



Agenda Report

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FROM: James D. Herberg, General Manager
Originator: Rob Thompson, Assistant General Manager

SUBJECT:

SUPERCRITICAL WATER OXIDATION RESEARCH PROJECT

GENERAL MANAGER'S RECOMMENDATION

RECOMMENDATION:

Information item.

BACKGROUND

The Orange County Sanitation District (OC San) collects and processes 185 million gallons of wastewater every day. Cleaning this water results in concentrated solids called sludge and scum. These energy rich solids are processed through anaerobic digestion to create methane-rich gas and biosolids. The methane-rich gas is cleaned and used in the treatment plants to make electricity and heat. Biosolids are the residual material commonly used in the agricultural industry as a soil amendment.

OC San continues to actively pursue management options to maintain a long-term program that promotes beneficial use of biosolids. In accordance with the principles of its biosolids management policy (Resolution No. OCSD 13-03), OC San maintains a diverse portfolio of biosolids management options that utilize multiple contractors, facilities, and product markets, while maintaining fail-safe, back-up options. This portfolio ensures that OC San has reliable options for managing the material should regulations, market conditions, severe weather, or other situations impact any one management option.

Staff has also been following a new technology for solids treatment for several years that takes advantage of a unique property of water at high temperature and pressure. The technology presents an opportunity to convert all complex organic material (including plastics and PFAS) to more basic and benign compounds like nitrogen, water, carbon dioxide, and mineral salts.

A new company, 374Water Systems, Inc. (374Water), with a novel, simpler process design, was moving to scale-up the process technology from a one-ton-per-day unit patented and operating at Duke University in North Carolina. Assistant General Manager Rob Thompson witnessed the operation of the unit in North Carolina in May 2021. OC San entered into an agreement with 374Water to scale up and operate a six-ton-per-day unit as part of OC San's research program and, if successful, potentially a thirty-ton-per-day unit.

It is also important to note that this process will only treat concentrated solids streams, not the entire water flow. Part of the research process will be to document the ability of the system to destroy plastics, PFAS type compounds, and other constituents of emerging concern that can be concentrated in sludge streams. The proposed research/demonstration program would be capable of treating raw primary and secondary sludge, biosolids, and food waste.

OC San has a long history of researching new and innovative technologies to improve wastewater treatment and resource recovery.

Staff will provide an update on the assembly of the new six-ton-per-day unit, the AQMD permit process and air emissions testing, the design of the site preparation project that will be competitively advertised and bid, the status of potential federal funding, and the opportunity to partner with other government agencies on this research project.

RELEVANT STANDARDS

- Provide technology leadership to the wastewater industry
- Search for technology solutions to neutralize constituents of emerging concern
- Maintain a culture of improving efficiency

PRIOR COMMITTEE/BOARD ACTIONS

December 2021 - Approved a Professional Services Agreement to 374Water Systems, Inc. for the Supercritical Water Oxidation Demonstration at Plant No. 1, Project No. RE21-01, to provide goods and services for demonstration of the 374Water AirSCWO Nix6 System, for an amount not to exceed \$5,139,000; and approved contingency funds for Project No. RE21-01 for a combined total not to exceed \$514,000 (10%).

November 2021 - Operations Committee deferred consideration of the project until the next meeting and requested additional information regarding the item.

July 2021 - Operations Committee Information Item.

ADDITIONAL INFORMATION

The site and utilities design work for this project is being finalized by 374Water. The execution of the Public Works site and utilities work will be competitively bid by OC San under an upcoming separate procurement.

CEQA

The project is exempt from CEQA and a Notice of Exemption was filed with the OC Clerk-Recorder on November 23, 2021.

FINANCIAL CONSIDERATIONS

The approved item will be funded through the Research Program (M-RESEARCH) and has been budgeted (FY2022-23, Section 8, Page 10).

To ensure the project budget to construct the site improvements is adequate, OC San worked with 374Water on the accuracy of the most recent construction cost estimate. This construction cost estimate did increase significantly. However, there is adequate budget in the Research Program to accommodate this increase.

ATTACHMENT

The following attachment(s) may be viewed on-line at the OC San website (www.ocsan.gov) with the complete agenda package:

- Presentation