STATE OF CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

STAFF SUMMARY REPORT: Gaurav Mittal
MEETING DATE: July 10, 2024

ITEM: 6

Nutrients from Municipal Wastewater Treatment Facilities' Discharges to San Francisco Bay; the Facilities Are Located in the Counties of Alameda, Contra Costa, Solano, Napa, Sonoma, Marin, San Francisco, San Mateo, and Santa Clara – Reissuance of NPDES Permit

DISCUSSION

This Revised Tentative Order (Appendix A) would reissue the NPDES permit for discharges of nutrients from 40 municipal wastewater treatment plants to San Francisco Bay (Nutrients Watershed Permit). The Revised Tentative Order would require the municipal wastewater treatment plants (Dischargers) to collectively reduce dry-weather total inorganic nitrogen loads to San Francisco Bay by 40 percent from 2022 levels within 10 years and includes associated load reduction effluent limits for each of the municipal wastewater treatment plants. It also includes interim limits for each plant to at least maintain current performance, requirements to plan and implement nutrient reduction actions and report progress to attain the load reduction requirement(s), and requirements to continue to support receiving water monitoring, modeling, and special studies to characterize and evaluate the Bay's response to current and future nutrient loads. Appendix B contains responses to comments received on the Tentative Order, and comment letters received are in Appendix C.

BACKGROUND

San Francisco Bay is the West Coast's largest estuary and home to over seven million people. It has long been recognized as a nutrient-enriched estuary with higher nitrogen and phosphorus concentrations than most estuaries in the world. The main source of nitrogen and phosphorous in wastewater is human waste. Too much nitrogen and phosphorous can result in excessive algal growth, which can be associated with harmful algal blooms and low dissolved oxygen levels. In San Francisco Bay, nitrogen has more influence on algal growth than phosphorous. During the dry season, municipal wastewater treatment plants account for about 86 percent of the total nitrogen load to San Francisco Bay.

Despite being nutrient rich, San Francisco Bay has historically resisted excessive algal growth due to its turbidity, strong tidal mixing, and filter-feeding clams. However, increasing algae levels in the early 2000s indicated the Bay's resilience may be weakening. The Regional Water Board initiated a Nutrient Management Strategy in 2012 and convened a Steering Committee in 2014, with the participation of U.S. EPA, the municipal wastewater community, scientific researchers, and non-governmental organizations. The Steering Committee oversees the Nutrient Science Program managed by the San Francisco Estuary Institute. The Nutrient Science Program has been undertaking monitoring, modeling, and special studies to better understand and respond to the possibility that the Bay could be losing its resilience to high nutrient levels, to evaluate nutrient reduction alternatives to prevent or resolve adverse impacts to the Bay, and to establish a scientific basis for possible regulatory action.

In 2014, the Regional Water Board issued the first Nutrients Watershed Permit requiring Dischargers to (1) contribute $880,000 total per year to the Nutrient Science Program to support

receiving water monitoring, modeling, and special studies to characterize the Bay's response to current and future nutrient loads; (2) monitor their effluent to characterize nutrient discharge concentrations and loads; and (3) evaluate opportunities to reduce nutrient discharges through treatment plant optimization and upgrades. In 2019, the Regional Water Board reissued the Nutrients Watershed Permit, requiring the Dischargers to (1) increase their contributions to $2.2 million per year to continue and enhance the Nutrient Science Program; (2) continue to monitor their effluent to characterize nutrient discharge concentrations and loads; and (3) evaluate opportunities to reduce nutrient discharges through recycling treated wastewater or using wetlands systems and other nature-based or multi-benefit systems. This provided a complete suite of nutrient reduction strategies from which municipal wastewater dischargers could select the most cost-effective actions that provide the most benefits to the communities they serve. The 2014 permit had forecasted nutrient load caps would be included in future permits, but they were not imposed in 2019 because of progress and commitments by the Dischargers to plan actions to address nutrients. The 2019 permit expected the Board to implement effluent limitations in 2024.

In July and August 2022, San Francisco Bay experienced a significant harmful algal bloom that resulted in nuisance odors and thousands of dead fish. While the causes of the harmful algal bloom are unknown, high levels of nutrients in the Bay enabled its extensive propagation by providing fuel for the algae to consume. Modeling and observational data demonstrate that San Francisco Bay cannot assimilate current nutrient loads during the summer months without risking a large algal bloom and significant fish kills as occurred in 2022. This event provided cause to require nutrient load reductions to prevent or minimize the propagation of future harmful algal blooms that could adversely affect San Francisco Bay beneficial uses. In 2023, there were harmful algal blooms adversely affecting beneficial uses in the North Bay; however, the blooms were not as widespread and destructive as the 2022 event.

Nutrients, such as nitrogen, are biostimulatory substances, and the proposed nitrogen load reductions are necessary to comply with the Basin Plan's biostimulatory substances water quality objective, which provides that waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that they cause nuisance or adversely affect beneficial uses, such as what occurred as a result of the 2022 harmful algal bloom. We used a model developed by the Nutrients Science Program to evaluate reductions in nitrogen levels that would constrain propagation of algal growth and avoid adverse reductions in dissolved oxygen resulting from die-off of an algal bloom based on observed nitrogen levels in San Francisco Bay prior to the 2022 bloom. The resulting proposed load reductions are the minimum necessary to protect the Bay's aquatic life from an algal bloom that could form under ambient conditions similar to those in July and August 2022.

The Revised Tentative Order would require Dischargers to collectively reduce dry season (May 1-September 30) total inorganic nitrogen loads to San Francisco Bay by 40 percent regionwide compared to 2022 loads within 10 years, the maximum time currently allowed by the State Water Resources Control Board's Compliance Schedule Policy that can be provided in an NPDES permit to comply with the proposed load reduction limits. It assigns a portion of the resulting regionwide load, 26,700 kilograms of nitrogen per day, to each major municipal wastewater treatment plant based on a dry season total nitrogen concentration of 20.5 mg/L and associated flows. All Dischargers would be considered in compliance if the regionwide limit is attained at the end of the compliance period. The individual load reduction limits could be enforced if the regionwide limit is not met.

The costs to achieve the regionwide 40 percent load reduction will be significant, but previous permits required Dischargers to prepare for these reductions. The 2014 Nutrients Watershed Permit

required Dischargers to evaluate opportunities to reduce nutrient discharges through treatment plant optimization and upgrades. The evaluation found that the cost to upgrade treatment plants using conventional technologies to reduce dry season total nitrogen concentrations below 15 mg/L would be about $8.8 billion in 2018 dollars, which is about $11 billion today. However, as noted previously, the proposed individual nitrogen limitations are based on dry season total nitrogen concentrations of 20.5 mg/L and there may be more cost-effective options than previously considered for treatment plant optimization and upgrades. The Revised Tentative Order provides considerable flexibility for Dischargers to minimize costs and optimize benefits, including collaborative efforts to provide financial support implementation of load reduction options by certain Dischargers that are more cost-effective than reductions by others. This could include a load trading program for future consideration by the Board when the permit is reissued.

While we recognize the costs of complying with the Revised Tentative Order will be significant, the costs of not imposing these requirements would also be significant. Harmful algal blooms negatively affect many beneficial uses, such as water contact and non-contact recreation; fishing; shellfish harvesting; cold and warm freshwater, marine, and estuarine habitats; and preservation of rare and endangered species. Impacts to these beneficial uses threaten a multitude of potential losses. As explained in the response to comments, there could be significant adverse impacts to the Region's tourism (which generates nearly $9 billion annually), commercial fishing (a $23 million a year industry), sport fishing (a $100 million a year industry), subsistence fishing, and endangered species. The California Fish and Game Commission recently added white sturgeon as a candidate species for listing under the California Endangered Species Act, in part, because of the number of white sturgeon killed by the harmful algae blooms in 2022 and 2023. Furthermore, harmful algae blooms have the potential to increase health care costs through direct contact, airborne transmission, and fish and shellfish poisoning. Allowing harmful algal blooms to be fueled by excessive nutrient loads would lead to devastating impacts to San Francisco Bay, its habitats, and its people, with incalculable losses. The investment in nutrient removal technology is necessary and will benefit the entire Bay Area community.

Although the Compliance Schedule Policy provides a maximum of 10 years to comply, as discussed in the Fact Sheet that is part of the Revised Tentative Order, the Dischargers are encouraged to consider multi-benefit solutions for nutrient load reductions. This includes nature-based treatment, e.g., wetlands, and water recycling, even though such projects may take longer than 10 years to complete. There are regulatory mechanisms that may allow the Board to provide more time when the permit is reissued. These are covered in Agenda Item 7, *Resolution to Identify and Consider Regulatory Mechanisms to Extend Compliance Schedules for Nutrient Effluent Limitations*.

For more than a decade, we have collaborated extensively with the discharger community, nonprofits, and U.S. EPA to improve our scientific understanding of how nutrients affect San Francisco Bay beneficial uses and prepared for the potential need to reduce nutrient discharges. Over the last year, we met regularly with the Bay Area Clean Water Agencies, its member agencies, and others to collaborate and receive feedback on development of the Tentative Order and collaborate on its requirements. Also, in February, we began outreach to dozens of community and environmental justice organizations and tribes, inviting them to attend an informational session in March. In addition, we also provided an administrative draft of the Tentative Order to stakeholders in February to solicit and incorporate feedback prior to formally releasing the Tentative Order for public comment in April.

COMMENTS and RESPONSES

We received comment letters from the U.S. Environmental Protection Agency, the Bay Area Clean Water Agencies, the California Association of Sanitation Agencies, 12 Dischargers, 20 members of the community served by the Central Costa County Sanitation District, and San Francisco Bay Baykeeper and its members. The comments encompass six themes that we summarize below.

1. Many commenters expressed support for nutrient reductions and that action is needed now.

2. Many Dischargers believe they need more than 10 years to comply with the proposed final limits, particularly to reduce nitrogen loads through wastewater recycling or other multi-benefit projects, or by implementing innovative technologies. As noted above, 10 years is the maximum time the Board can allow in the permit now, other than through a cease and desist order adopted concurrently with the Revised Tentative Order. The Board will explore and consider other regulatory mechanisms to grant more time when the permit is reissued, as discussed in the Fact Sheet. In Agenda Item 7, the Board will consider adopting a resolution that provides a means for the Board to demonstrate a commitment to encourage multi-benefit solutions and innovative technologies and direct staff to explore ways to allow more time for such projects.

3. Many parties are concerned about costs. While we acknowledge that costs will be significant, the proposed nutrient reductions are required to implement the Clean Water Act. There will also be significant ecological, economic, and health costs for the San Francisco Bay Region if nutrient loads are not reduced.

4. Dischargers suggested a best management practices approach instead of numeric effluent limits. Best management practices may be required when numeric effluent limitations are infeasible, which is not the case here. Importantly, the Dischargers' proposed open-ended approach will not result in compliance with the biostimulatory substances water quality objective.

5. Some Dischargers and San Francisco Baykeeper brought up differences in the capacities of various subembayments to assimilate nutrient discharges. Central Contra Costa Sanitary District (Central San) believes the state of the science does not support nutrient reductions in the North Bay. San Jose advocates for lower and San Francisco Baykeeper advocates for higher load reductions to the Lower South Bay, citing low dissolved oxygen levels at its margins and weak circulation.

   In response to Central San, the North Bay is vulnerable to large algal blooms because total inorganic nitrogen levels are comparable to other portions of the Bay where the significant 2022 harmful algal bloom occurred. This was evident in 2023 when San Pablo Bay experienced a harmful algal bloom that resulted in fish kills.

   With respect to San Jose, the Lower South Bay is threatened because there is sufficient nitrogen to propagate an algal bloom to a degree that adversely affects beneficial uses. The Lower South Bay subembayment has the highest measured nitrogen levels. Reducing the load reductions required by the Revised Tentative Order is therefore not appropriate.

   With respect to Baykeeper, the low dissolved oxygen levels occur over a small spatial scale corresponding with discharges from former salt ponds, not wastewater treatment plants. The Revised Tentative Order would regulate discharges from wastewater treatment plants to ensure compliance with the biostimulatory substances water quality objective, not discharges from former salt ponds that are likely to be restored to tidal marsh habitat over time.

6. Most commenters support continuation of the Nutrient Science Program, with which we absolutely agree to ensure informed decision-making based on the latest and best science available.

We made changes in the Revised Tentative Order including revisions to Provision 6.3.3 to clarify interim requirements to demonstrate progress towards nutrient load reductions and for annual updates, and revisions to the Fact Sheet to clarify the need for nutrient load reductions in the North Bay. We also made other changes as indicated in responses to comments, and minor editorial and formatting changes.

We anticipate that many commenters will present oral testimony regarding this matter.

APPENDICES

A. Revised Tentative Order
B. Response to Comments
C. Comments

Appendix A
Revised Tentative Order

Appendix B
Response to Comments

Appendix C

Comments

For an electronic copy of the comments, please contact Gaurav Mittal via email Gaurav.Mittal@waterboards.ca.gov or at (510) 622-2407.