

July 17, 2018

## MEMO TO THE BOARD OF DIRECTORS

Subject: Agenda Item No. 6.2

Title: Presentation of Surface Water Purchase Pilot Project Bench Scale Testing Results in collaboration with City of Santa Cruz Water Department

Attachment(s):

1. Presentation Slides
2. Bench-Scale Testing Technical Memorandum-Water Quality Assessment – City of Santa Cruz Water Department & Soquel Creek Water District by Black & Veatch

### Background

On March 20, 2018 the Board discussed ongoing efforts related to water quality testing and water compatibility between treated surface water from City of Santa Cruz Water Department (City) and the District's groundwater and distribution system. The work performed supports the District's Community Water Plan (CWP) (<http://www.soquelcreekwater.org/cwp>) and Pilot Water Purchase Agreement currently in place and the District's goal of purchasing water from the City of Santa Cruz in November 2018. Additional details for how this effort supports the District's strategic goals and CWP are included in the March 20 memo (Item 6.2 page 79 of 128) and can be viewed at: <https://www.soquelcreekwater.org/sites/default/files/documents/board-meeting/packets/03-20-18%20Board%20Packet%20secured.pdf>. The water purchase agreement and environmental review (required by the California Environmental Quality Act, CEQA) with constraints for purchasing winter water from the City is also referenced in the March 20 board packet.

The River Water Transfer/Purchase is a key project towards creating a diversified water portfolio in support of the goal of water resource management and sustainability. The Cooperative Water Transfer Agreement (Attachment 3) between the City of Santa Cruz and the District states that this pilot transfer project is fundamentally about exploring the opportunity for a longer-term agreement and an effort that may even lead to a bigger transfer or exchange opportunities to provide protection against seawater intrusion.

The purchase and use of treated surface water will enable the District to reduce groundwater pumping, reduce the potential for accelerating seawater intrusion, and contribute to the beginning of a longer-term process to improve the overdraft condition of the Soquel-Aptos groundwater basin. The pilot project is more focused on water quality than quantity, with the goal of providing information necessary to develop a longer-term agreement benefitting both agencies and our community.

### Environmental Review/Constraints

The City, as lead agency, completed an Initial Study-Negative Declaration as required by CEQA to evaluate transferring available winter supply to the District from the north coast streams Majors Creek and Liddell Springs. At this time, the source water must be from the City's pre-1914 appropriative water rights, and the amount of water transferred must be within the range of what has the City is allotted.

Based on the hydraulic capacity of the intertie and modeling of the City's ability to meet California Department of Fish and Wildlife flow requirements, the City could transfer an average of

approximately 115 million gallons (352 acre-ft) during the winter months of November through April to the District via the existing conveyance and treatment system. However, the range of transfer volumes on an annual basis will vary widely depending upon the water year type (i.e., critically dry, dry, normal, wet), instream flow agreements in place between the City and the resource agencies, and District water use. Any deviation from the project as described above will require further environmental evaluation. Other factors may reduce the volume of water available including if the City is operating under any mandatory water curtailment stage, the level of water in Loch Lomond Reservoir, and if the City's Beltz Wells are needed to meet daily demand.

### **Water Quality Compatibility/Corrosion Evaluation**

Changing sources of water requires a detailed evaluation to ensure water quality and integrity of the District's distribution system are not compromised. Such an evaluation takes several years to complete and will continue through 2019. The initial assessment began in September 2015 and was presented to the Board on June 21, 2016. This initial "desktop" evaluation titled "City of Santa Cruz Intertie Blending Analysis- Water Quality Impact Assessment Technical Memorandum" conducted by Black and Veatch recommended further analysis be considered using pipe specimens harvested from the District's distribution system. The City was involved and shared the cost of this initial assessment.

The District and City partnered again on the recent phase of the water quality evaluation with consultant evaluation beginning in 2016. On September 12, 2017 the current evaluation commenced, led by Black and Veatch and Virginia Tech University. The team of experts include Professor Marc Edwards of Virginia Tech, a nationally-recognized leader in the area of water treatment and corrosion control for cement, iron, lead and copper in distribution systems. Dr. Edwards has conducted considerable research on the use of phosphates for mitigating corrosion and laid the groundwork for investigative science uncovering the lead release events in Washington, D.C. and Flint, MI. Dr. Edwards and his staff also studied the drinking water discoloration issues and lead releases experienced in the City of Fresno caused by corrosion of galvanized iron service lines after the City changed sources from groundwater to surface water.

### **Results**

The evaluation involving jar testing of pipe coupons is complete. Black and Veatch and Virginia Tech University documented the water quality assessment results and recommendations in a Bench-Scale Testing Technical Memorandum (Attachment 2). Emily Tummons, P.h. D from Black and Veatch will present the findings summarized in Attachment 1 and itemized below.

The testing produced reliable data providing a basis for definitive recommendations to move forward with full scale pilot testing. Tests included wire testing, asbestos cement coupon testing, copper pipe with lead solder coupon testing, and galvanized iron coupon testing. Jar testing produced the following results that can be found on page 3-1 of the technical memorandum:

#### **WIRE TESTING**

- Wire testing demonstrated that groundwater conditions had similar or higher corrosivity to pure zinc or iron wires, compared to City surface water conditions.

#### **ASBESTOS CEMENT COUPON TESTING**

- The asbestos cement coupons showed no concern for calcium dissociation, even for the alternating conditions that experienced switches in source waters.

### **COPPER PIPE WITH LEAD SOLDER COUPON TESTING**

- Copper pipe with lead solder coupons displayed statistically similar results for copper release for all examined water conditions.
- When comparing alternating conditions for copper pipe with lead solder coupons, the lower surface water pH 7.2 appeared to help with maintaining low lead levels and minimized the spike in lead and copper when switching to groundwater.
- Copper pipe with lead solder coupons had more stable low levels of lead leaching when orthophosphate was added to groundwater, but the benefit was not statistically different from the baseline groundwater.

### **GALVANIZED IRON COUPON TESTING**

- Galvanized iron pipe coupons had similar ranges of water turbidity among all examined water conditions, but the most constant low levels of turbidity resulted from switching between surface water at pH 7.2 and groundwater at pH 7.5.
- Manganese leaching from the scale of galvanized iron pipe coupons for all treated conditions was similar to, or lower than, baseline groundwater at pH 7.5.
- Galvanized iron pipe coupons had consistently low levels of iron leaching for all conditions throughout the 10 weeks of exposure.
- Significant phosphorous uptake was only observed with the galvanized iron pipe coupons (as expected), and the uptake decreased over time as the orthophosphate reacted with the pipe surface to form a passivating layer.
- Additional testing with galvanized iron pipe coupons confirmed that phosphorous was still present in the water after two weeks of contact with surface water at pH 7.2 containing 0.2 mg/L (part per million) orthophosphate as phosphorus.

### **Conclusions**

The assessment of the City's water and the District's water towards harvested galvanized iron pipe, harvested asbestos cement pipe, and new copper pipe with lead solder indicates the following:

- Alternating between the current District's groundwater and the typical City's surface water at pH 7.2 performed equal to or better than the baseline groundwater especially in regard to decreasing lead and iron release.
- Adjusting the City's surface water to pH 7.8 was not beneficial as it resulted in spikes in both lead and copper when the source was switched to groundwater at pH 7.5 for the alternating condition as well as increased iron leaching.
- Adding orthophosphate to the groundwater was able to preserve slightly lower lead levels when comparing the alternating conditions, but the minimal benefit is not worth the expense when the lead levels for alternating between the City's existing surface water and District's groundwater are already lower than the baseline groundwater.

### **Recommendations**

The recommendations based on the results and conclusions of bench-scale testing are as follows:

- Pipe-loop testing is not recommended based on the positive bench-scale testing results for alternating condition of the current District's groundwater and the typical City's surface water at pH 7.2 (with current orthophosphate levels) because the results do not show a need to adjust water chemistry at the intertie or within the District's system.
- Proceed with the implementation plan to introduce the typical City's surface water at pH 7.2 (with current orthophosphate levels) to an isolated portion of the District's distribution

system, where the implementation plan includes coordination with the California Division of Drinking Water (DDW) to determine the number and location for compliance monitoring sites, additional sampling sites for the District to monitor water quality, a customer notification plan, and distribution system flushing.

- The results of bench-scale testing showed minimal aesthetic concerns for the proposed full-scale condition, but a proactive customer notification plan should be implemented to alert customers in the isolated portion of the District's distribution system of the proposed seasonal change in source water and the possibility for water quality changes that could include the following: discoloration, taste, odor, and turbidity.
- Businesses or individuals that could be susceptible to water quality changes should be alerted of the seasonal switch in water sources, and this could include hospitals, daycare facilities, nursing homes, dialysis patients, and food or beverage production facilities.
- The portion of the District's distribution system that will receive the City's water via the intertie should be isolated prior to receiving the City's water so that full-scale baseline water quality monitoring can be conducted. Water quality monitoring should continue after the City's water is introduced to the isolated portion of the District's system.
- Water-quality monitoring in the isolated portion of the District's system should continue through at least one year of the seasonal source water changes between the City's water and the District's water to validate the results of bench-scale testing.

Staff's goal is to be prepared to purchase water between November 2018 - April 2019, if available and the conditions set forth in the pilot water purchase agreement are met. However, the recommendation to collect full-scale baseline water quality monitoring of the isolated service area could delay this goal because Main St. well is currently out of service pending a casing liner and new pumping equipment and O'Neill Ranch well is still challenged with elevated ammonia levels. It is anticipated that Main St. well will be back in service in September and additional work to mitigate ammonia at O'Neill is planned but the success of the well modification will not be known until October or November. Based on these constraints, it would be unlikely that City surface water could be purchased before December 2019, if the water is even available at that time. Staff will continue to update the Board on the status of the two critical wells for this isolated zone.

**POSSIBLE BOARD ACTION(S)**

1. Review the Technical Memorandum prepared by Black & Veatch and provide comments, if any, and
2. By MOTION, accept the final report (Attachment 2), incorporating any changes/comments provided.

By   
Taj A. Dufour, P.E.  
Engineering Manager/Chief Engineer

By   
Christine Mead  
Operations & Maintenance Manager