Appendix E - Response to External Peer Review Comments

RESPONSE TO PEER REVIEW COMMENTS

Amendment to the Water Quality Control Plan for the Tulare Lake Basin to Remove the Municipal and Domestic Supply (MUN) and Agricultural Supply (AGR) Beneficial Uses from Groundwater Within a Designated Horizontal and Vertical Area Within and Surrounding the Administrative Boundaries of the South Belridge, Monument Junction and Cymric Oil Fields in Kern County Near McKittrick, California

The Central Valley Regional Water Quality Control Board (the Board) developed a proposed amendment to the *Water Quality Control Plan for the Tulare Lake Basin* (Basin Plan) to remove the Municipal and Domestic Supply (MUN) and Agricultural Supply (AGR) beneficial uses from groundwater within a designated horizontal and vertical area in Kern County California near the unincorporated community of McKittrick (Basin Plan Amendment). A public scoping meeting to gather information for the project regarding California Environmental Quality Act (CEQA) impacts was conducted by Board staff on 25 May 2023 in Buttonwillow, California.

Board staff prepared an initial Draft Staff Report (dated September 2024) detailing the proposed Basin Plan Amendment. The proposed Basin Plan Amendment has the following elements:

1. A proposal to de-designate the MUN beneficial use in the groundwater for a defined horizontal and vertical extent within the evaluated Project Area. The dimensions of this extent are detailed in the Draft Staff Report as the Revised Project Zone.
2. A proposal to de-designate the AGR beneficial use in the groundwater for a defined horizontal and vertical extent within the evaluated Project Area. The dimensions of this extent are detailed in the Draft Staff Report as the Revised Project Zone.
3. A proposal to use 5,000 mg/L (milligrams per liter) Total Dissolved Solids (TDS) as the salinity threshold concentration to de-designate the AGR beneficial use in the groundwater of the Revised Project Zone.

Health and Safety Code section 57004 requires external scientific peer review for certain water quality control policies. On 27 September 2024, Board staff submitted an External Peer Review Request Letter requesting an External Peer Review of this Draft

Staff Report to the State Water Resources Control Board External Peer Review Office (Peer Review Office). After Board staff completed revisions to the Peer Review Request Letter that were requested by the Peer Review Office, the revised Peer Review Request Letter regarding this Draft Staff Report was submitted to the Peer Review Office on 8 November 2024.

The peer reviewer's responsibility is to determine whether the scientific findings, conclusions, and assumptions are based upon sound scientific knowledge, methods, and practices. No person may serve as an external scientific peer reviewer if that person participated in the development of the scientific basis or scientific portion of the proposed rule, regulation, or policy. Four independent peer reviewers were selected by the Peer Review Office to review the Draft Staff Report. On 26 March 2025, the External Peer Review was initiated by the Peer Review Office for these four Reviewers. The four peer reviewers were provided the September 2024 Draft Staff Report, the supporting references for the Draft Staff Report, and instructions to focus the review efforts.

The peer reviewers were asked to provide their scientific review and comment on specific conclusions from the Draft Staff Report related to their individual expertise, and to evaluate if those conclusions were scientifically sound. Peer reviewers evaluated only the conclusions that they had the appropriate expertise to review (listed below).

Below are the six conclusions:

1. **Conclusion #1:** Based on the available data, the scientific assumptions, findings, and conclusions regarding the subsurface hydrology, geology, and Corcoran Clay Equivalent in the Project Zone are scientifically reasonable and defensible.

2. **Conclusion #2:** Based on the available data, the scientific assumptions, findings, and conclusions regarding the quality of the groundwater in the Project Zone are scientifically reasonable and defensible.

3. **Conclusion #3:** Based on the available data, the scientific assumptions, findings, and conclusions regarding the proposed horizontal and vertical boundaries for de-designating the MUN beneficial use of groundwater in the Proposed Basin Plan Amendment Revised Project Zone are scientifically reasonable and defensible interpretations of the subsurface geology, hydrology, and water quality conditions in the Project Zone, and therefore the MUN de-designation determination is scientifically reasonable and defensible.

4. **Conclusion #4:** Based on the available data, the scientific assumptions, findings, and conclusions regarding the determination to use 5,000 mg/L TDS as a salinity threshold concentration to evaluate AGR de-designation in the groundwater of the Project Zone is scientifically reasonable and defensible.

5. **Conclusion #5**: Based on the available data, the scientific assumptions, findings, and conclusions regarding the proposed horizontal and vertical boundaries for de-designating the AGR beneficial uses of groundwater in the Proposed Basin Plan Amendment Revised Project Zone are scientifically reasonable and defensible interpretations of the subsurface geology, hydrology, and water quality conditions in the Project Zone, and therefore the AGR de-designation determination is scientifically reasonable and defensible.

6. **Conclusion #6**: Based on the available data, and taken as a whole, the scientific assumptions, findings, and conclusions in regard to the scientific portions of the Proposed Basin Plan Amendment are based upon sound scientific knowledge, methods, and practices.

The information, expertise, and the evaluated conclusions for each peer reviewer are listed here:

1. Reviewer #1:
    a. Name: J. Jaime Gómez-Hernández, Ph. D.
    b. Current Profession: Professor, Technical University of Valencia, Spain Institute of Water and Environmental Engineering
    c. Expertise: Subsurface Hydrology
    d. Evaluated: Conclusions 1, 2, 3, 4, 5, and 6
2. Reviewer #2:
    a. Name: Alberto Bellin
    b. Current Profession: Professor, University of Trento, Italy, Department of Civil, Environmental and Mechanical Engineering
    c. Expertise: Subsurface Hydrology
    d. Evaluated: Conclusions 1, 2, 3, and 6
3. Reviewer #3:
    a. Name: Dr. L. Allen Pettey
    b. Current Profession: Assistant Professor, Department of Animal Science, University of California Davis
    c. Expertise: Livestock/Animal Scientist
    d. Evaluated: Conclusions 2, 4, 5, and 6
4. Reviewer #4:
    a. Name: Dr. Isaya Kisekka
    b. Current Profession: Professor of Hydrology and Agricultural Water Management, Department of Land, Air, and Water Resources, Department of Biological and Agricultural Engineering University of California, Davis
    c. Expertise: Subsurface Hydrology, Agronomy
    d. Evaluated: Conclusions 1, 2, 4, 5, and 6

In early May 2025, Board staff received all four of the peer reviewer reports from the Peer Review Office. Board staff reviewed these reports and submitted clarification questions for three of the peer reviewers to the Peer Review Office. On 19 June 2025 Board staff received the final External Peer Review reports from the Peer Review Office. The Board appreciates the thoughtful reviews provided by these scientific peer reviews.

Upon review of the clarified, final External Peer Review Reports, the Board staff developed comments in response to the External Peer Review report comments where Board staff felt additional clarification was necessary. These comments and the Board staff responses are listed below.

Please note that Board staff paraphrased the peer reviewers' comments below for conciseness. For the full comments of the peer reviewers please see the final External Peer Review Reports included at the end of this Appendix E within the final External Peer Review packet. Staff are not responding to all comments but acknowledge the comments of Reviewer #1 regarding Conclusion #4, Reviewer #3 regarding Conclusions #5 and #6, and comments of Reviewer #4 regarding Conclusions #1, 2, 4, 5, and 6, where the reviews found that the conclusions were scientifically reasonable and defensible.

Board Staff Responses To External Peer Review Comments That Do Not Support Conclusions in The Draft Staff Report

Reviewer #1 Comments:

1. Comment #1: Conclusion #1, Reviewer #1

The conclusion that the Corcoran Clay Equivalent (CCE) clay layer in the Project Zone can act as a barrier to prevent water migration from the alluvium into the Upper Tulare Formation is not fully supported either by the reports or by the available data.

In a fluvial depositional environment, heterogeneity in the sediments may be present, cutting across the CCE and providing preferential pathways for water migration from the alluvium downwards. The Valley Water Management Company (Valley Water) hydrogeologic reports imply that there has been downward migration of produced wastewater and a wastewater plume has migrated from beneath the Valley Water facility into the alluvium, through the CCE, and into the Upper Tulare Formation sediments. This potential lack of full containment of the CCE may explain the high values of total dissolved solids (TDS) observed in the Upper Tulare Formation and shown in Figure 2

of the Draft Staff Report. It is not enough to say that there are not enough samples in the Tulare Formation to justify its inclusion in the de-designated area.

Board Staff Response:

Board staff agree that alluvial environments can result in unsorted sediments that tend to be highly permeable. Alluvial environments also tend to include the occasional ephemeral stream, which can cut through previously deposited sediments, creating preferential pathways for water flow (including, at times, groundwater). Reviewer #1 suggests that this occurs in the Project Area, compromising the CCE.

Indeed, there are areas, especially close to the coast range, where the CCE thins or pinches out, or is cut through by fluvial facies. However, Board staff did not find evidence that any of those are occurring in the sediments underlying the Project Area. The CCE, which represents a change in depositional environment, is different from the alluvial fan deposition observed in the youngest sediments within the Project Area, where only relatively thin strands of clay are observed in the shallow subsurface. Within the Project Area, the CCE is laterally continuous and confining to semi-confining. In addition, logs from wells near the Project Area clearly show the presence of a clay layer (which Board staff interpret to be the CCE). This is in alignment with a USGS model of the Project Area, as referenced above, and in the Draft Staff Report.

Reviewer #1 states that the high TDS samples taken from the wells evaluated for the Draft Staff Report show that the CCE is compromised in the Project Zone. However, the data in the Draft Staff Report clearly show a major change in TDS values in wells situated in the Tulare Formation when compared to the alluvium, by order of magnitude (see Figures 2 and 3 of the Draft Staff Report). The high TDS in the Tulare Formation referred to in Reviewer #1's comment approaches 5,000 mg/L (where there is data), which is within expected values for the Tulare Formation. However, the groundwater wells are situated in the alluvium, and samples from those wells have TDS values that exceed 16,000 mg/L. Board staff find that the best explanation for this difference in TDS values between the Tulare Formation and the alluvium is the presence of a confining layer (i.e., the CCE), separating the two aquifers, the shallowest of which has been impacted by wastewater from Valley Water's facility. In addition, the wastewater appears to have traveled over a horizontal distance of more than three miles (i.e., 15,000 feet) since the discharge began in 1960. However, the vertical distance appears to have been much less (i.e., a few hundred feet). Percolation time alone does not explain the data discrepancy between the vertical and horizontal movement. A semi-confining or confining layer that restricts or impedes the discharge would explain why the discharge has moved so far horizontally, but not vertically and is confirmed by the data as described above.

2. Comment #2: Conclusion #2, Reviewer #1

The decision to exclude the Tulare Formation from the Revised Project Zone because the quality of the water in the formation cannot be assessed, given the small number of samples, is not defensible. There are two main reasons against this decision. The first one is that, even though there are few measurements, out of the seven measurements, all but one are above or very close to the 3,000 mg/L threshold; this exceedance occurring in most wells should raise the concern that maybe the Tulare Formation is also affected by high TDS concentrations. The second one is that there seems to be evidence of wastewater downward migration beyond the CCE formation.

Board Staff Response:

See the Board Staff Response to Comment Number 1 regarding the migration of wastewater beyond the CCE. Board staff agree that the water sampled in the wells situated in Tulare Formation approaches and even exceeds 3,000 mg/L in TDS. However, the top of the Tulare Formation is encountered at approximately 300 ft bgs and extends to a depth of approximately 1,630 ft bgs. The deepest groundwater monitoring well within the Project Zone is completed to a total depth of 490 ft bgs in the Tulare Formation, leaving the majority of the Tulare Formation unsampled. Board staff's decision to exclude the Tulare Formation is due to the limited groundwater quality data available to evaluate the entire vertical extent of the Tulare Formation and was not based solely on the number of samples available. In order to include the Tulare Formation in the Basin Plan Amendment, the Regional Board would need more rigorous data for the entire vertical extent of the Tulare Formation. Without that data, the Regional Board does not have the evidence necessary to demonstrate that the Tulare Formation meets one of the Basin Plan's criteria for de-designation of the MUN beneficial use and cannot include it in this Basin Plan Amendment.

3. Comment #3: Conclusion #2, Reviewer #1

It is not defensible to base the vertical boundary on the containment characteristics of the CCE formation. It appears that the CCE is permeable below the Valley Water facility, given that a waste plume has migrated beneath the CCE. Therefore, the CCE should not be used as a vertical boundary.

Regarding the horizontal boundaries in Figure 2 of the Draft Staff Report, the shape of the red-shaded area seems to be a little bit artificial, given that the groundwater moves from the McKittrick facilities 1 & 1-3 towards the northeast. There is a very high chance of having high TDS concentrations to the east of the facility, and probably north of McKittrick 1-1 as well.

Board Staff Response:

Reviewer #1 appears to suggest that areas outside of the Revised Project Area be de-designated for MUN and AGR beneficial uses. As discussed above, the Regional Board needs sufficient evidence to demonstrate that the groundwater meets one of the Basin Plan's criteria for de-designation of the MUN beneficial use in order to propose de-designation of that groundwater. The boundaries described in the Draft Staff Report are being proposed based on the data that is available and known characteristics of the aquifers considered for the amendment. De-designation outside of areas where there are data to support de-designation (for either horizontal or vertical de-designation), would not be in alignment with the Basin Plan.

4. Comment #4: Conclusion #3, Reviewer #1

Reviewer #1 reports that their statements could be better supported with a local numerical model that could evaluate the extent of the plume and its migration speed.

Board Staff Response:

Valley Water provided the Board with a Power Point presentation that discusses such a model, which is available to the public through the GeoTracker database. It should be noted that during a meeting with Valley Water, Board staff informed Valley Water that the model does not take into account all wells impacted by the discharge, and therefore is not a reliable model. Valley Water has not provided an updated model. If Valley Water or another group provides an updated model, Board staff will consider the updated model as part of the basin plan amendment for de-designation of the MUN and AGR beneficial uses in the Tulare Basin currently under development.

5. Comment #5: Conclusion #5, Reviewer #1

It is not scientifically reasonable to exclude the area below the CCE from the de-designated zone. Additionally, the area to the east of the McKittrick 1 & 1-3 facility (highlighted in green in a figure provided by Reviewer #1) should be included in the de-designation zone since it is very likely to have high TDS concentrations considering the groundwater flow direction in the alluvium.

Board Staff Response:

See Board Staff Response to Comment Numbers 1, 2, and 3.

6. Comment #6: Conclusion #6, Reviewer #1

The proposed basin plan amendment is not based on sound scientific knowledge methods and practices for the reasons stated above.

Board Staff Response:

Board staff disagree with Reviewer #1 for reasons described in Board staff's responses to Comment Numbers 1, 2, and 3.

Reviewer #2 Comments:

7. Comment #7: Conclusion #1, Reviewer #2

Conclusion #1 assumes that the Corcoran Clay Equivalent (CCE) layer is continuous in the project area and with a hydraulic conductivity sufficiently low enough to separate the unit called alluvium from the Tulare aquifer, which are therefore assumed to behave as two separate hydrogeological units. This separation is not a certainty based on the information that can be extracted from previous works.

Gillespie et al. (2019) indicates that the confining capability of the clay layers varies in space as their continuity, discontinuous at the Southern Belridge Oil field and that the hydrogeological unit called alluvium is in connection with the Tulare formation. The geological and stratigraphy analysis proposed in Gillespie et al. (2019) concurs with previous geological studies of the Central Valley geology. Given that the confining capability of the clay layers varies in space as their continuity, an analysis conducted north of the Project Area cannot be used to safely conclude that the CCE layer separates the two hydrogeological units.

Additionally, Gillespie et al. (2019) evidenced that the alluvium and the underlying Tulare formation developed in similar depositional environments alternating fluvial and lacustrine deposition, which generated discontinuous low-conductivity facies that potentially may promote the development of local confined aquifers. In particular, the facies called CCE, to which the report attributes confining capacity in the Project Area, is of difficult identification, and at least in the Southern Oil field area, does not protect the underlying upper Tulare formation from infiltration from the alluvium.

Therefore, the evidence does not fully support the conclusion that the CCE "*acts as a confining layer*" and that "*due to this confining layer, oil field produced wastewater discharged to the surface of the Revised Project Area is not expected to migrate into the Tulare Formation, as the Corcoran Clay Equivalent provides a vertical barrier*".

Also, concentration measurements from wells screened in the Upper and Lower Tulare formations downstream of the McKittrick 1 & 1-3 infiltration ponds, available in the GeoTracker database, confirm the presence of wastewater discharged in the infiltration ponds, as discussed in the comments to Conclusion #2.

Board Staff Response:

Board staff agree that the alluvium and Tulare Formation were deposited in similar environments, and that in some places in the Central Valley, it can be difficult to differentiate between them. As Reviewer #2 points out, the Project Area depositional environments generate at times semi-permeable to impermeable layers, as well as heterogenous layers, which are quite permeable.

As Reviewer #2 also points out, Gillespie et al. (2019) state, *The Tulare Formation and overlying alluvium also include lacustrine clays, which form confining beds.* Where it is present, the CCE provides a confining layer (as stated in work by Gillespie et al. and other sources). As described in the Board Staff Response to Comment Number 1, Board staff believe that the CCE is present in the Project Area, and that the CCE explains the difference between the quality of the groundwater between the alluvium and Tulare Formation. In addition, logs from wells near the Project Area clearly show the presence of a clay layer (which Board staff interpret to be the CCE). This is in alignment with the USGS geologic model of the Project Area, as referenced above and in the Draft Staff Report. Reviewer #2 also points out that wells downgradient of the Valley Water facility appears to have been impacted by discharges of wastewater, as evidenced in logs measuring SP and resistivity. Board staff agree that there is evidence of wastewater impacts in the groundwater downgradient of the Valley Water facility, which is why wells were emplaced and why they are monitored. However, as discussed in the Board Staff Response to Comment Number 4, Board staff disagree with the modeling conducted for Valley Water which concluded that the impacted wells are sourcing groundwater from the Tulare Formation.

Board staff believe that the USGS modeling (which uses more data points and is more consistent with interpretations made by oil and gas operators in the area) is the appropriate model to use as it is more accurate. This model is in alignment with observations made in well logs from near the Project Area and is the basis for decisions made when establishing the Revised Project Area (see the Type Log in the Draft Staff Report). The USGS modeling shows that the alluvium continues much deeper than the modeling conducted for Valley Water. The alluvium is underlain by a distinct confining layer (i.e., the CCE) which represents a change in depositional environment from the alluvium, as it is thicker and appears to be continuous within the Project Area, whereas other thinner clays do not.

8. Comment #8: Conclusion #2, Reviewer #2

The following comments assume 3,000 mg/l and 5,000 mg/l as a reference TDS concentration for MUN and AGR beneficial use de-designation, respectively. This review considered all of the available TDS concentrations included in the review documents as well as those in the GeoTracker database for wells up and downstream

from the McKittrick facility in the Project Area. The concentration data from GeoTracker (shown in Attachments 1 and 2 from Reviewer #2's report) support the conclusion that the high salinity water discharged into the McKittrick 1 & 1-3 pond reached both the Upper and Lower Tulare formation downstream from the McKittrick 1 & 1-3 facility in the Project Area.

The wells located downstream of the facility and screened in the Upper Tulare formation show TDS concentrations larger than 10,000 mg/l, with maximum values between 12,000-18,000 mg/l. These values are lower, but comparable with the TDS concentration of the discharge's wastewater observed between 11,000-26,000 mg/l.

Wells screened in the Lower Tulare formation showed lower TDS concentrations, but still significantly higher than the MUN limit of 3,000 mg/l, with most higher than the AGR limit of 5,000 mg/l.

The data is in agreement with Figures 2 and 3 of the Draft Staff Report, but with the important difference that the concentrations measured at the more surficial wells are attributed to the Alluvium (Figure 2) instead of the Upper Tulare Formation, and the deeper wells to the Upper Tulare Formation (Figure 3) instead of the Lower Tulare formation. This is important because the alluvium is supposed to be separated from the Upper Tulare formation by the CCE layer.

Conclusion #1 states that the CCE layer between the Alluvium and the Upper Tulare formation provides a barrier to the propagation of the discharged water into the Tulare formation. Based on the information above, this appears not to be the case because the Upper Tulare formation appears contaminated by the discharged water.

Additionally, some of the data reviewed (file 10_CDO R5-2019-0045.pdf in the material provided for the review, also in GeoTracker) indicates that the water sampled from wells screened in the Upper Tulare formation shows an isotopic signature that is closer to the water discharged to the McKittrick facility 1 &1-3 pond than the natural groundwater. The isotopic signature of the water sampled from the wells screened in the Lower Tulare formation is intermediate because of mixing with the natural groundwater.

Similar conclusions can be drawn from Sodium, Calcium Sulfate, and Chloride concentrations in the water. While natural groundwater is rich in Sodium, Calcium, and Sulfate, the sampled water is richer in Sodium and Chloride, as is the discharged wastewater in the McKittrick facility infiltration ponds. Similarly to the isotopic signature, the differences between the two waters are higher in the shallower wells, thereby providing further evidence that the origin is the discharged water.

Note that this report refers to the same wells reviewed for these comments and places their location in the Upper and Lower Tulare formations and not in the Alluvium and the Upper Tulare formation as in the Draft Staff Report under review.

Board Staff Response:

Board staff agree that there are measurable impacts from wastewater in wells downgradient of the Valley Water facility, but do not agree that the impacted wells are situated in the Tulare Formation (see Board Staff Response to Comment Numbers 2 and 4 above). The Draft Staff Report for the Cleanup and Abatement Order mentioned above utilizes modeling conducted on behalf of Valley Water. For reasons listed above in Comment Number 7, for this Basin Plan Amendment, Board staff utilized modeling conducted by the USGS, which places the impacted wells in the alluvium. This better explains the clear presence of two distinct aquifers (where data is available). While the shallower aquifer shows signs of wastewater impacts, the deeper aquifer does not and instead appears to contain groundwater with TDS values consistent with native groundwater of the Tulare Formation.

9. Comment #9: Conclusion #3, Reviewer #2

The criterion adopted in the Draft Staff Report is to delineate the de-designation zone based on available data. However, all the observation wells show the presence of the wastewater discharged into the McKittrick facility 1 & 1-3 ponds, which is mixed in different proportions with natural groundwater. In the Upper Tulare Formation (indicated as alluvium in the Draft Staff Report), the TDS concentration, as well as hydrogeochemical and isotopic characteristics, are similar to those of the discharged water. The TDS concentration of the discharged water varies between 11,000- to 26,000 mg/l, while GeoTracker reports TDS concentrations in the range of 11,000 to 18,000 mg/l in wells screened in the Upper Tulare Formation. In the Lower Tulare Formation, the TDS concentration is about half of the concentration in the Upper Tulare Formation and declines slightly with the distance from the infiltration facility.

Despite this reduction, the concentration at the northwest limit of the area (close to the Clean Harbors facility) is higher than the limit of 3,000 mg/l. Consequently, it remains uncertain if the “plume” extends outside the area identified for de-designation of the MUN protected uses. The conclusion #2 indicates that the de-designation zone should extend vertically down with the limit of 3,000 mg/l. This is sound, provided that the inconsistency described in my comments on conclusion #2 is resolved.

Extension of the monitoring northwest of the Clean Harbors facility is recommended to gain more insight about the propagation of the contamination. At the same time, the development of a groundwater model could be helpful in assessing future scenarios of the area, including the estimation of the possible extension of the contamination outside the monitored area.

Board Staff Response:

See Board Staff Responses above, including for Comment Numbers 1, 3, and 7. Any data collection or modeling efforts done by Valley Water or other groups will be reviewed as part of the upcoming basin plan amendment for de-designation of the MUN and AGR beneficial uses in the Tulare Basin currently under development.

10. Comment #10: Conclusion #5, Reviewer #2

Reviewer #2 cannot comment on the adopted limit of 5,000 mg/l for the AGR beneficial uses. Concerning the reduction of the de-designation zone for this use, the zone that remains protected for AGR beneficial uses (but not for MUN beneficial uses) includes the Clean Harbors facility and an area external to it without observation wells. The closest wells show TDS concentrations larger than 5,000 mg/l. Based on the data, and assuming the limit of 5,000 mg/l is valid, the restriction of the de-designation zone for AGR beneficial uses is scientifically reasonable and a defensible interpretation of the available data and geological information. The recommended extension of the monitoring zone and the development of a groundwater model could also provide important insights for the AGR beneficial uses.

Board Staff Response:

See Board Staff Responses above regarding the need for sufficient data to propose de-designation of the beneficial use under the Basin Plan. Like the MUN beneficial use, the Basin Plan contains criteria that must be considered in the de-designation of the AGR beneficial use.

Reviewer #3 Comments:

11. Comment #12: Conclusions #2, Reviewer #3

This conclusion is true, but the data needed to fully assess the quality of the groundwater may be incomplete. TDS is a common measurement of water quality used to determine its ability to support livestock animals, but there are further qualities (nitrates, sulfates, alkalinity) that can also further confirm the suitability of a water source to support livestock health and production.

Board Staff Response:

Board staff agree that there could be other constituents considered when evaluating water for AGR beneficial uses, particularly livestock watering. However, consideration of other potential water quality characteristics would take additional scientific review that

would extend the time necessary to complete the Basin Plan Amendment. The Board is under a Writ of Mandate in the case of *Valley Water Management Company v. California Regional Water Quality Control Board, Central Valley Region* (Kern County Superior Court Case No. BCV-19-101750) to bring this Basin Plan Amendment to the Central Valley Water Board for their consideration by December 2025, and so is focusing on the salinity criteria for both the MUN and AGR beneficial uses for the proposed de-designation areas. Other water quality characteristics, particularly boron, may be considered for the proposed de-designation area in an upcoming basin plan amendment for de-designation of the MUN and AGR beneficial uses in the Tulare Basin currently under development.

12. Comment #13: Conclusions #4, Reviewer #3

For specific species or production stages of livestock, the level of 5,000 mg/L TDS as a threshold is reasonable. Most non-ruminant species of livestock (poultry, swine) cannot tolerate TDS higher than 5,000 mg/L, yet grazing species (goats, cattle, sheep) have been known to maintain health and production when drinking from a water source with much higher TDS levels (up to 9,000 mg/L) for a relatively short period of time. The level of 5,000 mg/L TDS is reasonable as a threshold for long-term housing of all types of animals that may be reproducing, which would have extended consumption of water at these levels of TDS.

Board Staff Response:

In the absence of an established salinity water quality objective for the protection of the AGR beneficial use, the Board relies upon scientific literature to provide salinity threshold concentrations that are generally considered to be protective of AGR beneficial uses. For both livestock watering and irrigation, the literature supports a salinity value of 5,000 mg/L TDS as a general threshold.

Reviewer #3 points out that levels of up to 4,000- 5,000 mg/L appear to be ideal for watering many animal types (e.g., poultry and cattle), which is in alignment with much of the literature. There are circumstances in the literature where higher (or lower) TDS water can be used for agricultural purposes, but those instances appear to be special circumstances, or short-term uses, and not a salinity threshold applicable for long-term or general use.

Therefore, 5,000 mg/L TDS has been selected as a conservative and appropriate general salinity threshold for the AGR beneficial use for this Basin Plan Amendment.