



# Memorandum

**TO:** TRANSPORTATION AND ENVIRONMENT COMMITTEE

**FROM:** Kerrie Romanow

**SUBJECT: DISCHARGE REGULATIONS AND POTENTIAL IMPACTS TO THE SAN JOSÉ-SANTA CLARA REGIONAL WASTEWATER FACILITY**

**DATE:** May 15, 2023

Approved

Date

5/26/23

## RECOMMENDATION

Accept a report on future wastewater and air discharge regulations and their potential impacts to the Regional Wastewater Facility.

## BACKGROUND

The San José-Santa Clara Regional Wastewater Facility (RWF) is the largest wastewater discharger in the San Francisco Bay and the largest advanced wastewater treatment plant in the western United States, serving a population of 1.5 million people and over 17,000 businesses across eight cities and the County. From industrial dischargers to residents and restaurants, the RWF is responsible for cleaning wastewater to the highest standards before it is discharged through the Artesian Slough to the shallow waters of the Lower South Bay. Since 1956, the RWF has continually treated the majority of Silicon Valley's wastewater and protected public health and the San Francisco Bay environment. The RWF is sized and permitted to treat an average of 167 million gallons per day during dry weather.

Wastewater is treated at the RWF through a series of physical, biological, and chemical processes to treat the liquids and solids streams. Separated solids (or sludge) from wastewater are thickened and processed through anaerobic digesters to reduce pathogen content, sludge volume, and create biogas for beneficial reuse. Currently, the digested sludge (biosolids) is pumped to open air lagoons, capped with water, and then transferred to drying beds for further volume reduction with eventual disposition to the adjacent Newby Island Landfill.

The RWF is regulated under two principal operating permit categories:

- A facility-specific individual National Pollutant Discharge Elimination System (NPDES) permit under the Federal Clean Water Act administered by the California State Water Resources Control Board; along with two additional regional NPDES permits, one that regulates nutrients, and another that regulates mercury and polychlorinated biphenyl.

- Title V of the Clean Air Act is directed by the United States Environmental Protection Agency and administered by the Bay Area Air Quality Management District (BAAQMD), and includes a “Permit to Operate” - air permit, issued by BAAQMD

#### NPDES Permits – Clean Water

The NPDES permits issued mandate water quality monitoring requirements for the RWF’s effluent discharge to the San Francisco Bay and set specific concentration limits for several conventional wastewater pollutants, metals, and organic compounds. The RWF’s individual NPDES permit further prohibits effluent discharge from causing or contributing to impairment of any beneficial uses designated for the Lower South Bay. Permits are typically revised and reissued at five-year intervals, and requirements can change based on the conditions found in the bay determined from all regional monitoring and as new regulations are adopted.

The RWF continues to be recognized for supporting beneficial uses and providing environmental enhancement to the Lower South Bay estuarine habitat. The environmental enhancements are due to the elevated oxygen content in the effluent and the consistent flow of highly treated freshwater into an otherwise mostly stagnant system. This recognition is supported by the consistent documentation in the RWF’s monthly and annual compliance reports as well as regional monitoring programs the RWF participates in through the South Bay Monitoring Program and participation in the Bay Area Clean Water Agencies.

#### Title V Permit – Clean Air

The Title V permit program is designed to standardize air quality permits for major sources of emissions across the country and is required for facilities that emit more than the major source thresholds of criteria pollutants. The criteria pollutants include carbon monoxide, ozone, lead, nitrogen oxides, particulate matter, and sulfur dioxide. The Title V permit incorporates the RWF’s Permit to Operate issued by BAAQMD and all other applicable new local, state, and federal air quality regulations that were adopted in the prior permit period.

### **ANALYSIS**

Regulations typically evolve over multiple five-year cycles for wastewater NPDES and air permits, but they can have significant impacts to operational and capital costs that affect rate payers. Therefore, RWF staff proactively engage with their regulators to advocate for the most cost-effective approaches. Staff is continually identifying issues on the horizon, collecting data, and building case studies to inform common sense, science-based solutions for the San Francisco Bay and the RWF.

#### Wastewater Regulations Under Consideration or Development

Over the last two decades, the United States Environmental Protection Agency and the Water Board have developed water quality regulations related to a variety of pollutants. Regulatory focus through the late-1980s and early-1990s was on copper, nickel, and freshwater flows. In the

late-1990s, this focus shifted to cyanide, legacy mercury, polychlorinated biphenyl. More recent focus has shifted to nitrogen and contaminants of emerging concern (CECs).

***San Francisco Bay Nutrient Watershed Permit*** – In addition to discharging a variety of chemical constituents within the range allowed under each Publicly Owned Treatment Works' (POTW) NPDES permit, POTW discharges are also major contributors of nutrient compounds to the Bay, specifically nitrogen and phosphorus. Nitrogen levels in the Bay are elevated compared to other urban water bodies. For decades, the elevated nitrogen has not caused impairment, which would have manifested through effects like harmful algal blooms and low dissolved oxygen levels. Historically, this was referred to as the Bay's resistance to the harmful effects of excessive nitrogen. That resistance was broken in August 2022 when a harmful algae bloom, dominated by the red tide species *Heterosigma akashiwo*, spread from the Alameda Inner Harbor throughout the entire bay. The algae bloom lasted for nearly all of August and extended from Suisun Bay in the north down into the Lower South Bay. The most severe effects, in the form of widespread and massive fish kills, occurred in the region. While the harmful algae species was detected in the Lower South Bay through the South Bay Monitoring Program, it was at lower concentrations than other, more impacted regions of the Bay, and there were no documented fish kills within the RWF's area of influence.

Prior to the August 2022 event, regulators were poised to implement a hard limit, or cap, on nutrient loads discharged and not allow any future increases of nitrogen. Because of the bloom, regulators will now require substantial reductions in nitrogen loads coming from POTWs. The full extent and timing of the required reductions is still under evaluation through joint fact finding and investigations between POTWs, the Water Board, and regional scientists. Staff is actively engaged in all requirements to ensure the RWF is well represented in terms of its current nutrient removal performance, contribution of nutrients to the Bay, and opportunities to achieve additional nutrient reductions should they be necessary.

The RWF already removes a significant portion of the nitrogen it receives due to the advanced secondary treatment process that has been in place since 1998. This process, combined with recent optimizations implemented by the RWF Operations team and loads diverted from the Bay through non-potable reuse water recycling, results in an 85% nitrogen reduction throughout the plant. This high removal efficiency puts the RWF ahead of other large and medium sized wastewater treatment plants in the region. The current performance is exemplary and means that the RWF has already achieved the substantial nitrogen reductions that will be required of other POTWs who have not yet upgraded to reduce nitrogen. However, the RWF will be required to maintain its existing nitrogen loads discharged, which will be challenging as population increases and as changes to solids processing occur at the RWF, both of which will result in increases in nitrogen. Solids will be processed in a new dewatering facility currently under construction. This process will result in an increased volume of liquid removed from the wet solids that has a higher concentration of nitrogen and will need to be treated. The current treatment process will not be able to accommodate removal of the increased nitrogen load.

The nitrogen load cap will be imposed in 2024 when the Nutrient Watershed Permit is reissued and the RWF will have until 2029 to meet the permitted load cap. Current load projections indicate one or more actions (in the form of treatment upgrades, expanded recycled water for non-potable reuse, or treatment through green infrastructure) will be needed to maintain current nitrogen loads to the Bay. If no further action is taken by 2029 to reduce nitrogen loads, the RWF is projected to exceed the future nitrogen load cap between 2025 and 2030.

In anticipation of future nitrogen requirements, RWF staff initiated a comprehensive process optimization study in early 2020 to evaluate how RWF's Capital Improvement Program (CIP) and the RWF Operations could respond to future nutrient load limits and other regulatory requirements in a cost-effective and environmentally protective manner within the existing CIP project timelines. Such an evaluation was not included in the Plant Master Plan because at that time there were no indications that the Bay could be impaired by nutrients, so the Water Board had not prioritized nutrient regulations. The process optimization study identified an upgrade to the existing advanced secondary treatment as the best treatment technology to keep the RWF in compliance with its nitrogen load cap until 2051. The study also evaluated options and projected costs to reduce nitrogen loads even further below the nitrogen load cap in case scientific evaluations of the Bay indicate additional reductions are necessary. Since the study identified the treatment technology to meet the future load cap, the next five-year CIP plan will need to modify existing projects or include new project(s) to meet the nutrient loads cap. Similarly, the timing and phasing of nutrient treatment systems upgrades are under evaluation to ensure they will keep pace with future nutrient increases and regulations.

Concurrent with the CIP evaluation of necessary upgrades to meet nitrogen requirements, the RWF is participating in two regional studies that are required by the Nutrient Watershed Permit. When complete, the studies will provide a high-level evaluation of the opportunities and costs to reduce nitrogen discharges through recycled water and natural treatment processes such as engineered wetlands, open-water ponds, or marsh plains. Both studies are concluding in mid-2023 and will provide planning-level evaluations of opportunities and costs that can be further refined with facility-specific studies if desired.

***Contaminants of Emerging Concern*** – CECs include a broad range of currently unregulated chemical components found at trace levels in many of our water supplies and surface waters, and there is a concern that these compounds may have an impact on aquatic life. Examples include chemicals commonly found in pharmaceuticals and personal care products. The RWF is taking a proactive approach to CECs by engaging in regional science-driven efforts to understand the sources and environmental impacts of various CECs and integrating pollution prevention messaging into outreach campaigns to educate the public on proper disposal. The number of CECs causing concern in the environmental and scientific communities has steadily and rapidly grown over the past five years.

Poly- and Per-fluoroalkyl compounds (PFAS) and flea and tick treatment pesticides are CECs that have received focus recently and are the most likely to result in new regulatory control programs or effluent limits in the near term. These CECs' issues are explained below.

***Poly- and Per-fluoroalkyl Compounds (PFAS)*** – PFAS compounds are a large class of chemicals with a diverse number of applications that are receiving increasing regulatory attention. They are ubiquitous due to their wide use in textiles, carpet treatments, metal plating, cookware coatings, food packaging, and fire-fighting foams. PFAS originates in residential, commercial, and industrial sources and becomes part of wastewater and storm water streams, and thus reaches the environment. They are persistent, with some forms accumulating in wildlife, potentially causing harm.

Wastewater agencies in the Bay region initiated a study, which is unique in California, in late 2020 to characterize the levels of PFAS entering and leaving POTWs and to gain a better understanding of the source of PFAS in wastewater. The study was conducted in collaboration with scientific experts from the San Francisco Estuary Institute and the Water Board. This collaboration is the result of RWF staff actively participating in and assuming leadership roles in regional science programs, which has built trust between the wastewater community and our regulators over the course of many years. The preliminary results indicate that residential flows are highly variable and, in some instances, may convey non-trivial amounts of PFAS to POTWs. Among the industrial and commercial categories sampled, industrial laundries were both highly variable and had some of the highest concentrations of PFAS entering the sanitary sewer system. The preliminary information is under evaluation and will help identify whether wastewater PFAS is coming from specific industries and if residential inputs are a significant source.

***Flea and Tick Pet Treatment Pesticides*** – Topical flea and tick treatments for household pets have received considerable attention and potentially pose a future regulatory threat due to their impact on the environment. Many of the common lower cost products on the market are applied topically to a dog's or cat's skin between their shoulders. Studies conducted in the Bay Area have demonstrated that topical application causes the product and chemicals to spread rapidly throughout a household, onto furniture, clothes, bedding, hands, and faces. As things are washed, these treatment chemicals reach the collection system and the RWF. Many of the popular, widely used treatments contain one of the two most problematic pesticides, fipronil and imidacloprid. Studies conducted at the RWF and other POTWs have shown that these two compounds are not removed or reduced by treatment, even at advanced wastewater treatment facilities like the RWF, and thus are discharged to the environment. These compounds are highly toxic to aquatic life. Imidacloprid is also in a class of pesticides implicated in honeybee colony collapses.

Since there is not an identified treatment technology to remove these compounds from wastewater, RWF staff initiated a proactive pollution prevention effort to educate the public and San José staff on the environmental risks posed by fipronil and imidacloprid. Outreach messaging encourages residents to consider using chewable flea and tick treatments for their pets after speaking to their veterinarian, to practice integrated pest management (less-toxic actions and alternatives) for flea and tick control and treatment, and to research other products that do

not contain fipronil and imidacloprid. Staff has continued to research and refine pollution prevention messaging

Air Quality Regulations under Consideration or Development

***Toxic Air Contaminants / AB617 Implementation*** – Assembly Bill (AB) 617, the Community Air Protection Program, passed in 2017, mandated that the California Air Resources Board reduce exposure to toxic air contaminants in communities most impacted by existing air pollution sources. Compliance with new reporting provisions associated with the Community Air Protection Program will require additional source testing from wastewater treatment operations. The California Association of Sanitation Agencies is coordinating an industry-wide testing effort to develop emission factors that can be used to evaluate and report emissions to the California Air Resources Board and BAAQMD under the new Community Air Protection Program. This effort will be conducted over the next four to five years with each participating facility contributing to annual cost sharing. Preliminary estimates for the testing program show an approximate \$200,000 cost share assessment for the RWF. The results of the study will also be used for compliance with local BAAQMD air toxic rules, including Rule 11-18 and Rule 2-5.

***Toxic Air Contaminants / Rule 11-18*** – BAAQMD is implementing a new rule: Regulation 11, Rule 18 (Rule 11-18) to assess and reduce human health risks associated with toxic air contaminant emissions from facilities throughout the Bay area. The RWF will be subject to Rule 11-18 and required to fund a human health risk assessment for the entire RWF under the guidance of BAAQMD. Implementation of Rule 11-18 has been delayed and BAAQMD has not provided a definitive timeline for implementation.

***Toxic Air Contaminants / Rule 2-5*** – BAAQMD adopted a revised Rule 2-5, *New Source Review for Toxic Air Contaminants* in 2021 that sets stricter standards for new or modified facilities in and near communities that are deemed to be disproportionately affected by air pollution. Prior to adopting the new regulation, the BAAQMD Board of Directors formed a working group comprised of BAAQMD staff and Bay Area Clean Water Agencies members to discuss implementation and address concerns of the wastewater treatment industry. RWF staff is involved in this group to increase engagement with BAAQMD and address concerns with the air permitting process.

***Greenhouse Gas Emissions / Cap and Trade*** – California created statewide programs, including a Cap and Trade program, to track and promote reduction of GHG emissions. The current program authorized by AB 32 in 2006 was set to expire in 2020 but was extended through 2030 with the adoption of Senate Bill (SB) 32 in 2017.

The RWF uses its digester gas to power operational equipment but must blend it with another fuel to have sufficient fuel supplies. After five years of being subject to the Cap and Trade program for blending with piped natural gas (a fossil fuel), the RWF was able to exit the program in 2018 by purchasing electricity from the utility grid rather than supplementing with natural gas. This change in operations increases the cost of electricity purchases but reduces natural gas costs

and eliminates the cost of emission reduction credits. The estimated net cost for 2022 of remaining out of the Cap and Trade program was \$1,4 million in 2022.

***Greenhouse Gas Emissions / BAAQMD Methane Rules*** – BAAQMD has announced plans to develop Rule 13-4, targeting wastewater treatment facilities and anaerobic digesters for methane and nitrous oxide emission reductions. The intent of the rule is to limit fugitive methane emissions and minimize the formation of nitrous oxide in the treatment process. Formal rulemaking for this was expected by 2019 but has been delayed due to lack of BAAQMD staff resources and the effects of the COVID-19 pandemic. City staff and Bay Area Clean Water Agencies members are working to educate BAAQMD personnel on wastewater treatment and anaerobic digester operations to help inform their rulemaking process.

#### South Bay Odor Study

BAAQMD hired two consulting firms to conduct a regional odor attribution study that analyzed air samples from the RWF, Newby Island Landfill, and Zero Waste Energy Development Company. The community has ongoing concerns that all three facilities contribute to nuisance odors in Milpitas. The odor attribution study took air samples from each of the three facilities and characterized their molecular signatures so that odors observed in the community could be traced to their source. The results of the study will be used by BAAQMD to develop a plan for reducing odors from any of those facilities that are found to contribute to odors observed in the community.

BAAQMD distributed a draft report of the results in October 2022. The draft report identified activities at the Newby Island Landfill as the primary source of odors that generate complaints in Milpitas. The RWF was identified as a source of identifiable odors but was not shown to be a source of odor complaints at this time. BAAQMD has stated that they intend to initiate a rule making process to address findings of the South Bay Odor Study. Staff will engage with BAAQMD during the rule making process to ensure compliance with the future rule.

Recent and planned changes at the RWF are expected to reduce potential emissions of odors. Headworks 3, currently undergoing initial start-up, will replace the open headworks with an enclosed process equipped to collect and treat air with a biofilter to reduce potential odors. In addition, the RWF completed start-up of new odor control measures for undigested sludge handling systems in 2022. The Digested Sludge Dewatering Facility, currently under construction, will allow the eventual decommissioning of the lagoons and drying beds which have been alleged as odor sources by BAAQMD. These enhanced odor control measures are intended to prevent objectional odors beyond the RWF fence line.

#### COORDINATION

This report has been coordinated with the City Attorney's Office and Budget Office.

TRANSPORTATION AND ENVIRONMENT COMMITTEE

May 15, 2023

**Subject: Discharge Regulations and Potential Impacts to the San José-Santa Clara Regional Wastewater Facility**

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/s/

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