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Madera WWTF, Tentative WDRs Comments

This letter transmits my comments on the Tentative Waste Discharge Requirements Order for the City of Madera Wastewater Treatment Facility dated 27 September 2022 (Tentative Order), and its accompanying Tentative Monitoring and Reporting Program (Tentative MRP). Waste Discharge Requirements Order 95-046 currently regulates the Facility and its discharge to adjacent land of up to 7 million gallons per day (mgd) of undisinfected secondary treated municipal wastewater. The Tentative Order proposes to replace the Current Order with revised waste discharge requirements that reflect the current Facility and Central Valley Water Board plans and policies.

I am a California registered civil engineer and resident of Fresno County. From 1998 to 2010, I was employed by the Central Valley Regional Water Quality Control Board in the Fresno Office, mostly in the WDR Program, performing then supervising permitting and enforcement work associated with waste discharges to land from industrial and municipal facilities, including the City of Madera (Discharger or City) Wastewater Treatment Facility (Facility).

Major Concerns. In general, the Tentative Order does not characterize the discharge as a major source of groundwater recharge in an area dominated by almond orchards and vineyards. It characterizes groundwater beneath and immediately downgradient of effluent disposal ponds as containing salinity constituents in concentrations generally higher than in effluent, and nitrate (as N) in concentrations approaching or exceeding the water quality objective of 10 mg/L. It relies only on data obtained exclusively in 2021 for the characterization, and cites the lack of recent upgradient data, brought about by receding groundwater levels, to justify an apparent reluctance to attribute the discharge as the major contributor to the elevated concentrations of salinity constituents and nitrate in groundwater beneath and immediately downgradient of the ponds. And, it justifies deferring the kind of fulsome evaluation of the discharge's groundwater impacts typically presented in updated waste discharge requirements for major publicly owned treatment works (POTW) until after the Central Valley Water Board adopts the Tentative Order and once the Discharger submits sufficient data obtained from new, deeper monitoring wells.

Additionally, the Tentative Order does not disclose the Discharger's past sludge management and disposal practices and assess the extent to which these may pose an ongoing threat to groundwater (so-called "legacy" impacts).

Specific Comments and Recommendations

Unless otherwise specified, findings cited below are from the Tentative Order.

Finding 6 indicates the Current Order designates the Facility's effluent disposal area as "fifteen evaporation/percolation ponds across 320 acres." Finding 15 also cites the number of ponds available for effluent disposal as fifteen. The Current Order (Finding 4) characterizes the Facility's effluent disposal area as fourteen 20-acre ponds (280 acres). The Tentative Order's ATTACHMENT A—SITE LOCATION MAP delineates a 320-acre area with 15 labeled ponds, including Pond 9S, singled out as "(Not in use)." Google Earth imagery shows Pond 9S as either fallow or cropped, except for three consecutive images taken in 2017 and 2018, when it appears to be full (3/31/2017, 8/7/2017, and 2/6/2018).

Please explain the 40-acre difference in effluent disposal area identified in the Current Order (280) and the Tentative Order (320). Is it related to the Discharger's current and anticipated use of Pond 9S, which is almost 40 acres in size? The Tentative MRP identifies Pond 9S as a sampling location, so it would appear that the Discharger does plan to continue discharging effluent to this pond.

The 1995 Current Order (Finding 4) characterizes the ponds as shallow, three to five feet deep, and characterizes the effluent disposal operation's rotation of ponds for disposal (four ponds, 80 acres) and for reclamation (ten ponds, 200 acres). A 27 July 2010 Board staff memorandum (discussed later) indicates the Discharger ceased reclaiming effluent in 2006. Google Earth imagery bears this out, and generally shows two to up seven ponds full at any one time. Assuming the use of five ponds (100 acres), an annual average discharge flow of 5.25 mgd, and an evaporation rate of about five feet/year, the discharger's resulting net hydraulic loading rate is over 60 feet/year: ((5.25 mgd*365 days)/year)(3.57 AF/mg))/100 acres – (5 ft evaporation losses/year) = 63 feet/year. This hydraulic loading rate greatly exceeds that attributable to the area's almond orchards and vineyards.

Please revise the Tentative Order to characterize the Discharger's past, current, and anticipated effluent disposal operations. At a minimum, please identify how many ponds are currently used at any one time and what criteria is used to decide which ponds are rotated in and out of service for effluent disposal, and include estimates of annual hydraulic loading rates at current and maximum authorized discharge flows.

And, on an unrelated matter, please confer with the Discharger to obtain an explanation for what appears to be an unusual discharge to Pond 1S in three consecutive Google Earth images taken in 2017 and 2018 (3/21/2017, 8/7/2017, and 2/16/2018). If possible, please include an explanation for this unusual discharge in the Response to Comments.

Finding 6 lists Facility operations identified in Finding 3 of Current Order, but omits Finding 3's inclusion of "four sludge drying beds." In 1998, the Facility had six rectangular-shaped earthen drying beds in a 1.75-acre area at its southwest corner (Google Earth image taken 8/14/1998). Because they were vital to the Facility's operation prior to the implementation of mechanical sludge dewatering, and because they may pose an ongoing threat to groundwater, please include the sludge drying beds in the list.

Finding 7 lists the Facility expansion as including a "second centrifuge." The Tentative Order does not mention a first centrifuge. Please identify when the first centrifuge was installed. Presumably it is the mechanical sludge dewatering unit installed in 2004 in what once was the northern-most sludge drying bed (now covered by the Centrifuge Building).

Finding 15 lists the Facility wastewater and sludge treatment operations. Please revise the finding to indicate that each operation is a fully enclosed facility (e.g., tanks, concrete-lined facilities of limited areal extent) and maintained in a manner that ensures compliance with the Tentative Order, especially Discharge Prohibitions B.2.a and B.2.b.

Finding 16 references the Discharger's Report of Waste Discharge (RWD) to describe the Discharger's current sludge operations at the Facility. Elsewhere, the Tentative Order cites two RWDs submitted by the Discharger, one in 2003, the other, in 2019. To eliminate any ambiguity, this finding should reference the year of the relevant RWD (i.e., 2019 RWD). Also, the Tentative Order should identify when the Discharger fully initiated its current sludge treatment and disposal operations.

The Tentative Order does not disclose the Discharger's past sludge treatment and disposal practices, let alone evaluate their potential to have degraded and continue to degrade groundwater. These practices include use of sludge drying beds and discharge of sludge to ponds for use as a soil amendment, both authorized by the Current Order since 1995.

The Current Order indicates that the Discharger applies all of the Facility's sludge to the "reclamation area" and "occasionally by-passes the drying beds and applies the digested sludge directly to the reclamation area and/or to pond levees and other open areas within the boundary of the WWTF" (Finding 5). It authorizes an annual sludge application "between crop plantings" (D.7), and prescribes maximum concentrations of trace metals in applied sludge (D.4) and maximum cumulative loadings of trace metals to the reclamation area from sludge discharges (D.4). It prohibits the application of sludge to pond levees (D.10), but not the discharge of digested sludge directly to ponds. It does this indirectly, however, by requiring disposal of sludges removed from liquid wastes in accordance with applicable regulations and as approved by the Executive Officer" (D.1).

The frequency of bypass sludge discharges to ponds increased such that, in 2001, the Executive Officer issued the Discharger Cleanup and Abatement Order 5-01-727 (Enforcement Order).

Ten years later, on 27 July 2010, the Executive Officer rescinded the Enforcement Order after the Discharger complied with the required work to clean up sludge and solids discharges and investigate the soil profile in ponds receiving sludge discharges. The staff memorandum accompanying the rescission states, in part:

> Historically, digested sludge was dried in sludge drying beds and applied to disposal ponds prior to crop planting. Staff inspections in 1998 and 2001 revealed that Facility operators had been diluting digested and undigested sludge with effluent, conveying the effluent-sludge slurry through a common pipeline, and discharging it directly to disposal ponds, even when they were in active service. Facility operators had also been discharging undigested sludge directly to disposal ponds and burying screenings and grit onsite. Specifically, Order findings indicate, in part, that the City: (a) installed a pipeline to convey undigested sludge for drying to Pond 1S; (b) discharged an effluent-sludge slurry to an inactive pond (Pond 5N) and to active ponds (Ponds 3S, 4S, and 5S); (c) discharged dried sludge to inactive ponds (Ponds 4S, 6N, 7S, and 8S) without determining cumulative pollutant loading; and (d) buried grit, screenings, and waste pit solids in various areas within the Facility property (e.g., unlined pit, pond embankments).

The staff memorandum summarizes the Discharger's efforts to cleanup and abate the sludge discharges. These include implementation in 2004 of mechanical sludge dewatering, presumably the first centrifuge. This allowed the Discharger to abandon the sludge drying beds. The staff memorandum recaps the investigation of soils affected by sludge discharges, especially in Pond 1S and other ponds closest to the sludge drying beds. Affected soils were determined to contain trace metals within acceptable limits and nitrate and TKN at levels that, while elevated in the upper soil profile, decreased to background levels by 30 feet. The staff memorandum concludes, in part:

> The use of Pond 1S for sludge dewatering caused elevated soil nitrate concentrations that have attenuated appreciably. However, the degree to which nitrate attenuation is due to biological decomposition within the upper soil profile or to leaching to depths below the maximum 30-foot sampling depth is not known. Groundwater monitoring data obtained from wells in the vicinity of this pond should be evaluated to determine if and when groundwater nitrate concentrations increase.

Please revise the Tentative Order to reference Cleanup and Abatement Order 5-01-727, briefly summarize the events leading to and after its issuance, and acknowledge that the Discharger's past sludge management and disposal practices may have degraded and continue to degrade groundwater for waste constituents derived from sludge. These include nitrogen (nitrate, TKN, ammonia); organic carbon; organic carbon decomposition by-products (namely alkalinity and hardness, which contribute to overall salinity, as well as dissolved iron, manganese, and arsenic); and potentially trace metals.

Finding 19 appears to incorrectly refer to the Discharger's RWD submitted on 23 May 2019 as the "August 2019 RWD."

Finding 23 concerns the Discharger's Industrial Pretreatment Program and states, in part, that the "Central Valley Water Board finds this program is adequate to meet the Facility's needs." The Discharger's pretreatment program was inspected in 2011 and 2021, according

to information in the California Integrated Water Quality System (CIWQS). CIWQS posts the 2011 pretreatment inspection report (Pretreatment Compliance Inspection Summary Report, City of Madera, WDR Order No. 95-046, Madera County. Inspected 25 April 2011 by I-Hsin Lee, Tetra Tech, Inc.). This report provides a summary of program deficiencies and recommendations. CIWQS does not post the 2021 pretreatment inspection report, which may have described corrective measures taken by the Discharger to address the deficiencies identified in 2011. Please revise the Tentative Order to include a brief summary of the Discharger's progress in addressing the program deficiencies identified in 2011, and identify any additional deficiencies observed in 2021.

Finding 31 indicates the Discharger's groundwater monitoring well network consists of eight wells and states, in part, that "MW-02 was lost/destroyed due to farming operations and can no longer be located by the Discharger." Because the word "destroyed" has a specific legal meaning when applied to groundwater wells, please consider revising to read: "MW-02 was ~~lost/destroyed due to~~ *damaged by* farming operations and can no longer be located by the Discharger."

Finding 32 attributes receding groundwater levels to explain a three-year gap in groundwater monitoring data from 2017 to 2020 for all wells except MW-01, next to the southern boundary of Pond 9S. In 2021, groundwater levels rose sufficiently to allow for the collection of samples from four wells, all in close proximity to ponds. The Current Order's MRP requires groundwater monitoring to be performed monthly for total coliform organisms; quarterly for EC, pH, Standard Minerals, and Total Nitrogen; and semi-annually for metals. Table 7 in Finding 32 summarizes data obtained in 2021 for four wells for salinity and salinity constituents, nitrate and TKN, dissolved iron, dissolved manganese, and arsenic. Because of the history of sludge discharges to ponds, this finding should also include the 2021 semi-annual monitoring results for the other 11 trace metals required in the Current Order's MRP.

As mentioned earlier, the Tentative Order cites receding groundwater levels for the Discharger's recent inability to sample most wells, including the sole upgradient well in the groundwater monitoring well network. Because the Tentative Order does not evaluate data obtained prior to 2021, it effectively dismisses as irrelevant a large groundwater monitoring data base assembled by the Discharger at, no doubt, considerable expense. The Facility is a major POTW, and its discharge operation represents a major contributor of waste constituents to groundwater. The Tentative Order's groundwater characterization should be based on a larger sample of groundwater data, even if it is pockmarked by gaps. And, it should summarize monitoring results for trace metals (required semi-annually) because of the Discharger's past sludge management and disposal practices.

In summary, the Tentative Order's groundwater characterization is unusually superficial for a discharge of this size. Even if there are gaps in monitoring data, the Tentative Order should include data obtained prior to 2021 and summarize evaluations of data trends. Please revise the Tentative Order to present a more fulsome characterization of groundwater conditions.

Finding 34 discloses elevated concentrations of salinity and nitrate in groundwater passing under and beyond effluent disposal ponds, but does not attribute them to the discharge due to the apparent lack of recent data on upgradient groundwater conditions. The finding concludes, "Therefore, it is unclear if the elevated nitrate and salinity contributions are the result of the Facility's discharge or surrounding activities (e.g., farming)."

As mentioned earlier, the discharge's hydraulic loading (over 60 feet/year) represents a major source of groundwater recharge. Groundwater passing through shallow monitoring wells immediately adjacent to the ponds is dominated by percolated effluent and likely contains waste constituents derived from past sludge discharges. While farming is significant non-point source of salinity and nitrate in groundwater, there is sufficient evidence to attribute to the apparent salinity and nitrate degradation of groundwater to the Facility's effluent disposal operation.

Please revise the Tentative Order to acknowledge: (1) the Discharger's effluent disposal operation is largely responsible for the elevated levels of waste constituents in shallow groundwater beneath and immediately downgradient of ponds; and (2) additional sources of waste constituents include the Discharger's past practices of reclaiming effluent on crops grown in ponds, applying Facility sludge to ponds for use as a soil amendment, and, because it lacked sufficient sludge dewatering capacity, discharging digested sludge directly to ponds, even when in service for effluent disposal.

Finding 35 describes work underway to install new, deeper groundwater monitoring wells to replace wells that have gone dry. Please confirm whether the new upgradient monitoring well (MW-09) is adequately distant from the groundwater mound created by the discharge to be unaffected by percolated effluent. If appropriate, please consider requesting the Discharger to perform a groundwater mounding analysis to confirm whether the new upgradient well is placed sufficiently distant from the groundwater mound created by the discharge. Also, please confirm whether the network is sufficient to monitor groundwater affected by past sludge discharges to Pond 1S, as mentioned in the staff memorandum cited earlier.

Finding 61 lists BPTC measures as including offsite transport and disposal of sludge/biosolids. Please revise this list to add mechanical sludge dewatering, as this is a major BPTC measure (kudos to the City!). And, please confirm that the centrifuge's high-strength liquid waste stream (centrate) is directed back to the treatment works. ATTACHMENT C—FLOW SCHEMATIC, does not depict centrate, nor does it depict digester supernatant (or stormwater—more on this later). Please revise Attachment C to include centrate and supernatant flows, as well as septage flows from the septage receiving station.

Finding 67 concerns stormwater discharges and states all Facility stormwater is collected and sent "directly to the headworks." The finding cites City staff for this information. Has Board staff confirmed the accuracy of this information? Please include in the Response to Comments confirmation by staff that all of the Facility's stormwater is collected and

directed to the headworks. And, please revise ATTACHMENT C—FLOW SCHEMATIC to include stormwater flow to the headworks.

Immediately north of the treatment works is a 5-acre surface impoundment. Google Earth imagery after 2009 shows it equipped with what appears to be a lined inlet channel and an outlet structure. And, images taken during the rainy season shows it appearing moist and green, suggesting sufficient water available to support plant life. What is the function of this surface impoundment? Emergency storage of bypassed wastewater flows? Stormwater disposal? Please revise the Tentative Order to describe the function of this impoundment, and revise ATTACHMENT B—FACILITY MAP accordingly.

Discharge Prohibitions B.4 and B.6 refer to "treatment ponds" and "evaporation/storage ponds." Do the "treatment ponds" refer to the Facility's oxidation ditches? If so, consider using the term, "oxidation ditches." And, since elsewhere the Tentative Order refers to effluent disposal ponds as "evaporation/percolation ponds," this term should be used in Discharge Prohibition B.6.

Effluent Limitation D.1 for 10 mg/L total nitrogen is expressed as an annual average. The Tentative MRP requires twice monthly sampling for effluent nitrogen species (nitrate, nitrite, TKN), quarterly reporting of each month's calculated 12-month rolling average total nitrogen effluent concentration, and yearly evaluation of the Discharger's compliance with the annual average total nitrogen effluent limitation.

For comparison, the recently-adopted NPDES permit for the City of Chico Water Pollution Control Plant also contains a 10 mg/L total nitrogen limitation for effluent discharges to land. Chico's permit authorizes a discharge of up to 2.5 mgd to unlined ponds and constructed wetlands. Its accompanying MRP requires weekly monitoring of total nitrogen in effluent discharged to land. Chico's discharge situation features shallow groundwater that has been significantly impacted by the discharge's organic and nitrogen overloading.

The Tentative Order's annual average effluent limitation for total nitrogen is not adequately protective of groundwater given the discharge's hydraulic loading (over 60 feet/year) and evidence that groundwater already contains nitrate-nitrogen exceeding the water quality objective of 10 mg/L.

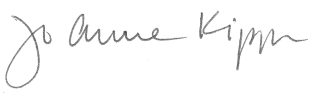
Please revise the Tentative Order to change the effluent limitation of 10 mg/L total nitrogen from an annual to a monthly average. If staff rejects this recommendation, please include in the Response to Comments an assessment of how the Tentative Order's effluent limitation and monitoring requirements for total nitrogen compare to other similarly situated POTWS with the same numerical limit. Please do not dismiss this request with a short response that each discharge situation is different. This is an issue of consistency and fairness within the Central Valley Region. In the event staff reckons that there is sufficient unsaturated soil depth to justify use of an annual average effluent limitation for total nitrogen, please revise the Tentative Order to require compliance with the annual average limitation be determined monthly based on a 12-month rolling average.

The Tentative MRP requires influent monitoring for pH based on 24-hr Composite samples. Isn't it typical for influent pH to be monitored either continuously or by grab samples?

The Current Order's MRP requires semi-annual groundwater monitoring for metals (aluminum, arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc). The Tentative Order also requires semi-annual groundwater monitoring for most of these metals, with the exception of barium, chromium, lead, mercury, nickel, and selenium. Please provide a technical justification for removing these constituents from the suite of constituents monitored in groundwater wells.

And, please consider adding quarterly groundwater monitoring for total organic carbon, as this constituent is extremely useful for evaluating the extent to which the discharge may be causing anoxic conditions in groundwater. These conditions, induced by organic overloading, appear to exist in effluent-dominated groundwater judging from manganese concentrations in MW-06 and MW-07 exceeding the water quality objective.

Thank you for the opportunity to submit these comments.



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