BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

Application of California-American Water Company (U210W) for Approval of the Monterey Peninsula Water Supply Project and Authorization to Recover All Present and Future Costs in Rates.	A.12-04-019 (Filed April 23, 2012)

REBUTTAL TESTIMONY OF ERIC J. SABOLSICE

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I. INTRODUCTION

Q1. Please state your name and business address.

A1. My name is Eric J. Sabolsice, my business address is 511 Forest Lodge Road, Pacific Grove, CA 93950, and my business telephone number is (831) 646-3291. I am the Direct of Operations and General Manager for the Coastal Division of California-American Water Company ("California American Water").

Q2. Did you previously provide information regarding your employment and qualifications?

A2. Yes. I included information regarding my employment and qualifications in my direct testimony submitted as part of this proceeding.

Q3. What is the purpose of your testimony and what issues will you be addressing in your rebuttal testimony?

A3. The purpose of my rebuttal testimony is to respond to the Division of Ratepayer Advocates ("DRA") report on California American Water's application for the Monterey Peninsula Water Supply Project, A.12-04-019. Specifically, DRA's recommendations regarding operation & maintenance ("O&M") costs.

II. EXPERIENCE WITH DESALINATION

Q4. Does California American Water have any experience operating desalination facilities?

A4. Yes. California American Water has operated and maintained the Sand City Desalination Plant since early 2010. The source of supply to the facility is naturally occurring brackish water withdrawn through beach wells containing between 17,000 to 24,000 mg/L total dissolved solids ("TDS"). Reverse osmosis ("RO") membranes are utilized to remove dissolved salts and produce permeate that contains approximately 180 mg/L as TDS. The RO is followed by ultra violet ("UV") disinfection to ensure proper disinfection. The permeate is then rehardened using calcite contactors and chlorine is added for disinfection. Finally, sodium hydroxide is added for pH adjustment to ensure the product water is noncorrosive. The product water is blended 3/1 with water from the distribution system, metered and then pumped to California American Water customers.

Q5. Did California American Water utilize the Sand City Desalination Facility as a reference when developing the cost model for the water supply project cost model?

A5. Yes. While the water supply project's desalination facilities will be different in some respects (e.g. plant capacity and the naturally occurring levels of TDS in the raw water), there are many similarities that provide reference points when estimating future O&M costs. These similarities include subsurface intakes located along the beach, minimal pretreatment systems due to higher quality raw water associated with subsurface intakes, the use of reverse osmosis to remove salts and the use of an energy recovery system to transfer energy from the waste stream to the feed water.

Q6. Are there other desalination projects currently in operation that you have used as a reference when estimating power consumption?

A6. Yes. American Water operates and maintains the largest seawater desalination project (27.5 MGD or 30,800 AFY) in the U.S. through a joint venture with Acciona Agua, S.A. The facility is located in Apollo Beach, FL and is operated under contract to Tampa Bay

Water. I was personally involved as the Project Director for the joint venture during design, construction, and start up of the facility. The desalination plant processes seawater withdrawn from the outfall of the Big Bend Power Station owned by TECO Energy. The seawater water drawn from the power plant outfall is warmed by the power plant steam condensers to above 100 degrees Fahrenheit. The warmed seawater reduces the feed pressure required. The reduced feed pressure results in a power consumption rate of approximately 3.0 kWh/cubic meter. Other projects of interest around the world include the Fujairah I desalination plant expansion in Abu Dhabi rated at 36 MGD. The facility utilizes a hybrid desalination process combining multi-stage flash distillation and reverse osmosis. The projected power consumption is reported to be 3.7 kWh/cubic meter.[1] Finally, the 18 MGD Ghalilah seawater reverse osmosis facility located in Ras al-Khaimah, UAE is reported to claim an energy consumption target of 3.14 kWh/cubic meter.[2] This lower consumption target is stated to have caused "ripples of surprise in the industry."[3]

III. ESTIMATE MODIFICATIONS

A. Power

Q7. Do you agree with DRA regarding estimates of power consumption in Chapter 4, Section C.1?

A7. No. DRA understates the expected levels of energy consumption for the facility by 50% in some cases when estimating kilowatt-hours ("kWh") per year for the intake wells, desalination facility, and conveyance/high service pumps. DRA proposes the annual consumption rate for the 9.6 MGD facility be adjusted down to 26,500,000 kWh from 51,500,000 kWh. A similar reduction is suggested for the smaller facility as well. DRA's estimate for the larger facility equates to 7,563 kWh/MG or 2.0 kWh per cubic meter of water produced. When intake wells, desalination process, and conveyance are taken into

[1] *See* GLOBAL WATER INTELLIGENCE, Feb. 2013, p. 27.
[2] *See id.*
[3] *Id.*

account, the Sand City Desalination Facility produces water at approximately 3.3 kWh per cubic meter. DRA's forecast for the water supply project is much lower than the actual rate of consumption experienced at the Sand City Desalination Facility. In addition, the forecast is far below any known seawater reverse osmosis facility in the world.

Q8. Would California American Water's facility, as proposed in its water supply project application, operate at a similar power consumption rate as the Sand City Desalination Plant?

A8. No. The water supply project will operate at a higher rate of consumption than the Sand City Desalination Plant. While the process will be similar to Sand City, a key difference will be higher raw water TDS (i.e. salinity) expected for the larger water supply project facility. The goal of using slant wells as the form of subsurface intake will be to obtain a raw water supply that is closer to that of seawater. The raw water TDS concentration is expected to range between 28,000 to 33,000 mg/L. The projected salinity for the water supply project is 20% to 30% higher than the raw water TDS concentration experienced at the Sand City Desalination Plant. As salinity increases so does the osmotic pressure. For reverse osmosis to occur the osmotic pressure must be overcome. Additional factors that will affect the driving pressure required to produce permeate are the type of membrane system, system configuration, and feed water temperature.

Q9. Do you agree with DRA's suggested correction to the power model regarding adjusting for the density of seawater?

A9. Yes. Due to its mineral or salt content seawater will be denser than fresh and that adjustment can be incorporated. With that correction, it remains somewhat vexing as to how DRA estimated the rate of power consumption for the entire facility at 2.0 kWh per cubic meter, which would be more in line with a facility treating source waters with a much lower total dissolved solids or utilizing a process such as forward osmosis. While forward osmosis as a technology is known to reduce the rate of energy consumption, it is

new in the drinking water industry and far from proven. Furthermore, the use of an osmotic agent to facilitate osmosis requires separation of the pure water from the agent. These agents are not yet NSF/ANSI certified for contact with potable water by the California Department of Health. In closing, I believe that DRA's use of such a low ratio of power/production indicates an error in their calculations when considering results for other projects around the world.

Q10. Do you agree with DRA's position regarding a reduction in labor expense of $20,000 annually?

A10. No. DRA's bases the adjustment on an escalation factor of 3.1% as opposed to that contained in California American Water's application of 4%. The Energy Cost of Service Branch Escalation Memorandum escalation factor does not take into account cost of living factors specific to the Monterey Peninsula nor does it consider the skill set required to operate and maintain a large desalination facility. While the suggested reduction is small, it should be recognized that this facility will be one of the largest desalination facilities operating on the west coast and will have its share of operational challenges. Sufficient budget for personnel is important to ensure that the right talent is available to operate and protect the asset.

B. Labor Expense

Q11. Do you agree with DRA's position regarding the use of de-chlorination chemicals and subsequent reduction of the chemical budget?

A11. No. De-chlorination may be required to avoid the formation of disinfection by-products when what supplied from the desalination facility or groundwater replenishment facility is injected into the aquifer. The escalation factor of 4% should be maintained as the market for certain chemicals such as anti-scalents may be significantly affected by a large desalination plant, such as the proposed project here in Monterey.

C. Chemicals

Q12. Do you agree with DRA's position on removing the cost of second pass membrane replacement?

A12. No. DRA's has maintained that a second pass RO train is unnecessary and therefore no second pass replacement is needed. California American Water requires inclusion of a second pass RO train in the design to ensure that the facility is reliably able to meet the California Department of Public Health's notification level of 1 mg/L for Boron.

D. Boron

Q13. What has been California American Water's experience with Boron at the Sand City Desalination Plant?

A13. The Sand City Desalination Plant utilizes naturally occurring brackish source water that contains a Boron concentration of 2 – 4 mg/L. The single stage reverse osmosis process results in a permeate Boron concentration of 0.9 to 1.1 mg/L. The permeate is blended with distribution system water to reduce the final Boron level below the notification limit of 1 mg/L.

Q14. What is your expectation for Boron concentrations for the proposed water supply project?

A14. I would expect that as TDS increase the level of Boron will increase as well. Using slant wells, California American Water will draw upon the naturally occurring brackish water beneath the ocean floor resulting in a feed water Boron concentration greater than 4 mg/L. The expected permeate concentration would be greater than the 1 mg/L, which would exceed the California Department of Health's limit. Furthermore, the second pass RO train will ensure that the chloride levels in the product water are maintained low enough to avoid customer complaints regarding taste or damage to plants/landscaping. It is important to California American Water that any new facility should be designed to reliably meet current and future primary and secondary public health standards. The value

of the membrane replacement account should be maintained as proposed in California American Water's application to include second pass replacement.

Q15. Is it possible for California American Water to blend the permeate with distribution water to lower the Boron concentration to below 1 mg/L similar to the Sand City Desalination Plant?

A15. The output of the Sand City Desalination Plant is approximately 220 gallons per minute as permeate. This equates to 3% of the daily input to the Monterey distribution system, allowing for an adequate blend. During the summer months, the proposed 6.4 MGD or 9.6 MGD desalination facility will provide the majority of daily input to the Monterey distribution system and therefore cannot be blended to reduce the Boron concentration.

E. Repair and Replacement

Q16. Do you agree with DRA's reduction in the value of the repair and replacement ("R&R") account for the facility?

A16. No. DRA simply adjusted the value of the R&R account based on its reduced estimate of overall plant costs. The value of the R&R account is based on an expected replacement schedule, which is significantly affected by the corrosive seawater environment, and higher operating pressures experienced at a desalination facility. Proper maintenance of equipment is critical both to protect the health and safety of employees working in the area of the equipment as well as to ensure the desired production. The value of the R&R account should be maintained as proposed in California American Water's application.

Q17. Does this complete your rebuttal testimony?

A17. Yes it does.