Message

From: Goodwin, Cathleen@Waterboards [Cathleen.Goodwin@waterboards.ca.gov]
Sent: 5/20/2020 8:42:17 PM
To: Brian Gerving [bgerving@ci.eureka.ca.gov]; Jesse Willor [jwillor@ci.eureka.ca.gov]
CC: Moore, Heaven@Waterboards [Heaven.Moore@Waterboards.ca.gov]; Reed, Charles@Waterboards [Charles.Reed@waterboards.ca.gov]
Subject: Regional Board Comments on Eureka ERWWTP Evaluation of Ammonia Toxicity Technical Memorandum dated November 25, 2019

Good Afternoon Brian and Jesse:

Regional Water Board staff has reviewed the City's November 25, 2019 Technical Memorandum 1, *Evaluation of Ammonia Toxicity during Elk River Wastewater Effluent Mixing in Humboldt Bay* (Technical Memorandum). Regional Board staff appreciates the City's ongoing efforts to comply with the NPDES permit requirements and to protect Humboldt Bay. This email conveys Regional Board staff's initial comments on the Technical Memorandum.

The modeling assessment of the City's discharge must be robust and well-supported. It must include sufficient detail to demonstrate that the resulting findings are defensible and show that Eureka's discharge to Humboldt Bay will result in ammonia concentrations that are below the required ammonia criteria in all locations outside those set aside for mixing, at all times, thus posing no toxicity risk outside the zone of mixing.

The Regional Water Board has the following specific comments based on the City's modeling effort completed to date and presented in the Technical Memorandum.

1. The selection of a modeling platform should be carefully considered.

   The modeling platform must provide the capability to incorporate all factors necessary to fully evaluate ammonia toxicity in Humboldt Bay. The selected modelling software must be able to model all conditions and ensure conservative values and/or assumptions are used to mitigate the limitations of the model. The Technical Memorandum must clearly discuss how limitations of the model were mitigated.

   For example, Visual Plumes does not evaluate the potential effects of plume interaction with complex bottom shape, nearby shorelines, and tidal currents and how they change over time, all of which may reasonably be expected to affect the City's discharge into Humboldt Bay. These limitations must be addressed, all assumptions shown, and fully explained.

   If these limitations cannot be fully addressed using Visual Plumes, a more sophisticated program capable of incorporating these factors, such as CORMIX, may need to be used.

2. The intended conditions being modeled must be clearly stated.

   For example, clarify that the Visual Plumes model is intended for buoyant-plume mixing (initial dilution) only and would not be used to model any other mixing or dilution dynamic (e.g. far-field). Alternative Models such as CORMIX may need to be considered if there is a need to understand more complex mixing or dilution dynamics than what Visual Plumes can model.

3. The current modelling effort does not define a spatial area of mixing. Defining a spatial area of mixing and the dilution within that area would provide additional clarity as we review the model and would be used for any future permitting.

4. All assumptions need to be clearly stated and explained, adequate factors of safety applied, and all work and supporting calculations and documentation provided.

    a. The Technical Memorandum must explain all modeling challenges encountered and how they were addressed. It must also explain which assumptions where made and demonstrate that they are conservative in their impact on the resulting model output. This includes modeling coinciding worst case conditions, such as the effect of high background ammonia levels, high effluent ammonia concentration, and worst-case tidal mixing conditions should these all occur simultaneously, or clear evidence that specific sets of worst-case conditions cannot coincide. See also item (5) below requesting inclusion of a sensitivity analysis based on further model runs.

    b. The model assumed no ammonia was present in Humboldt Bay, a "zero background concentration". Given the enclosed nature of the Bay, the findings of the 2014 Study that not all effluent exits the Bay on the outgoing tide, and the possibility of other sources of ammonia to the Bay (including ammonia from the City's discharge), this assumption does not be appear to be correct or conservative.

        i. The City is encouraged to perform a literature search and utilize any ambient ammonia data that may exist and/or conduct additional sampling to support and verify this assumption before using it in the model. If no data are available, a conservative assumption should be used and fully explained and justified.

        ii. The model should either assess the impacts of ammonia in the City's discharge on ambient ammonia concentrations within the area being modelled or provide clear demonstration and a defensible explanation to support any proposition that ammonia from the discharge does not remain in the vicinity of the discharge.

    c. The model was run with an effluent ammonia concentration that is lower than values that have been recorded in the discharge. The model should be run with the a more conservative ammonia concentration based on a statistical analysis of the effluent ammonia data from the last five years. At a minimum, the model should use the maximum effluent concentration of ammonia detected during the last five years. The concentration selected should be fully explained.

    d. The model was run for effluent flow rates of 6 mgd and 30 mgd but appears to assume a continuous discharge. The Technical Memorandum should explicitly describe how the actual pattern of discharge flows (two pulses per day) and their interaction with the tidal current cycle in the bay was considered.

    e. Page 1 of the Technical Memorandum contains a statement regarding late summer/early fall conditions, implying that this represents the most sensitive conditions with regard to dilution and impacts on aquatic species. The Technical Memorandum should clearly document why this represents the most sensitive conditions.

f. The Technical Memorandum should discuss whether there are ammonia sensitive species present near the diffuser and within areas likely to be affected by the effluent plume and consider the potential impacts of the discharge on these species.

g. The Technical Memorandum should include the entire data set from the Fall 2019 sampling event.

h. The analysis and discussion should demonstrate that the plume doesn't interact with any boundaries such as bottom or shoreline and does not affect designated uses at the water's surface despite being predicted by the existing model to rise to a depth of less than 3 feet.

i. The analysis should address currents by performing model runs that include tidal effects or give a defensible explanation as to why it is reasonable not to consider the ambient flow reversals over the tidal cycle.

j. The Technical Memorandum should include the Excel spreadsheet for Table 3-2 in digital format, to allow Regional Water Board staff to review all calculations in the table, particularly the calculations for unionized and total ammonia criteria. The values in the un-ionized criterion columns appear less stringent than the values that result from using the formulas in the U.S. EPA 1989 *Ambient Aquatic Life Water Quality Criteria for Ammonia (Salt Water)*.

k. The model report should either demonstrate that chemical transformation modelling is not needed (i.e., demonstrate that model assumptions are conservative, dilution alone is not sufficient to demonstrate compliance with ammonia limits), otherwise chemical transformation of ammonia may be necessary.

5. A sensitivity analysis should be conducted in the model over a wide variety of conditions and with varied assumptions.
   Multiple model runs should be evaluated and discussed in the Technical Memorandum along with supporting details. This effort is necessary to demonstrate that the most appropriate and conservative conditions and factors were covered by the modeling effort.

   For example, the model should consider a wide range of discharge rates, temperatures, pH levels, ammonia concentrations in both the discharge and Humboldt Bay, and tidal conditions and how these factors may vary with depth.

6. Sampling may be needed to validate the model results if adequate data do not already exist, or if the results do not closely correlate to measured values. This validation effort should be considered early in the process.

Regional Water Board staff appreciates the City's work to analyze the impacts (or lack thereof) of ammonia in discharges from the wastewater plant. We anticipate that the additional information requested in these comments will result in the robust analysis that will be needed to defend the results before the Regional Water Board and interested public and stakeholders.

Regional Water Board staff is available to discuss these comments with you, as well as the timing for the City to complete its revised modelling evaluation. This modelling evaluation will need to be coordinated with the timing of the City's permit renewal in 2021. Please include the City's anticipated schedule for completing the modelling work in the City's response to the comments in this email.

Best Regards,

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The governor of California has issued a statewide shelter in place order due to the COVID-19 emergency. The Water Boards are continuing day-to-day work protecting public health, safety, and the environment. However, most staff are working remotely and we continue to check email and voicemail regularly. Thank you and stay healthy and safe.