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To a New Level

FIRST-OF-A-KIND TECHNOLOGIES ENABLE CREATION OF A 'COMPLETE REMOVAL' TERTIARY TREATMENT SYSTEM FROM A LAGOON FACILITY IN CENTRAL CALIFORNIA

By Peter Lescure, P.E., and Edward C. Myers, M.S.Ch.E.

The Graton (Calif.) Community Services District (GCSD) had just been formed in July 2004 when the Regional Water Quality Control Board issued a notice of public hearing for October to upgrade its water resource recovery facility (WRRF) from secondary to tertiary discharge standards.

Graton's collection system and secondary treatment plant were built in 1979 by the Sonoma County Department of Public Works. In 1995, the county transferred all wastewater plant operations to the Sonoma County Water Agency. That agency in 2004 transferred the Graton plant to local control but continued to operate the plant through the first year, giving the Graton district time to build the management and operations structure needed to assume control.

Lescure Engineers had started design of a flood wall when, six months into GCSD's control, a flood struck. The district completed construction of a Flood Works Project in November 2010 to protect its treatment ponds and an anticipated treatment upgrade. In March 2014, the district commissioned its upgraded 160,000 gpd (design) WRRF, employing three first-of-a-kind technologies, and began producing Title 22 tertiary disinfected effluent. The facility serves an unincorporated community of about 1,700 residents.

INNOVATIVE FILTRATION

Graton's first board of directors adopted a policy to maximize land discharge of effluent, aiming to sustain the local watershed. The original vision was to disperse effluent to a redwood forest and nearby farms. However, limited land dispersal capacity and the Regional Water Quality Control Board's



The Suspended Air Floatation (SAF) system from Heron Innovators has one-tenth the connected hp and one-fifth the footprint of conventional approaches. It also uses less chemistry while generating substantially higher percent algae solids.

order to achieve tertiary standards required the district to upgrade the treatment process as early as possible. A design criterion added by the district general manager was to achieve "complete removal," leaving no residuals needing further treatment or cleanup.

In response to the water board's order, GCSD implemented a unique process for treating secondary aerated lagoon effluent to tertiary standards. Before considering how to meet the tighter standards, Lescure Engineers examined the treatment ponds' capability and found they had sufficient biological treatment capacity to deliver effluent meeting the numerical BOD limits for tertiary effluent without any adaptation. Initial operations of the tertiary system confirmed that capability.

Since the district had rejected membrane technology for tertiary treatment chain, the challenge was to specify an alternative. An investigation of various cloth membrane and media depth filters led to the Fuzzy Filter (Schreiber), a robust, simple depth filter with low energy and maintenance requirements. However, the filter was certified for Title 22 treatment of activated sludge effluent containing relatively large particles, whereas pond effluent contains large amounts of algae small enough to pass through.

The solution lay in the suspended air flotation (SAF) technology (Heron Innovators). The SAF process uses flocculants and coagulants to "glue" algae particles together and a surfactant agent to create froth that floats the algae and microbial floc out of the wastewater stream.

A pilot test found that the combination performed robustly. The SAF performed equally well with settled and unsettled pond effluent as a "roughing filter." The Fuzzy Filter reliably produced long filter runs with effluent turbidity better than 1 NTU, versus the Title 22 standard of 2 NTU.

Graton's was the first SAF installation in municipal wastewater service — it previously had been used only in industrial applications. The Graton WRRF was also the first application of the Fuzzy Filter to pond effluent, enabled by coupling it with the SAF.

COMPLETING THE PROCESS

Two more processes completed the tertiary treatment chain: disinfection and biosolids management. Graton historically disinfected with gaseous chlorine but now uses a first-in-the-world pasteurization technology for municipal wastewater.

Pasteurization Technology Group (PTG) certified its technology for Title 22 service in 2007. Besides disinfecting the effluent, the technology generates 30 kW of electricity rather than consuming electric power. It also eliminates formation of disinfection byproducts, the cost of monitoring effluent for them, and the risks of storing and handling chlorine.

A system from Pasteurization Technology Group disinfects effluent while generating 30 kW of electricity instead of consuming power.



Biosolids are stabilized by composting. The SAF removes biosolids from the main effluent stream and the Fuzzy Filter backwash. While dewatering of biosolids from an activated sludge process typically requires a centrifuge or press, at Graton the SAF “float” is pumped to a bin, where it drains by gravity to a solids content level suitable for composting, saving the district \$250,000 in capital costs. This step is key to achieving “complete removal” rather than returning constituents to the treatment process.

Lescure Engineers also designed a composting facility scaled to treatment plant capacity. The facility combines features of open static piles and the automated facility at Santa Rosa’s Laguna treatment plant. The Graton composting site provides permanent structural cover with capacity for 80 days’ production, yielding a Class A-EQ material.

The permanent cover prevents contamination by runoff and eliminates the labor of dealing with temporary cover. The geometry of the facility, with internal “push-walls” dividing it into quadrants, facilitates turning of the compost with a simple tractor loader. The first quadrant provides capacity for the 20- to 25-day initial period to achieve Class A-EQ standards. The remaining quadrants allow added time for aging and screening to produce the finished product.

PROCESS CONTROL

Edward C. Myers, M.S.Ch.E., of Lescure Engineers, prepared the process control narrative to direct



Fuzzy Filter simple depth filter technology (Schreiber) provides robust treatment with low energy and maintenance requirements.

package integrator Telstar in writing the SCADA programs for the facility. The SCADA program performs historical process data trending and graphics presentation while coordinating the relay logic panel for the SAF and the two programmable logic controllers for the Fuzzy Filters and the pasteurization system.

The control system works around the clock, incorporating features for monitoring performance and sending alarms to the operator on-call. If an operator is unable to respond promptly, programming and

mechanical features are built in to shut the system down in a fail-safe mode without compromising effluent quality.

The new treatment facility met the district’s objectives within the constraints of regulations and compliance schedules, applying innovative technologies to produce two valuable products: tertiary disinfected reclaimed water and compost suitable for unrestricted application. The project also meets the goal of a complete-removal system, or a true water resource recovery facility.

ABOUT THE AUTHORS

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