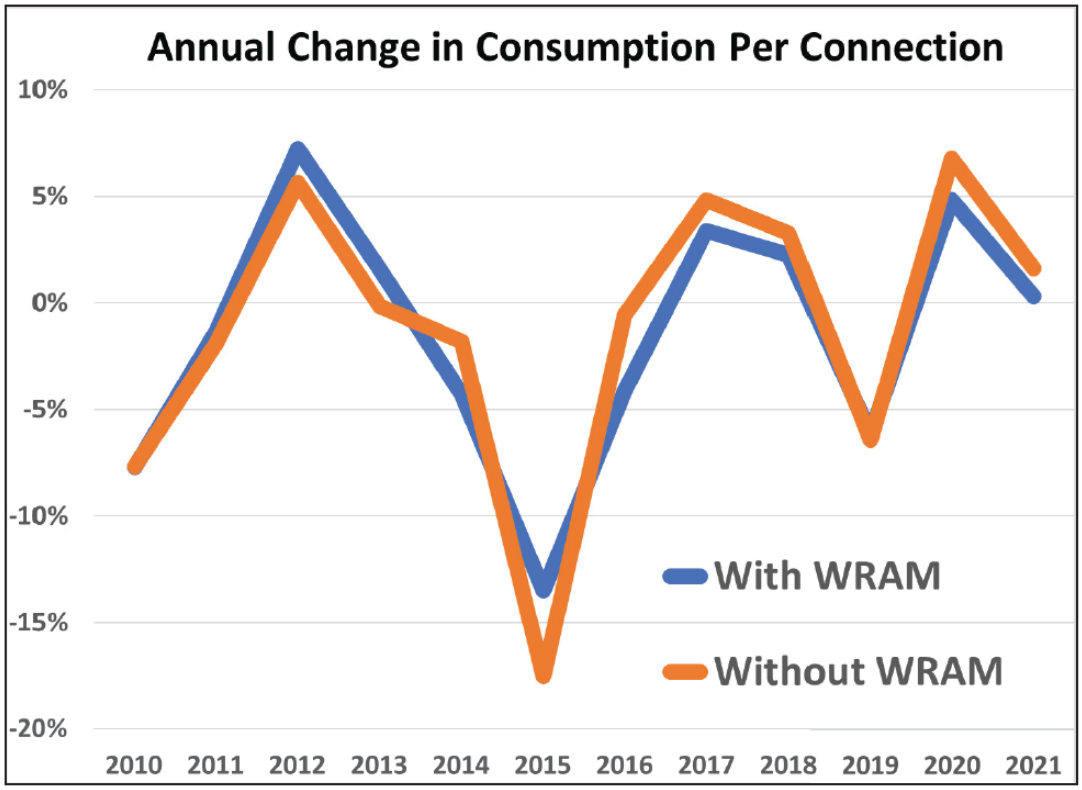
A39. No. Having read their report and carefully reviewed their analysis, I do not find it persuasive. In most cases their assertions are not empirically supported. Where they do present data, they do not properly analyze it. Their report is primarily a rhetorical exercise rather than a rigorous analysis.

Q40. Do you agree with Cal Advocates' claim that the WRAM has no significant impact on consumption?

A40. No. They base this assertion on Figure 1 in their report, which I have included below.

[79] It also wants the name of the M-WRAM changed to something else.

Figure 1 from Cal Advocates Special Request #1 Report



This figure claims to demonstrate the annual change in consumption per connection from 2010 to 2021 for those Class A utilities operating with the WRAM versus those operating with the M-WRAM. Cal Advocates contends that the similarity between the two lines is robust causal evidence that the WRAM had no effect on consumption. However, such a conclusion cannot be supported by Figure 1 for the following reasons:

Aggregation Bias – Aggregation bias occurs when it is erroneously assumed that the trends observed in aggregated data also apply to individual data series. Figure 1's "With WRAM" series is an aggregation of five different investor-owned utilities: California American Water, Cal Water, Golden State Water Company, Park Water Company, and Antelope Valley Water Company. These companies operate at least 50 different water systems located throughout California. The "Without WRAM" series, on the other hand, is an aggregation of four different investor-owned utilities: San Gabriel Valley Water Company, Suburban Water Company, San Jose Water Company, and Great Oaks Water

Company. These companies operate fewer than 10 different water systems primarily located in the Bay Area or Southern California.

It is impossible to determine from Figure 1 whether the trends observed in the aggregated data apply to the 60 or so individual systems. Additionally, it is impossible to discern whether the trends differ geographically or along any other data dimension that could contribute to similar or divergent patterns. Cal Advocates' reasoning is a type of fallacy known as the fallacy of division, where it is assumed that something that is true for the whole must also be true for some or all of its parts.

Confounded Treatment and Control Groups – Cal Advocates characterizes Figure 1 as showing the results of a "natural experiment" with respect to the impact of the WRAM on water use.[80] Valid experimental inference requires a clear delineation between a "treatment" group and a "control" group, which enables the study of differences with and without treatment. It is clear that in Figure 1 the "With WRAM" series is intended to represent the treatment group and the "Without WRAM" series is intended to represent the control group, where treatment is operating with the WRAM. However, over the study period numerous acquisitions of systems that operated without a WRAM occurred in the "With WRAM" treatment group of utilities, which confounds treatment.

More importantly, during the 2013-2017 drought, all but one of the utilities in the "Without WRAM" control group operated with a Lost Revenue Memorandum Account (LRMA), which according to the Commission provided exactly the same treatment as operating with the WRAM. In authorizing the use of this account, the Commission states the following:[81]

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[80] Ibid., pp. 2, 5, and 16.

[81] Commission Resolution W-4976 dated February 28, 2014, p. 11.

> A memorandum account to track lost revenues for utilities with existing full revenue decoupling WRAMs is a redundant protection against lost revenues associated with reduced sales from voluntary conservation or mandatory rationing. A lost revenue memorandum account to track revenue shortfalls associated with reduced sales from either activation of voluntary conservation measures or a mandatory rationing plant [sic] pursuant to a declared drought emergency is available only to utilities that do not have an existing full revenue decoupling WRAM.

During a significant portion of Cal Advocates' "natural experiment," both utility groups were operating with revenue decoupling. As a result, both groups were subjected to the same treatment, which compromised the basic requirements for valid experimental inference. However, Cal Advocates fails to acknowledge any of these issues in their report, nor do they present an analysis that could potentially address this problem. Instead, their conclusions seem to be solely based on a superficial analysis of the data.

Confounding Variables – A confounding variable is an extraneous variable that is correlated with both the independent variable and the dependent variable in a study. It can lead to misleading conclusions about the relationship between the independent variable and the dependent variable, as it may be unclear whether the observed effect is due to the independent variable or the confounding variable. For example, suppose a researcher is interested in examining the relationship between exercise and weight loss. If the researcher does not control for diet, then diet may be a confounding variable that affects the relationship between exercise and weight loss. If the participants in the study who exercise also have a healthier diet, it may be difficult to determine whether the observed weight loss is due to exercise or diet. Controlling for confounding variables is important in statistical analysis because it helps ensure that any observed effects are due to the independent variable and not due to other variables. Without controlling for confounding variables, researchers risk making incorrect conclusions about cause-and-effect relationships.

Cal Advocates fails to acknowledge the importance of controlling for potential confounding variables in their analysis of the data presented in Figure 1. They make the misleading claim that their "natural experiment allowed for data collection on over a million customers over an entire decade, with far fewer uncontrolled variables than might ever be possible again."[82] However, this claim is highly deceptive, as it implies that their analysis is based on disaggregated data for over a million water users, when in reality, they use highly aggregated sales data.[83] Moreover, their cavalier attitude towards possible confounding variables poses a significant risk to their analysis. While their report acknowledges the presence of uncontrolled variables, they neither identify them nor incorporate them into their analysis. Why they believe the potential for confounding variables was lower in this period than possibly in any other period is a mystery.

In contrast, consider the care the Public Policy Institute of California (PPIC) took to control for confounding variables in its analysis of trends in water use among urban water suppliers during the 2013-2017 drought:[84]

> In particular, we consider the following utility characteristics that might affect water use and water conservation relative to the 2013 baseline:
>
> **Water use in the baseline period**: Differences in baseline year water use can affect the ease of additional savings. In particular, one might expect that conservation is easier for suppliers with high per capita water use, to the extent this implies a higher proportion of less essential (or more "elastic") uses such as landscape watering. Indeed, this was the rationale for higher state mandate targets for suppliers with higher residential per capita use.

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[82] Cal Advocates Special Request #1 Report, p. 5.

[83] This was determined based on Cal Advocates' response to California American Water's data request for the underlying data supporting their analysis of the effect of the WRAM on water use, which were provided in the Excel file CAW-01 RESPONSE_WRAM WORKPAPERS.xlsx, attached hereto as Attachment 1.

[84] Public Policy Institute of California. 2017. Building Drought Resilience in California's Cities and Suburbs: Technical Appendix A: Urban Water Use Patterns and Trends in California from 2013 to 2016.

State conservation targets: The target itself is likely to influence supplier savings rates, which varied considerably before, during, and after the mandate. Prior to the establishment of the state-mandated targets in June 2015, suppliers were applying local conservation targets (mostly voluntary) in accordance with their water shortage contingency plans, and these varied considerably (Table A3). During the mandate period, the state assigned one of nine target levels to each supplier (ranging from 4% to 36%). In the self-certification period, most local suppliers returned to their own voluntary targets, and some continued with a state target. Although we do not have systematic information on voluntary targets in the first and third periods, we can assess the role of different state-assigned mandate targets. We also test for the persistence of the mandate target on customer behavior in the self-certification period.

Local supply conditions: We include a dummy variable to account for whether a utility is a member of a wholesale water supply network. Insofar as this improves water supply reliability, membership in a wholesale network could reduce efforts to promote water conservation. Conversely, wholesalers' role in conservation messaging and their support for other demand management measures could strengthen conservation efforts during the drought.

Other utility characteristics: We examine the effect of governance structure—public vs. private—on conservation response. Different governance structures may rely on different management methods and drought response strategies. There is no consensus in the literature about the relative efficacy of different governance approaches (see Martínez-Espiñeira et al. 2009). Additionally, economies of scale suggest that larger utilities may be better prepared to face shortages and increase conservation, so we control for the size of the utilities to check this hypothesis.

Composition of the customer base: Some classes of water users may have more flexibility to reduce their use. For instance, single-family residential customers and institutional customers (such as local governments, which manage parks) may have more outdoor water use that can be cut back. Industrial customers and multi-family customers, in contrast, may have less flexibility. Suppliers with a greater share of water use in these more flexible customer categories may find it easier to reduce water use. In this category we include two variables: share of residential water use—which we expect to be more elastic than other customer categories—and the ratio of summer to winter use, as a control for outdoor use.

Socio-economic factors: We also include in the analysis several socio-economic variables that may correlate with observed reductions in water use. These include: median household income, the presence of disadvantaged communities, the percentage of Spanish speaking households (and the percentage of Spanish speaking households with limited English speaking abilities), the percentage of population under 10 and over 75 years of age, and the median year when housing units were built.

> **Climate**: Differences in local temperature and precipitation between the policy periods and the baseline year can change the demand for water, especially for suppliers with higher outdoor water use. For instance, December 2014 was wetter in Southern California than December 2013, resulting in higher water savings as shown in Figure A6.
>
> **Region**: Other unobserved factors can lead to different water conservation patterns across regions. For instance, we previously noted how utilities in Southern California were generally more confident in their supply situation in 2014 than utilities in the Bay Area, which may partly explain the lower savings response during the voluntary conservation period.

The PPIC study discovered that numerous factors had an impact on observable trends in urban water use. As a result, these factors were deemed necessary controls to make valid inferences about the causes of water use patterns. Despite the fact that these factors are equally relevant to Cal Advocates' analysis of water use patterns, they fail to consider any of them. Even if their treatment and control groups were not confounded, their shallow examination of the data does not offer dependable evidence regarding the impact of the WRAM on water use.

Q41. Are there other reasons to be concerned with Cal Advocates' assertions regarding Figure 1?

A41. Yes, there are additional issues with Figure 1 beyond the methodological problems I've just reviewed. The data used to create the two series in the figure is not valid due to a mismatch of volumetric units. Utilities report their usage in various units in their annual reports, with California American Water reporting in thousands of gallons, Cal Water in thousands of CCF, and Golden State, Park, and Apple Valley in CCF. However, instead of first converting the data to a common unit, Cal Advocates simply added the reported volumes together, leading to a meaningless aggregation of volumes expressed in different units. Therefore, regardless of their intended purpose, the series in Figure 1 do not show the year-to-year change in water use. They show the year-to-year change in numbers untethered from any real world physical quantity.

Q42. Are there other problems with the data used in Figure 1 that impact its interpretation?

A42. Yes, there are additional problems with the data used in Figure 1 that are important to be aware of. To calculate water use per service, Cal Advocates used both metered and flat rate service connections. Flat rate services, which include unmetered customer services, private fire connections, and public fire hydrants, do not have their water use metered and are not included in reported water usage. Therefore, even if the volume totals calculated by Cal Advocates corresponded to actual water use, their calculation of water use per service would still be incorrect because it includes a large number of services for which water use has not been measured. The inclusion of flat services biases the calculation, and it's important to note that the relative proportions of metered to flat services can vary significantly across utilities and over time, leading to varying degrees of bias across utilities and for the same utility over time.

For example, in 2009, the first year of data used to construct Figure 1, flat services accounted for 25% of California American Water's total services. By 2021, the last year of data used in the figure, this proportion had more than halved to 11%. Including flat services in the denominator and excluding the associated water use in the numerator results in a downward bias in the calculation of water use per service. The larger the proportion of flat services, the greater the bias. Therefore, in the case of California American Water, the larger proportion of flat services at the start of the series means that Cal Advocates' estimates of water use per meter at the start of the series are biased downward to a greater degree than its estimates at the end of the series, resulting in an understatement of the cumulative change in use over the period. The same is the case for Cal Water, which also experienced a significant decrease in the relative proportion of flat services over the period of analysis.

Q43. In addition to these two issues with the data used to construct Figure 1, are there other problems with how the series in Figure 1 were calculated?

A43. Yes there are. In addition to incorrectly calculating the aggregate volume of water use for the two groups of utilities and incorrectly including flat services in the calculation of water use per services, Cal Advocates included contract water uses in the calculation. Some utilities supply water for contracted purposes to other entities. This water use category may also be termed sales-for-resale (SFR). Golden State Water Company, for example, has contract uses serving the Calipatria State Prison and the Barstow Naval Air Station, among others. Golden State's contract uses are about a million CCF annually. Typically the utility records a single service connection for each contracted use and the reported use per connection is thus extremely large. For example, over the last five years in Golden State's Region 3 ratemaking area, annual contract uses averaged about 131,000 CCF per connection compared to 144 CCF per connection for residential customers and 787 CCF per connection for commercial customers, a thousand-fold difference in magnitude.

Including contract water in the calculation causes an upward bias in use per connection. As with flat service connections, contract uses can vary significantly across utilities and overtime for the same utility and thus also may lead to varying degrees of bias in Cal Advocates estimates of water use per connection.

Q44. What effect do these data issues have on Cal Advocates' estimates of the annual change in water use per connection?

A44. The volume unit error and inclusion of flat service connections have a significant effect on the values calculated by Cal Advocates and shown in Figure 1. I have compared the corrected values to those in their report for the "with WRAM" group of utilities, as shown in the following table, and found that the percentage errors are large in most cases, with a mean absolute percentage error of 73% for the series. Even if we exclude the two largest errors, the mean absolute percentage error is still 21%. Therefore, Figure 1 not only fails

to provide any evidence regarding the impact of the WRAM on water use but also fails to accurately depict the annual change in average water use per connection.

Year	Estimates Corrected for Volume Unit Error and Inclusion of Flat Service Connections	Cal Advocates' Estimates Shown in Figure 1 of their Report	% Error	Abs. % Error
2010	-6%	-8%	21%	21%
2011	-0.2%	-1.4%	535%	535%
2012	7.3%	7.2%	-1%	1%
2013	2.4%	1.6%	-36%	36%
2014	-5.3%	-4.3%	-19%	19%
2015	-12.9%	-13.5%	4%	4%
2016	-4.9%	-4.1%	-15%	15%
2017	5.1%	3.4%	-34%	34%
2018	3.6%	2.3%	-37%	37%
2019	-4.9%	-6.2%	26%	26%
2020	4.2%	4.8%	15%	15%
2021	-0.8%	0.3%	-137%	137%
	Mean Absolute Percentage Error (MAPE)			73%
	MAPE Excluding Two Largest Errors			21%

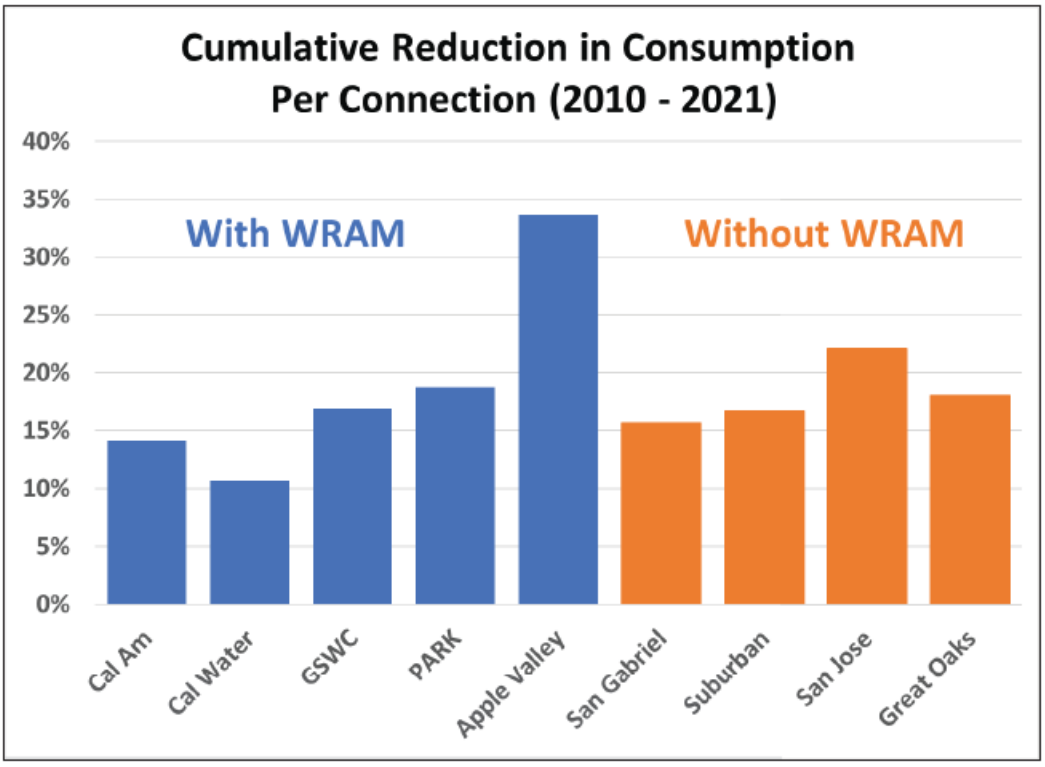
Q45. In their report, Cal Advocates presents Figure 2 as further evidence that the WRAM did not impact water use. Do you agree with their claim?

A45. I disagree with their claim. Figure 2, which I have included below, is subject to the same issues I previously discussed regarding Figure 1, such as aggregation bias, confounded treatment and control groups, and confounding external variables. It also suffers from the same computational errors as Figure 1, as it was derived using the same data series. Additionally, Figure 2 is incorrectly labeled as showing the cumulative reduction in consumption per connection from 2010 to 2021, when it actually shows the change from 2009 to 2021.[85] While this may seem like a minor point, accurately recording and

[85] This was determined based on Cal Advocates' response to California American Water's data request for the underlying data for Figures 1 and 2, which were provided in Attachment 1, the Excel file CAW-01 RESPONSE_WRAM WORKPAPERS.xlsx.

reporting the provenance of data used in analysis is a fundamental aspect of good data science and reproducibility of results.

Figure 2 from Cal Advocates Special Request #1 Report



Cal Advocates makes several inaccurate and misleading statements based on Figure 2. For example, they make the statement:[86]

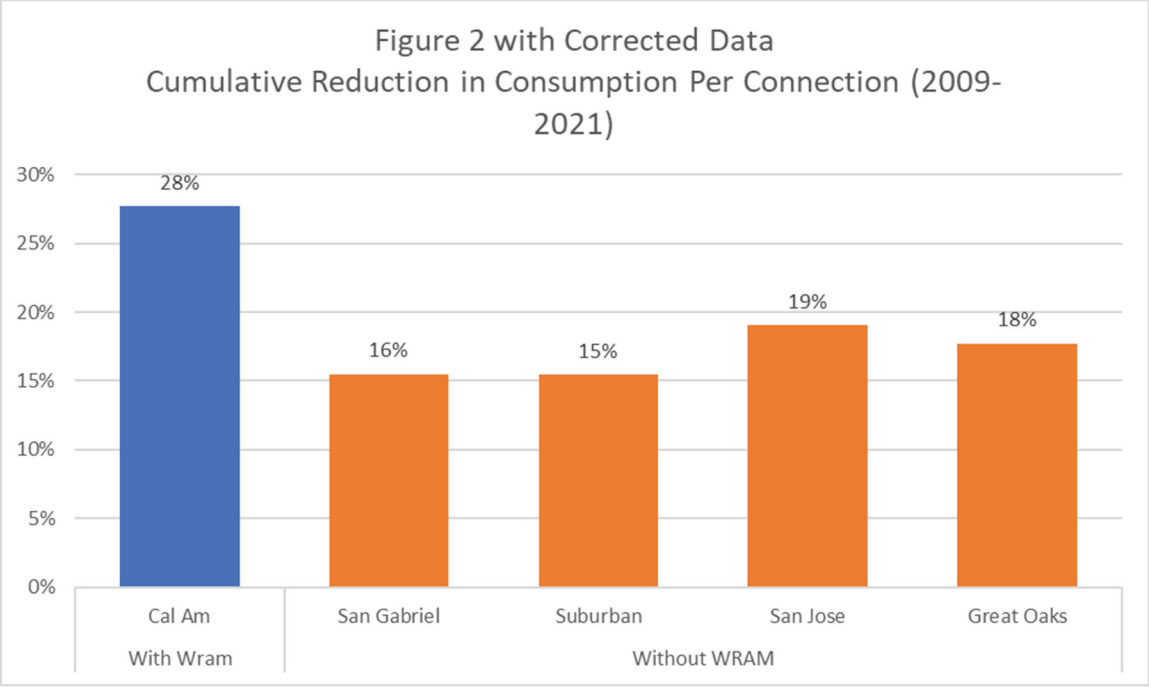
> Specific to California American Water, the cumulative reduction in consumption per connection (14%) was less than each of the four utilities operating without a WRAM (16% to 22%).

This is false. The cumulative reduction in consumption per connection from 2009 to 2021 was 28% for California American Water while the reduction for the four utilities operating without a WRAM ranged from 15% to 19%, about a third to a half as much reduction as California American Water. The data are provided in the following table,

86 Cal Advocates Special Request #1 Report, p. 8.

and I have re-generated the series in Figure 2 for a visual representation of results. Contrary to Cal Advocates' assertion, the cumulative reduction in consumption per connection for California American Water was GREATER than each of the four utilities operating without a WRAM by a wide margin.

	Year	Metered Connections	Usage	Vol. Units	% Reduction
California American Water	2009	137,845	27,649,722	Thou. Gal.	
	2021	180,605	26,188,682	Thou. Gal.	28%
San Gabriel	2009	90,324	34,403,451	CCF	
	2021	95,463	30,724,061	CCF	16%
Suburban	2009	75,392	21,981,052	CCF	
	2021	75,290	18,564,849	CCF	15%
San Jose	2009	217,448	56,334	Thou. CCF	
	2021	222,357	46,616,038	CCF	19%
Great Oaks	2009	20,419	5,054,413	CCF	
	2021	21,413	4,360,781	CCF	18%



Q46. Please summarize your assessment of the data Cal Advocates presents in their report to support their assertion that the WRAM did not have a significant impact on reducing water use.

A46. The data presented by Cal Advocates does not show that the WRAM had no impact on reducing water use during its operation. The assessment provided by Cal Advocates is not capable of demonstrating a causal relationship between the WRAM and water use. Their analysis suffers from aggregation bias, confounded treatment and control variables, and confounding external variables. When asked about potential uncontrolled variables, Cal Advocates responded that their study did not have any.[87] This response is surprising, especially when compared to the Public Policy Institute of California's study of California urban water use trends, which included 40 separate control variables.[88] Only one of these variables, utility governance, would not have direct relevance to Cal Advocates' assessment of water use trends among Class A investor-owned utilities.

Additionally, Cal Advocates' method of aggregating volumetric data reported in different units, including flat service connections while excluding their water use, and including contract water deliveries, not only fails to provide any evidence of the impact of the WRAM on water use but also inaccurately portrays the annual change in average water use per connection. Their claim that the cumulative reduction in water use by California American Water was significantly less than the reductions achieved by each of the four utilities without a WRAM is particularly concerning. In fact, the data clearly demonstrate the opposite to be true, as the cumulative reduction in consumption per connection for

[87] Public Advocates Office Response to California American Water Company's Data Request, dated May 2, 2023, Data Request No.: Set 01 (CAW-01), p. 5, attached hereto as Attachment 2.

[88] Public Policy Institute of California. 2017. Building Drought Resilience in California's Cities and Suburbs: Technical Appendix A: Urban Water Use Patterns and Trends in California from 2013 to 2016, Table A4, p. 19.

California American Water was significantly greater than that of each of the four utilities without a WRAM.

Q47. Do you agree with Cal Advocates' claim that the WRAM has a very significant impact on customer bills?

A47. No, I do not. First, WRAM surcharges have comprised a small share of the average bill, as clearly documented in the Rebuttal Testimony of Stephen (Wes) Owens.[89] Second, WRAM balances consist of unrecovered authorized expenditures that were determined to be reasonable and prudent in a prior rate case. It seems contrary to logic that these expenditures would result in significant impacts to customer bills simply because they were recovered via a future surcharge rather than via a commodity charge at the time they were incurred. Typically, spreading the cost of something over a longer period reduces rather than increases the bill impact. For example, in the energy and water sectors, it is common for utilities to provide bill payment plans that enable customers to smooth their monthly bills over the year in order to mitigate the impact of high seasonal bills.[90]

Keep in mind that water utilities recover a large share of their fixed costs through commodity sales. California American Water, for example, currently recovers nearly 70 percent of its fixed costs from commodity charges.[91] Utilities still incur fixed costs when sales are less than projected and eventually these costs need to be recovered for utilities to continue safe and reliable water service.[92] This is not unique to investor owned utilities operating with WRAMs. It is common to all water utilities. Droughts amplify the

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89 Rebuttal Testimony of Stephen (Wes) Owens, pp. 18-24.

90 For example, Cal Am operates the Budget Billing program to smooth out bills and avoid seasonal spikes. PG&E offers a similar budget billing option to its customers that bases monthly bills on a 12-month average energy cost.

91 Memo dated April 12, 2022, from David Mitchell to Jeffrey Linam, regarding statewide meter charge consolidation and fixed cost recovery analysis.

92 The alternative, of course, is deferring system maintenance and improvements and degrading service. Customers are the ones that bear the brunt of degraded service. This is simply a different type of cost, but it is a cost, nonetheless.

problem, and thus it is a more pronounced issue in California than in other parts of the country. At one time or another, we all have seen a headline to the effect "Customers Conserve Water, Rewarded with Rate Increase by Utility."

Such headlines speak to the fact that utilities still have to recover fixed costs even when sales are below their projected level. This is not a consequence of the WRAM. The WRAM is a way of dealing with this underlying reality, not the cause of it. Another way to deal with this reality is to recover a larger share of fixed costs through service charges. This is exactly what the four Class A utilities operating without a WRAM did. They recovered 66% more of their fixed costs through fixed service charges than did the utilities operating with the WRAM.[93] Their customers had to pay these higher service charges even though realized sales were mostly below their projected level over the period Cal Advocates considers in its report. Is this not what the WRAM does, with only the timing of recovery being different? The WRAM recovers fixed costs that otherwise would have been recovered by commodity charges had sales been at the level projected when the rates were set. A higher service charge is used by utilities operating without a WRAM to accomplish the same thing.[94] Is it therefore the case that the higher service charges used by these utilities resulted in significant bill impacts for their customers? This is not a claim one hears Cal Advocates make, but it is a logical extension of their argument regarding the impact of the WRAM on customer bills.

Cal Advocates' bill impact argument demonstrates their fundamental misunderstanding of what the WRAM does. They claim that WRAM surcharges are fees that customers pay

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93 Mitchell, David, Tom Chesnutt, and Gary Fiske, "Impacts on Customer Bills and Water Use of Recoupling Water Utility Revenue and Sales: Analysis of CPUC Proposed Decision to Transition all Class A Utilities to a Monterey-Style Water Revenue Adjustment Mechanism. August 2020, pp. 9-13.

94 The downside of recovering costs this way is a degraded price signal to customers to conserve water.

for water service, in addition to their regular rates.[95] However, this statement is misleading as these surcharges represent authorized costs that the utility was unable to recover at the time they were incurred due to lower-than-expected sales.

If the sales forecast had accurately predicted the decreased level of sales, then costs would have been spread over a smaller base of sales, and the rates would have been set higher from the start. In this scenario, the only costs that customers would avoid are variable production costs, which the WRAM accounts for through the Modified Cost Balancing Account (MCBA).[96] Customers would still pay the authorized fixed production costs through higher commodity charges. The WRAM simply provides for deferred recovery of these costs when projected sales exceed actual sales.[97]

It is not logical to argue that if the sales projection is accurate, then the utility should be allowed to recover authorized fixed costs, but if it is inaccurate[98], then these same costs should not be recovered by the utility. However, this is essentially what Cal Advocates' argument amounts to.

Q48. Do you agree with Cal Advocates' claim that the WRAM harms all ratepayers?

A48. They do not provide any evidence this is the case, so no, I do not agree with their claim. They base their claim on two unsupported assertions: (1) that the WRAM is used to

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95 Cal Advocates Special Request #1 Report, p. 10.

96 It is noteworthy that Cal Advocates never mentions this in the hypothetical examples they present in their report.

97 And it works in both directions. When actual sales exceed projected sales, the WRAM prevents the utility from over recovering its authorized costs.

98 All sales forecasts are going to be inaccurate to some degree. That is simply the nature of forecasting an uncertain future. California's unique climate and hydrology means there is a significantly greater chance of overpredicting rather than underpredicting sales (see Supplemental Direct Testimony of David Mitchell, pp. 14-20). Cal Advocates seems to believe this is the fault of utilities rather than a consequence of nature.

generate extraordinary profits,[99] and (2) the WRAM shifts risks from the utility to ratepayers.[100]

With regard to the claim that the WRAM is used to generate extraordinary profits, they do not provide any empirical evidence that this is the case. Instead, they offer an implausible hypothetical example as their evidence. It seems to me that if utilities operating with the WRAM were earning extraordinary profits it would be straightforward to show this empirically. Afterall, utilities publicly report their earnings on a regular basis and their earnings are thoroughly scrutinized during general rate cases and cost of capital proceedings. Additionally, all of the Class A companies file Annual Reports to the Commission that include detailed financial statements that Cal Advocates could have used to demonstrate "extraordinary profits". As clearly documented in the Owens Rebuttal, California American Water did not earn extraordinary profits during the period the WRAM operated.[101]

Cal Advocates' hypothetical example purporting to show how the WRAM generates extraordinary profit is purely conjecture. Moreover, the example is implausible as clearly demonstrated in the testimony of Keith Switzer on behalf of the California Water Association.[102]

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99 Cal Advocates Special Request #1 Report, pp. 10-12.

100 Ibid., pp. 12-14.

101 Rebuttal Testimony of Stephen (Wes) Owens, pp. 32-33.

102 Direct Testimony of Keith Switzer, dated April 20, 2023, pp. 20-22. It should be noted that Mr. Switzer may have unintentionally understated the extent of the absurdity of Cal Advocates' example. In his analysis, Mr. Switzer isolated the portion of the hypothetical revenue requirement that would need to be reduced to achieve the hypothetical 10% cost reduction presented by Cal Advocates. He states that this portion, which includes labor costs, system maintenance, uncollectible costs, insurance, employee benefits, and healthcare insurance, would need to be reduced by 27% of the authorized amount to achieve Cal Advocates' results. However, this figure is not accurate. In reality, to achieve Cal Advocates'

With regard to the claim that the WRAM shifts risks from the utility to ratepayers, Cal Advocates again provides no empirical evidence that this is the case. Additionally, they inaccurately assert that "California American Water attempts to re-frame this risk transfer by claiming WRAM removes this risk for both ratepayers and utilities."[103] However, it is not California American Water, but the Commission itself that frames the WRAM this way. In D.20-08-047, the Commission states:[104]

> It will be incumbent upon the parties in each GRC to determine that the recommended forecasts are as accurate as possible. The consequences of inaccuracy can be significant to both the water utility and the customer. The WRAM/MCBA mechanism removes most of the consequences from the utility and removes most of the risk from customers, by adding a means to adjust future rates to meet the approved revenue requirement.

In adopting Golden State Water Company's WRAM/MCBA, the Commission stated:[105]

> GSWC's WRAM and MCBA will balance utility and ratepayer interest and will ensure neither is harmed nor benefits from the adoption of conservation rates.

In adopting WRAM/MCBA mechanisms for Cal Water and Park, the Commission stated:[106]

> The goals for both Cal Water's and Park's WRAMs and MCBAs are to sever the relationship between sales and revenue and to remove disincentive to implement conservation rates and conservation programs, to ensure cost savings are passed on to ratepayers, and to reduce overall consumption. The parties agree that the WRAMs and MCBAs are designed to ensure that the utilities and ratepayers are

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hypothetical extraordinary profit, those costs would need to be reduced by 73% of the authorized amount, not 27% as stated in Mr. Switzer's testimony. In other words, those costs would need to be reduced to just 27% of their projected level for Cal Advocates' example to work as presented in their report. To borrow from Mr. Switzer, "while that may be mathematically possible, it's difficult to perceive of that outcome as a practically feasible one."

103 Cal Advocates Special Request #1 Report, p. 12.

104 D.20-08-047, p. 73.

105 D.08-08-030, p. 16.

106 D. 08-02-036, p. 25-26.

proportionally affected when conservation rates are implemented, so that neither party is harmed nor benefits.

Cal Advocates' report attempts to use the fact that weather and hydrology are more likely to result in sales being lower rather than higher than projected as evidence that the WRAM favors utilities over ratepayers.[107] However, this is not an accurate portrayal of the situation. It simply means that utilities have greater risk exposure to demand shocks than ratepayers. Equitable treatment of risk does not require that the risks be evenly distributed, as Cal Advocates contends.[108]

In fact, most risks are not evenly distributed across exposure groups. This is why insurance premiums for 16-year-old male drivers are significantly higher than for 46-year-old female drivers. It does not mean that the premiums are inherently unfair; it simply reflects the differences in risks posed by the two groups to the insurance company. If the risks were identical, and the premiums were still different, that would be potential evidence of unfairness. However, when the risks are different and the premiums reflect those differences, it is not evidence of unfair treatment.

We do know that ratepayers benefited from the conservation that occurred while the WRAM was in place. This is demonstrated in the direct testimony of Dr. Thomas Chesnutt and his technical report "The Economic Value of Water Efficiency in California American Districts: Lower Water Bills."[109] This analysis shows that conservation occurring between 2012 and 2021 reduced customer bills in California American Water's six rate areas by 4 to 31 percent from what they would have been in the absence of this

[107] Cal Advocates Special Request #1 Report, p. 12-13.
[108] Ibid., p. 12.
[109] Direct Testimony of Dr. Thomas W. Chesnutt dated January 27, 2023.

conservation. These results are not anomalous, but rather extend a wide body of research into the long-run benefits of conservation for utility ratepayers.[110]

Q49. Do you agree with Cal Advocates' assertion that the WRAM is not necessary to promote conservation?

A49. I would suggest this is not the right question to ask. The relevant question is whether utilities with revenue decoupling promote conservation more aggressively than utilities whose revenues depend on the volume of their sales. Obviously, there are utilities without revenue decoupling with conservation programs. The question is whether these programs differ significantly from utilities with revenue decoupling. Our research into this question concluded the following:

- The Class A utilities operating with the M-WRAM rather than full decoupling recovered significantly more of their fixed costs from fixed service charges – 66 percent more -- and deployed volumetric rate designs with fewer and flatter tiers, resulting in less financial incentive for customers to conserve water.[111]

- The Class A utilities operating with the M-WRAM rather than full decoupling spent significantly less on conservation programming than the fully decoupled utilities – $8 per residential customer per year compared to $18 per residential per year, on average.[112]

110 See, for example, Chesnutt, T.W., D.M. Pekelney, and J. Spacht, (2019) "Water Conservation and Efficient Water Rates Produce Lower Water Bills in Los Angeles", Journal AWWA, 111:4, April 2019, pp. 24-30.

111 Mitchell, David, Tom Chesnutt, and Gary Fiske, "Impacts on Customer Bills and Water Use of Recoupling Water Utility Revenue and Sales: Analysis of CPUC Proposed Decision to Transition all Class A Utilities to a Monterey-Style Water Revenue Adjustment Mechanism. August 2020, pp. 8-13.

112 Ibid., 13

In our 2020 report I am referencing here, we wrote:

> As we stated in the introduction, incentives matter. If you want to understand the impact of a proposed policy, trace out the consequences of the incentives it creates. In the case of revenue recoupling, the incentives suggest utilities will flatten their tiers, recover more fixed cost through their service charges, and spend less on conservation programming.

This is, in fact, what we are starting to see the decoupled Class A utilities propose if revenue decoupling is ended and they are transitioned to the M-WRAM, as recommended by Cal Advocates.[113] This is not surprising. It has long been established that aggressive conservation rate structures induce revenue instability for utilities.[114] The WRAM mitigates this revenue instability. Recoupling revenue to sales will cause utilities to seek to mitigate the revenue instability of their rate structures in some other way that is likely to reduce incentives for customers to conserve water.

Similar consequences have been observed in the energy sector. For example, the Natural Resources Defense Council found that "utilities more than doubled their energy savings in 2008 compared to a decade earlier when regulators had eliminated decoupling for several years."[115]

As I noted above, during the 2013-2017 drought, all but one of the Class A utilities operating with the M-WRAM availed themselves of full revenue decoupling via that Lost Revenue Memorandum Account. These utilities met or exceeded their state conservation

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113 See, for example, California Water Service Company General Rate Case Application 12-07-002.

114 Chesnutt, T.W., C.N. McSpadden, and J. Christianson (1996), "Revenue Instability Induced by Conservation Rate Structures," Journal of the American Water Works Association, January 1996.

115 Dylan Sullivan, et al., "Removing Disincentives to Utility Energy Efficiency Efforts," https://www.nrdc.org/sites/default/files/decoupling-utility-energy.pdf, May 2012.

mandate. The one utility that did not adopt full decoupling during the drought is also the only Class A utility that failed to comply with the state conservation mandate.[116]

Q50. Do you agree with Cal Advocates' assertion that the WRAM does not protect low-income customers?

A50. As with the previous question, I would suggest that this is not the right question to ask. The WRAM is not designed to be a low-income assistance program. The relevant question is whether utilities with revenue decoupling deploy rate designs that are more beneficial to low income customers than the rate designs deployed by utilities operating with the M-WRAM.

This is something we evaluated in great detail in our 2020 report.[117] We used 2018 monthly customer billing data for Cal Water and California American Water, two of the largest fully decoupled utilities, to compare bills based on their current rate designs to bills customers would have paid if rates had instead been based on the rate designs used by the four M-WRAM utilities. In all of the simulations, we enforced strict revenue neutrality, meaning each rate design was calibrated to generate the same amount of revenue, while preserving the rate design's relationships between service and commodity charges, and the number, width, and height of rate blocks, so that the simulations isolated the impact of the rate design on customer water use and bill amount.

The results of the simulations clearly show that the rate designs used by the M-WRAM utilities would result in higher bills for low income and low water use customers. For customers in the bottom 25% of the water use distribution, bills increased, on average, by

116 Mitchell, David, Tom Chesnutt, and Gary Fiske, "Impacts on Customer Bills and Water Use of Recoupling Water Utility Revenue and Sales: Analysis of CPUC Proposed Decision to Transition all Class A Utilities to a Monterey-Style Water Revenue Adjustment Mechanism. August 2020, p. 21.

117 Ibid., pp. 14-19.

14%. Bills for high water use customers, on the other hand, those in the top 25% of the water use distribution, decreased by 8%, on average. Thus, the rate designs used by the M-WRAM utilities were found to result in higher bills for low water use customers and lower bills for high water use customers.

Similar results were found for low-income customers enrolled in Customer Assistance Programs (CAP). For CAP customers with low water use, even with the CAP discount, the rate designs used by the M-WRAM utilities caused bills to increase by 9%, on average. Bills for CAP customers with high water use decreased by 6%, on average. However, water use of CAP customers skews toward lower usage and thus proportionately more CAP customers saw higher rather than lower bills.

Bills also increased for customers in the middle of the water use distribution, though not to the same degree as those in the bottom 25%. In fact, the only group that clearly had lower water bills under the rate designs used by the M-WRAM utilities were the high water use customers, which is contrary to State and Commission directives and policies on urban water use efficiency.

D.20-08-047 asserts that "there is no evidence that eliminating the WRAM will raise rates on low-income and low-use customers."[118] Yet, our bill impact analysis provides clear evidence that the rate designs used by the M-WRAM utilities recover more revenue from fixed service charges and have less steeply inclining residential tiered rates which results in lower bills for the highest-volume water users and higher bills for the lowest-volume customers. Because water use by low-income customers skews towards the low end of the water use distributions, bills for low-income customers were, on average,

118 D.20-08-047, p. 68.

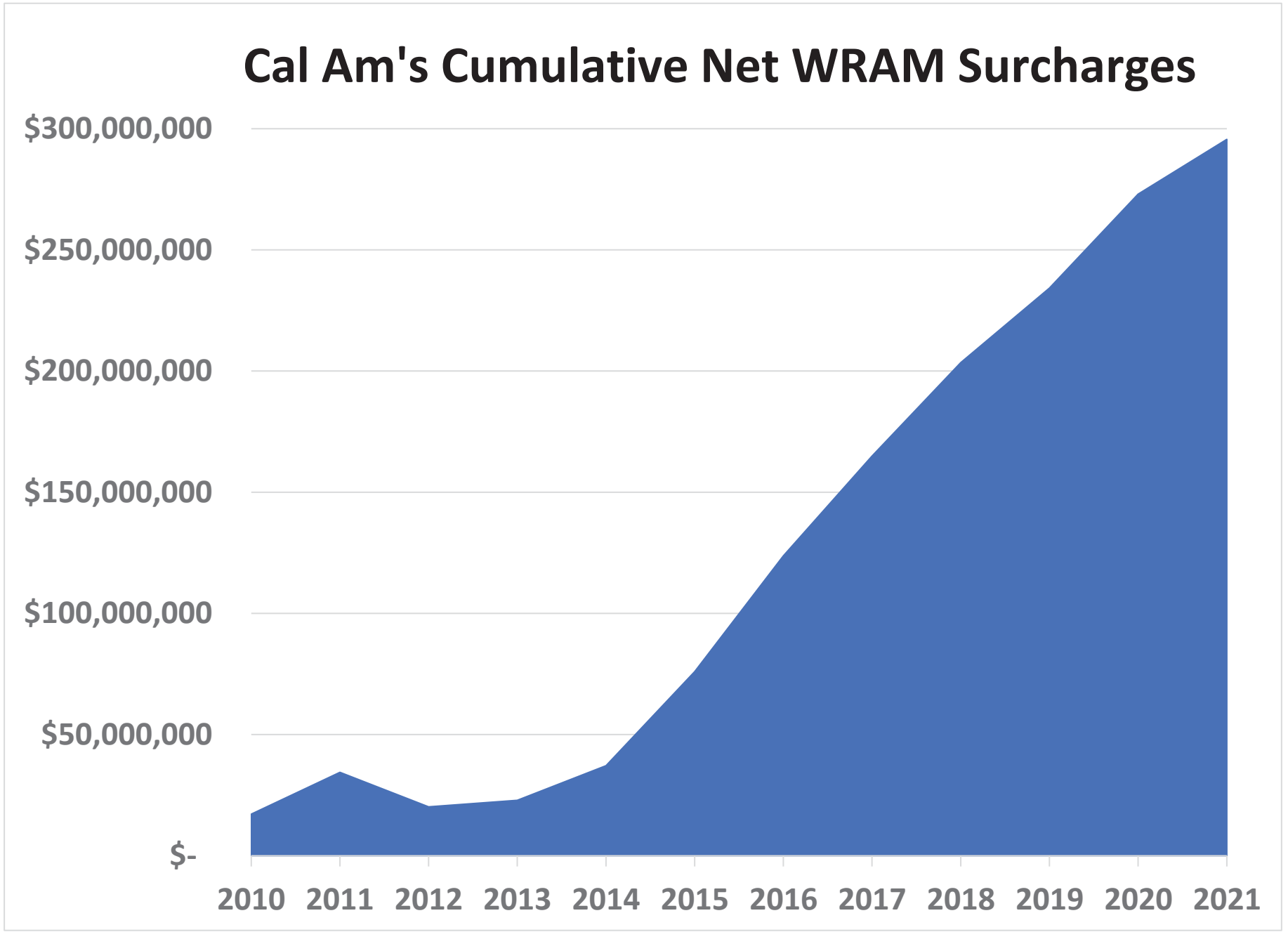
higher under the rate designs used by the M-WRAM utilities than under those used by the fully decoupled utilities included in the study.

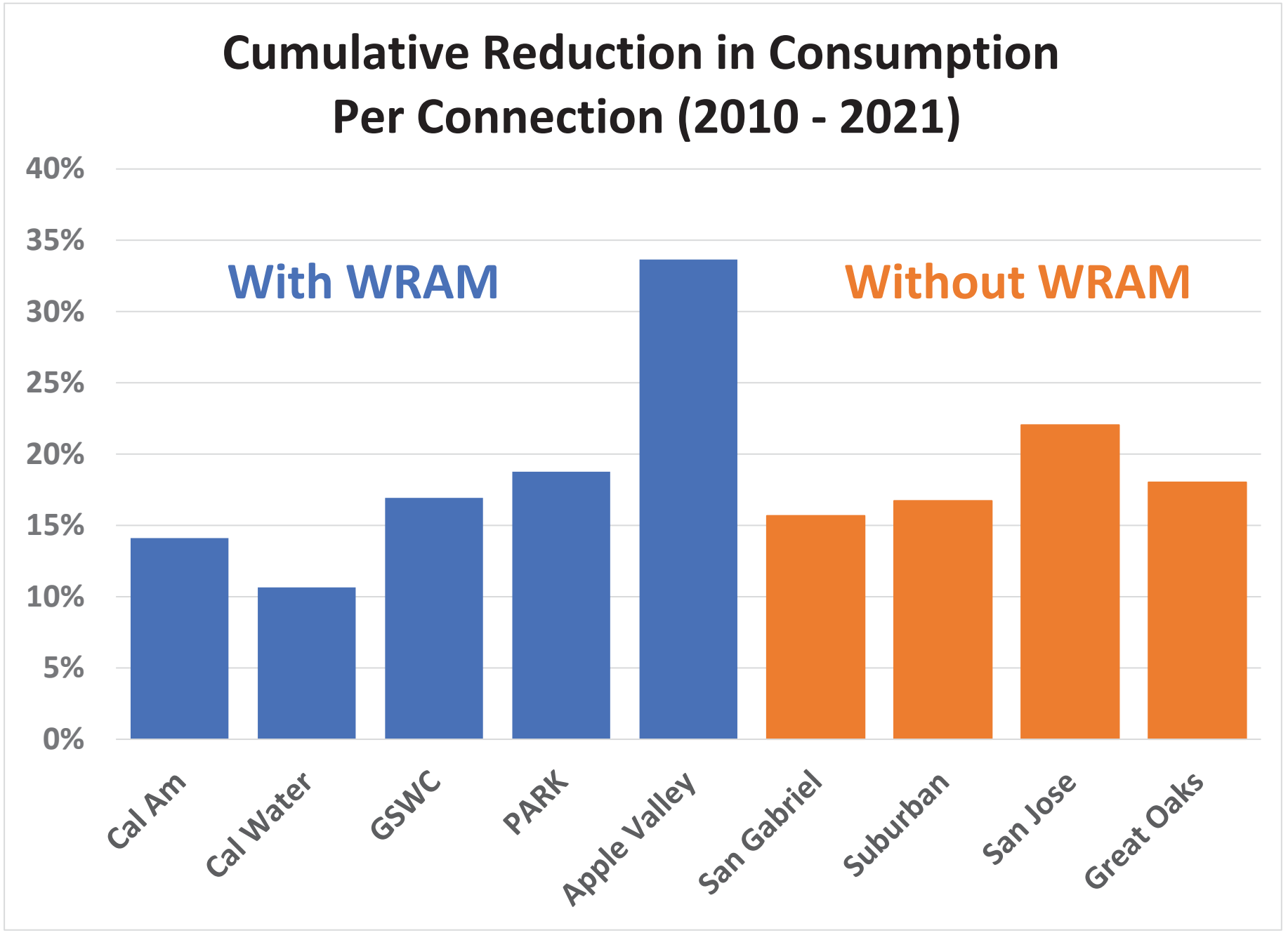
VI. CONCLUSION

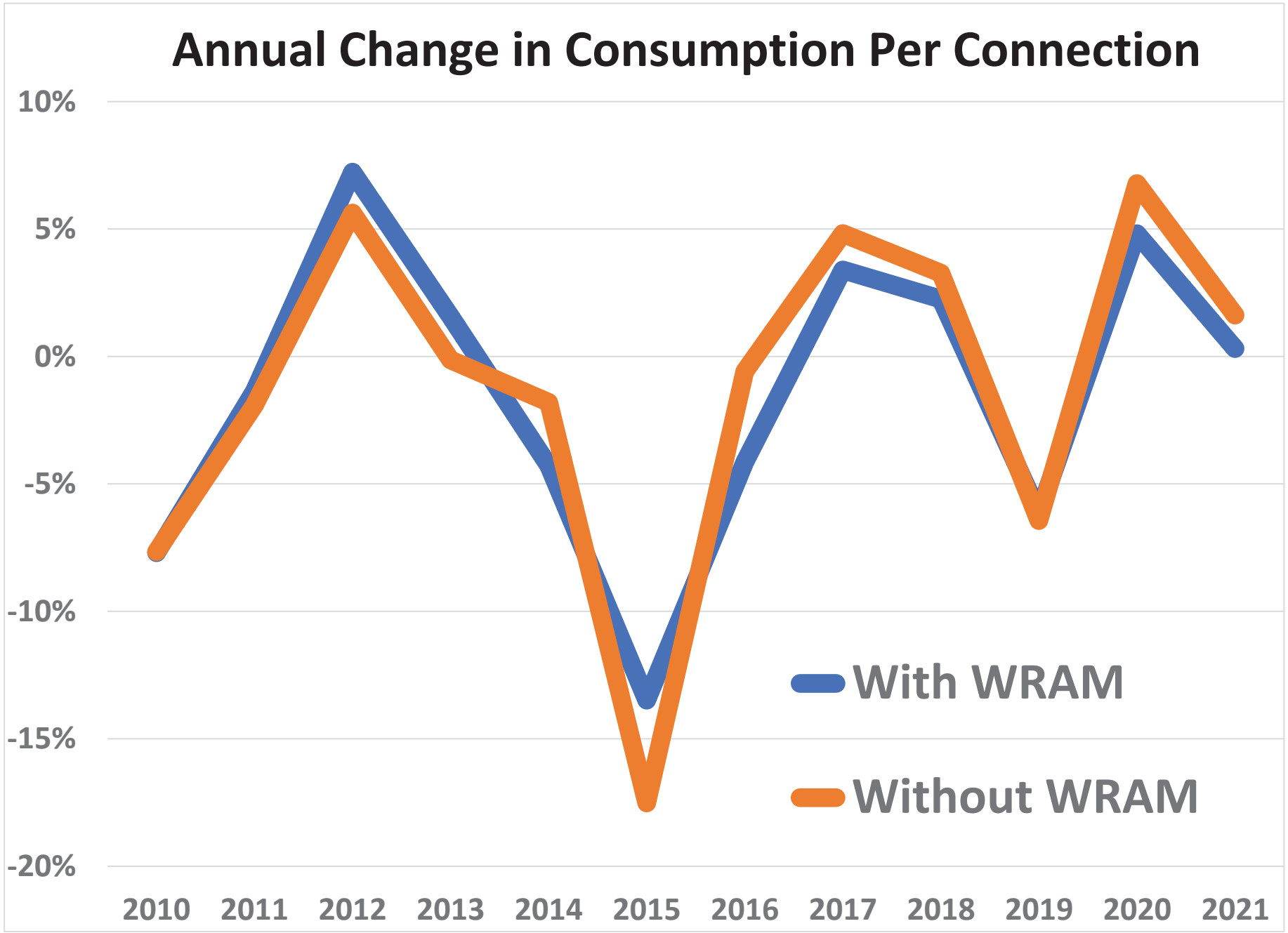
Q51. Does this conclude your testimony?

A51. Yes it does.

ATTACHMENT 1


Cal Am's Cumulative Net WRAM Surcharges
$300,000,000
$250,000,000
$200,000,000
$150,000,000
$100,000,000
$50,000,000
$-
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021


Cumulative Reduction in Consumption
Per Connection (2010 - 2021)
40%
35%
30%
25%
20%
15%
10%
5%
0%
With WRAM
Without WRAM
Cal Am
Cal Water
GSWC
PARK
Apple Valley
San Gabriel
Suburban
San Jose
Great Oaks


Annual Change in Consumption Per Connection
10%
5%
0%
-5%
-10%
-15%
-20%
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
With WRAM
Without WRAM

	A	B	C	D	E	F
1		**2009**		**2010**		**2011**
2	**WRAM**	**Usage**	**Connections**	**Usage**	**Connections**	**Usage**
3	Cal Am	27,649,722	183,873	25,641,622	184,325	26,327,979
4	Cal Water	128,472	500,911	121,593	504,627	123,631
5	GSWC	66,450,210	254,998	61,171,308	249,110	60,703,395
6	PARK	5,284,838	28,790	4,867,587	28,828	4,752,180
7	AVR	6,447,757	21,494	5,860,202	21,760	5,485,443
8	**TOTAL**	105,960,999	990,066	97,662,312	988,650	97,392,628
9						
10	**NO WRAM**					
11	San Gabriel	34,403,451	101,453	31,855,558	101,671	31,126,768
12	Suburban	21,981,052	75,466	20,337,015	75,472	20,082,338
13	San Jose	58,334	220,931	53,510	221,043	53,364
14	Great Oaks	5,054,413	20,677	4,590,175	20,712	4,615,454
15	**TOTAL**	61,497,250	418,527	56,836,258	418,898	55,877,924
16						
17				**2010**		**2011**
18			Cal Am	-7%		2%
19			Cal Water	-6%		1%
20			GSWC	-6%		-3%
21			PARK	-8%		-3%
22			AVR	-10%		-7%
23			San Gabriel	-8%		-3%
24			Suburban	-7%		-1%
25			San Jose	-8%		-1%
26			Great Oaks	-9%		0%
27						
28				**2010**		**2011**
29			Total WRAM	-8%		-1%
30			Total Non-WRAM	-8%		-2%
31		**2010**	**2011**	**2012**	**2013**	**2014**
32	**Cal Am**	-7%	2%	14%	2%	-7%
33	**Cal Water**	-6%	1%	7%	3%	-6%
34	**GSWC**	-6%	-3%	5%	2%	-3%
35	**PARK**	-8%	-3%	4%	0%	-4%
36	**AVR**	-10%	-7%	2%	-3%	0%
37	**San Gabriel**	-8%	-3%	5%	-1%	0%
38	**Suburban**	-7%	-1%	6%	0%	-2%
39	**San Jose**	-8%	-1%	6%	2%	-10%
40	**Great Oaks**	-9%	0%	8%	2%	-11%
41						
42	**With WRAM**	-8%	-1%	7%	2%	-4%
43	**Without WRAI**	-8%	-2%	6%	0%	-2%

	G	H	I	J	K	L
1		**2012**		**2013**		**2014**
2	**Connections**	**Usage**	**Connections**	**Usage**	**Connections**	**Usage**
3	186,275	30,047,425	187,260	30,274,511	185,720	28,247,592
4	506,617	132,556	507,906	137,278	510,027	129,878
5	255,789	63,912,034	255,657	65,713,687	257,442	63,877,012
6	28,890	4,956,804	28,995	4,964,208	29,082	4,782,103
7	21,880	5,640,770	22,038	5,517,814	22,226	5,547,992
8	999,451	104,689,589	1,001,856	106,607,498	1,004,497	102,584,577
9						
10						
11	102,030	32,814,468	102,185	32,781,863	102,666	32,769,796
12	75,431	21,350,657	75,638	21,416,762	75,856	21,094,999
13	221,585	56,677	222,483	58,152	223,373	52,673
14	20,794	4,977,113	20,786	5,098,186	20,882	4,586,248
15	419,840	59,198,915	421,092	59,354,963	422,777	58,503,716
16						
17		**2012**		**2013**		**2014**
18		14%		2%		-7%
19		7%		3%		-6%
20		5%		2%		-3%
21		4%		0%		-4%
22		2%		-3%		0%
23		5%		-1%		0%
24		6%		0%		-2%
25		6%		2%		-10%
26		8%		2%		-11%
27						
28		**2012**		**2013**		**2014**
29		7%		2%		-4%
30		6%		0%		-2%
31	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
32	-17%	0%	5%	2%	-6%	3%
33	-8%	-10%	6%	5%	-4%	4%
34	-17%	1%	4%	2%	-6%	5%
35	-14%	-1%	-1%	7%	-6%	7%
36	-22%	-5%	4%	-1%	-5%	7%
37	-17%	-1%	5%	2%	-7%	6%
38	-18%	0%	4%	4%	-8%	6%
39	-18%	-4%	7%	5%	-1%	10%
40	-20%	-3%	11%	4%	-1%	8%
41						
42	-13%	-4%	3%	2%	-6%	5%
43	-18%	-1%	5%	3%	-6%	7%

	M	N	O	P	Q
1		**2015**		**2016**	
2	**Connections**	**Usage**	**Connections**	**Usage**	**Connections**
3	186,809	23,322,872	186,947	23,482,220	187,577
4	512,998	109,504	472,658	108,537	519,002
5	258,493	53,477,650	260,288	54,082,045	261,244
6	29,110	4,099,199	29,149	4,046,815	29,119
7	22,431	4,418,390	22,981	4,214,752	23,136
8	1,009,841	85,427,615	972,023	85,934,369	1,020,078
9					
10					
11	103,121	27,257,705	103,701	27,199,243	104,235
12	76,031	17,384,863	76,124	17,350,750	76,152
13	224,203	42,980	224,440	41,331	224,648
14	21,013	3,694,188	21,197	3,619,744	21,454
15	424,368	48,379,736	425,462	48,211,068	426,489
16					
17		**2015**		**2016**	
18		-17%		0%	
19		-8%		-10%	
20		-17%		1%	
21		-14%		-1%	
22		-22%		-5%	
23		-17%		-1%	
24		-18%		0%	
25		-18%		-4%	
26		-20%		-3%	
27					
28		**2015**		**2016**	
29		-13%		-4%	
30		-18%		-1%	
31	**2021**				
32	0%				
33	-2%				
34	0%				
35	1%				
36	4%				
37	3%				
38	1%				
39	-8%				
40	-4%				
41					
42	0%				
43	2%				

	R	S	T	U	V
1	**2017**		**2018**		**2019**
2	**Usage**	**Connections**	**Usage**	**Connections**	**Usage**
3	24,878,711	189,870	25,523,692	190,902	24,075,414
4	116,001	522,661	121,913	524,696	117,895
5	55,765,291	259,091	57,219,323	260,055	53,838,197
6	4,029,345	29,295	4,316,520	29,375	4,184,544
7	4,425,702	23,340	4,422,324	23,484	4,208,235
8	89,215,050	1,024,257	91,603,772	1,028,512	86,424,285
9					
10					
11	28,658,354	105,068	29,523,191	105,649	27,810,070
12	18,002,431	76,251	18,815,672	76,420	17,304,552
13	44,278	225,373	46,674	226,265	46,061
14	4,042,550	21,596	4,227,045	21,643	4,207,642
15	50,747,613	428,288	52,612,582	429,977	49,368,325
16					
17	**2017**		**2018**		**2019**
18	5%		2%		-6%
19	6%		5%		-4%
20	4%		2%		-6%
21	-1%		7%		-6%
22	4%		-1%		-5%
23	5%		2%		-7%
24	4%		4%		-8%
25	7%		5%		-1%
26	11%		4%		-1%
27					
28	**2017**		**2018**		**2019**
29	3%		2%		-6%
30	5%		3%		-6%
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					

	W	X	Y	Z	AA
1		**2020**		**2021**	
2	**Connections**	**Usage**	**Connections**	**Usage**	**Connections**
3	191,879	25,732,296	198,758	26,188,682	202,769
4	527,407	123,473	530,610	122,107	532,827
5	260,853	56,689,647	261,941	56917971	262,917
6	30,328	4,491,136	30,303	4,534,670	30,409
7	23,546	4,546,979	23,770	4,752,223	23,875
8	1,034,013	91,583,531	1,045,382	92,515,653	1,052,797
9					
10					
11	106,452	29,764,828	107,088	30,724,061	107,449
12	76,489	18,417,636	76,554	18,564,849	76,539
13	226,602	50,798	226,296	46,616	226,478
14	21,687	4,539,926	21,742	4,360,781	21,762
15	431,230	52,773,188	431,680	53,696,307	432,228
16					
17		**2020**		**2021**	
18		3.2%		-0.2%	
19		4.1%		-1.5%	
20		4.9%		0.0%	
21		7.4%		0.6%	
22		7.0%		4.1%	
23		6%		3%	
24		6%		1%	
25		10%		-8%	
26		8%		-4%	
27					
28		**2020**		**2021**	
29		5%		0%	
30		7%		2%	
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					

	AB	AC
1	TOTAL REDUCTION	
2		
3	-14%	
4	-11%	
5	-17%	
6	-19%	
7	-34%	
8		
9		
10		
11	-16%	
12	-17%	
13	-22%	
14	-18%	
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		
32	Cal Am	14%
33	Cal Water	11%
34	GSWC	17%
35	PARK	19%
36	Apple Valley	34%
37	San Gabriel	16%
38	Suburban	17%
39	San Jose	22%
40	Great Oaks	18%
41		
42		
43		

	A	B	C	D	E	F
1		2010	2011	2012	2013	2014
2	LA WRAM	$ 2,282,086	$ 2,859,495	$ 2,310,391	$ 1,897,473	$ 173,503
3	Coronado	$ 1,575,112	$ 3,005,330	$ 2,329,585	$ 4,796,335	$ 5,618,860
4	Village	$ 716,535	$ 2,046,999	$ 1,761,921	$ 4,155,772	$ 4,855,282
5	Larkfield	$ 540,373	$ 1,098,392	$ 423,042	$ 349,882	$ 831,576
6	Ambler	$ 257,927	$ 434,263	$ 209,129	$ 212,503	$ 571,285
7	Monterey	$ 11,786,491	$ 24,977,240	$ 13,177,935	$ 11,480,899	$ 25,109,054
8	Sacramento					
9	TORO					
10		2010	2011	2012	2013	2014
11		$ 17,158,524	$ 34,421,719	$ 20,212,003	$ 22,892,864	$ 37,159,560
12						
13						
14						
15						
16						
17						
18						
19						

	G	H	I	J	K
1	2015	2016	2017	2018	2019
2	$ 1,836,547	$ 4,799,403	$ 8,343,796	$ 13,034,514	
3	$ 6,482,764	$ 8,527,636	$ 12,197,225	$ 15,145,559	
4	$ 10,392,115	$ 19,350,040	$ 24,744,804	$ 31,531,872	
5	$ 1,501,503	$ 2,148,754	$ 2,888,795	$ 3,816,651	
6	$ 926,695	$ 1,143,848	$ 1,472,316	$ 1,700,215	
7	$ 45,442,340	$ 67,663,923	$ 83,678,612	$ 99,360,399	
8	$ 9,391,644	$ 20,101,829	$ 31,565,138	$ 38,901,973	
9		$ 459,381	$ 699,065	$ 929,507	
10	2015	2016	2017	2018	2019
11	$ 75,973,608	$ 123,735,433	$ 164,890,686	$ 203,491,183	$ 234,238,947
12					
13					
14					
15					
16					
17					
18					
19					

	L	M
1	2020	2021
2		
3		
4		
5		
6		
7		
8		
9		
10	2020	2021
11	$ 273,009,016	$ 295,638,591
12		
13	Per Customer	$ 1,529.26
14		
15	2021 Operating Rev	265,077,341
16	Average Revenue/C	1307.287312
17	Average Monthly Bil	108.9406093
18		
19	xTime Monthly Bill	14

	A	B	C	D
1		**PRESENT RATE**	**PROPOSED**	**REV INCREASE**
2	**WRAM**	85,126.60	99,687.30	
3	**UPDATE**	89,727.70	99,171.10	
4		128,865.10	140,836.00	
5	**TOTAL**	303,719.40	339,694.40	35,975.00
6				
7	**NO WRAM**	85,724.40	99,705.60	
8	**UPDATE**	89,727.70	99,171.10	
9		129,898.50	141,414.20	
10	**TOTAL**	305,350.60	340,290.90	34,940.30
11				
12	**ORIGINAL**	81,672.30	101,577.40	
13	**Application**	86,581.60	99,504.80	
14		126,140.60	148,356.20	
15	**TOTAL**	294,394.50	349,438.40	55,043.90
16				
17	DECREASE (NO WRAM) FROM ORIGINAL			20,103.60
18	**DECREASE (NO WRAM) FROM AMENDED**			**-1,034.70**

ATTACHMENT 2

CAW-01-Q007

On page 5 of the testimony of Richard Rauschmeier, it states: "In fact, the Commission's robust natural experiment allowed data collection for more than a million customers over an entire decade, with far fewer uncontrolled variables than might ever be possible again."

a. Provide the data, including, but not limited to workpapers in Excel format, and calculations, collected for more than a million customers over an entire decade.
b. Enumerate and explain the relevance of each uncontrolled variable referenced in the above quote, including, but not limited to, its relationship to the information presented in Figure 1, its potential to confound inference into the effects of the WRAM on water consumption, and how Cal Advocates has controlled for the influence of each variable in its analysis of water consumption trends of Class A utilities operating with the WRAM versus operating with the M-WRAM.
c. Explain why the "uncontrolled variables" are far fewer… than might ever be possible again."

Response
Provided by Richard Rauschmeier

a. See attached Excel File: *WRAM WORKPAPERS,* Worksheet: *Consumption Data.*
b. As explained on page 5:8-15 in the Direct Testimony of Richard Rauschmeier, uncontrolled variables not present in the CPUC's natural experiment included: multiple and different state jurisdictions, different utility ownership and regulatory structures, and different populations exposed to different conservation messaging over different time periods. Cal Advocates did not need to control for the influence of these uncontrolled variables because they were not present.
c. In addition to having the lack of uncontrolled variables identified above in (b), an equitable distribution of WRAM and non-WRAM utilities was the fortunate result of Class A utilities' own voluntary selections. One reason why so few uncontrolled variables might not be possible again is that in numerous proceedings since each Class A utility's initial decision to voluntarily have or not have WRAM, those utilities without WRAM have repeatedly indicated their unwillingness to voluntarily not have WRAM.

CAW-01-Q008

Please provide all workpapers, including, but not limited to workpapers in Excel format, and calculations that support the statement on page 10 of the testimony of Richard Rauschmeier that the "proposed WRS Plan including the re-named WRAM (i.e. ESBA), would require an increase in average system rates greater than $1 million more than its alternative proposal."

Response
Provided by Richard Rauschmeier

See attached Excel File: *WRAM WORKPAPERS,* Worksheet: *RATE INCREASE*