**RO Concentrate Treatment Update**

Valley Water’s RO Concentrate Management (ROCM) project, in coordination with GHD, is getting close to producing site-specific design for ROC disposal/treatment options in alignment with their Countywide Master Planning. These options mostly focus on blending/dilution with the remaining effluents from POTWs and identifying the best discharge locations based on Mass Balance Analysis Models and the results of the recently completed Hydrodynamic Modeling study which used SFEI’s hydrodynamic model of the South San Francisco Bay.

While blending/dilution for discharging to the South Bay would address the handling of ROC, the presence of metals (e.g., Cu, Ni) remain as a concern. There could be instances—such as lowest influent/effluent combined with high demands for Recycled Water from POTWs—that could cause exceedance of NPDES limits for metals.

The following three (3) research plans represent a comprehensive effort led by staff to test the most promising treatment alternatives for determining whether ROC treatment for metals removal would be feasible and effective. Each treatment system has its own unique characteristics which can be useful for different future discharge sites.

**Floating Wetlands Treatment (FWT) of RO Concentrate at SVAWPC:**

**Objective:** The proposed FWT project would establish a pilot for testing ROC treatment at the Silicon Valley Advanced Water Purification Center (SVAWPC) using hyperaccumulating plant species and various flow-through rates. Floating wetlands are a form of phytoremediation using vegetation to remove nutrients, metals and organic contaminants from water. The active mechanisms are the plants and biofilms that form on submerged roots and submerged portions of the platforms.

**Scope and Duration:** The FWT project would test six (6) scenarios in parallel, occupying approximately 16’ X 50’ of space adjacent to the ongoing Engineered Treatment Cell Pilot at the SVAWPC. Construction and start-up would take 4-6 months, followed by one (1) year of continuous testing, starting early Fall 2019 and continuing through March 2021. Valley Water staff would design, build, operate, and supervise analytical services for the project. Humboldt State University and Intrinsyx Technologies Corporation have offered to form a project advisory team in collaboration with Valley Water. Their expertise in phytoremediation and engineered natural treatment systems would provide invaluable benefit in process design, data analysis, and hyperaccumulator plant species selection.

**Cost:** The majority of the FWT project budget would be covered by Valley Water. SFEI and Humboldt State University would also provide some in-kind contribution for participating in research team meetings and reviewing reports.

**RO Concentrate Treatment in Horizontal Levee at Oro Loma Sanitation District:**

**Objective:** The proposed Oro Loma ROC project would be a three-way collaboration between Oro Loma Sanitation District (OLSD), UC Berkeley (UCB) and Valley Water to test the ability of the subsurface horizontal levee system to remove nitrate, trace organics and trace metals of concern (e.g., Cu and Ni) from RO concentrate (ROC) produced at the Silicon Valley Advanced Water Purification Center (SVAWPC). The horizontal levee has previously been tested by OLSD and UCB and shown effective removal of metals, nutrients and organic contaminants from treated municipal wastewater.

**Scope and Duration:** The Oro Loma ROC project would be partnership with UC Berkeley and Oro Loma Sanitation District to test ROC through one cell of the horizontal levee system for minimum of one (1) year. Valley water would provide for 5,000 gallons of storage at Oro Loma and deliver 10,000 gallons per week of ROC from SVAWPC for one (1) year. OLSD would provide the horizontal levee system and all pumping and plumbing needs. UC Berkeley would provide levee operation and maintenance, water sampling and analysis, and report writing. This project would begin early Fall of 2019 and continue to Fall of 2020.

**Cost:** The majority of project costs would be covered by OLSD, UCB, and an EPA grant. The cost to Valley Water would be for procuring weekly shipping of ROC and providing a second storage tank at OLSD.

**Capacitive Coagulation Removal of Free and Chelated Metals in RO Concentrate at SVAWPC:**

**Objective:** The purpose of this pilot project is to test PowerTech Water’s (PTW) novel capacitive coagulation (CapCoTM) technology for the removal of dissolved metals (e.g. Se, Ni, Zn, Al, Mn, Fe, and Cu) from RO brine produced at the Valley Water’s Advanced Water Treatment Facility. The CapCoTM system electrochemically, chemically, and physically remove metals from drinking water sources by applying a small voltage to a series of functionalized porous carbon electrodes to manipulate the pH and redox conditions.

**Scope and Duration:** This project is a collaboration between three entities: PTW, Carollo Engineers, Inc., and Santa Clara Valley Water District (Valley Water). Valley Water will be providing a test site, laboratory analyses and on-site operational support. PTW will supply the treatment technology pilot facility and provide remote support. Carollo will be in charge of the experimental design, pilot setup, overseeing the first phase of testing, data analysis, and drafting the final report. This project will proceed for 2-3 months from project approval and purchase order; estimated start date is September, 2019.

**Cost:** Costs for the CapCoTM project will be shared between Valley Water and PTW.

**Conclusion**

The two natural treatment options have the potential to offer low CAPEX and low OPEX solutions for wastewater treatment, and they were recently identified in the Bay Area Regional Water Quality Control Board’s Second Nutrient Watersheds Permit as preferred solutions for future reductions to nutrient loading in the San Francisco Bay. Potential potable reuse partners, Palo Alto and Sunnyvale, show strong interest in using natural treatment systems for wastewater management in general.

These three projects will help Valley Water to find a cost-effective ROC treatment option for our unique discharge considerations to the sensitive South Bay ecosystem. Results from these three pilot projects will aid in decision-making for ROC Management at future advanced purification facilities. All three projects offer new treatment mechanisms for metals and nutrient management for wastewater and ROC discharge to San Francisco Bay