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Comments— Tentative WDR Order for Bronco Wine Company, Bronco Winery, Stanislaus County

This letter presents my comments on the subject tentative Waste Discharge Requirements (WDR) Order issued 3 November 2023. The Tentative Order, like its predecessor circulated on 4 June 2020, proposes to update and rescind WDR Order 96-247 for Bronco Wine Company, Inc. (Current Order). I submitted comments on the previous version of the Tentative Order by letter dated 6 August 2020. The introductory paragraphs of my 6 August 2020 letter are relevant today as they were then:

> The Bronco Wine Company's facility south of Ceres…has played a significant role in field studies sponsored by the Wine Institute. This study collected a suite of analytical data on soil, soil pore water, and groundwater at this facility. The manner in which Bronco Wine Company (Bronco) has historically discharged winery waste to land (rapid infiltration basins) and the elevated salinity concentrations in groundwater underlying Bronco's discharge operation compared to background has long been a concern to me. It is not often that the Board updates the Waste Discharge Requirements Order for a major winery, and it is important that the Tentative Order reflects the most up-to-date understanding of the discharge's groundwater impacts….
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> I am a resident of Fresno County and a California registered civil engineer with 12 years' experience working for the Central Valley Regional Water Quality Control Board (CVRWQB or Region 5). During my employment from February 1998 through December 2010 in Region 5's Fresno Office, I worked primarily in the WDR regulatory program. As a result, I was fortunate to have gained expertise in evaluating the effects to soil and groundwater from discharges of food processing and winery wastewater to land for treatment and disposal. As part of my regulatory duties, I served on the BOD Loading Rate subcommittee that prioritized and defined the revisions to the 2006 version of the 2007 *Manual of Good Practice for Land Application of Food Processing/Rinse Water* prepared for the California League of Food Processors by Brown and Caldwell and Kennedy/Jenks Consultants (CLFP Manual).[1] I also prepared technical commentary to Region 5 management on documents proposing and then describing the results of field studies conducted on the land application of winery wastewater sponsored by the Wine Institute and

[1] Available at:
http://clfp.com/wp-content/uploads/CLFP-Manual_COMPLETE_FINAL_3-14-07-2-1.pdf

> performed by Kennedy/Jenks Consultants. This work is cited or otherwise appears in the 2009 *Comprehensive Guide to Sustainable Management of Winery Water and Associated Energy* prepared by Kennedy/Jenks Consultants for the Wine Institute (Wine Institute Guide).[2]

Preface. Over the 13 years since retirement from state service, I have submitted comments on many tentative WDR orders for industrial and municipal dischargers in the Central Valley with land discharge operations. I also submitted a comment letter on the Statewide General Winery Order (Order WQ 2021-0002-DWQ), which the State Water Resources Control Board adopted on 20 January 2021. I am aware of the limited resources allocated to staff and the difficulties they face in preparing updated tentative WDR orders for challenging discharge situations. I appreciate the effort staff and management spend on reviewing and responding to my comments. My objective in this letter, as in my previous letters, is to persuade staff to revise the Tentative Order so that the Board and public can have reasonable confidence that it accurately characterizes the discharge and its groundwater impacts, and establishes appropriate discharge requirements that ensure the discharge does not cause pollution or nuisance and is otherwise compliant with the Basin Plan and State Antidegradation Policy.

Discharger. Bronco Wine Company is a California corporation and is among the top ten wine companies in the United States.[3] It has over 250 brands, including Charles Shaw, AKA "Two Buck Chuck."[4] In the 1970s, it began operating its Bronco Winery and discharging winery waste to nearby land. Currently, the Facility processes between 300,000 and 450,000 tons of grapes to produce 60 to 80 million gallons of wine annually (Tentative Order, Finding 7). The Tentative Order's Map, Attachment B, depicts the Facility Boundary as including the winery and its tank farm and parking areas, storm water retention basin, wastewater discharge areas, and several parcels of cropland.

Discharge Characterization - Flow. The Current Order indicates the Facility's wastewater disposal area consists of 22 acres of shallow infiltration basins and 106 acres of cropland planted in vines or grain crops. Its Information Sheet states that WDR Order 92-081, the Discharger's then current order, authorized a discharge of

> …a maximum of 0.65 [million gallons per day] of wastewater from cleaning and waste byproducts to either 22 acres of shallow infiltration basins during the non-growing season or an 80-acre grape vineyard for crop irrigation. The basins collect all of the settleable solids and are periodically ripped and disced when they are dry. Wastewater diverted to the vineyard is supplemented with irrigation water at a ratio of approximately 2:1 (irrigation water/wastewater applied). The irrigation

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[2] Available at https://www.sustainablewinegrowing.org/amass/library/7/docs/Comprehensive%20Guide%20to%20Sustainable%20Management%20of%20Winery%20Water%20and%20Associated%20Energy.pdf

[3] Mordor Intelligence list of the best United States Wine companies from the 2022 & 2023 market share report. Source: https://www.mordorintelligence.com/industry-reports/united-states-wine-market/companies

[4] Wikipedia https://en.wikipedia.org/wiki/Bronco_Wine_Company

> water is applied separately from the wastewater. Wastewater will be applied to the vineyard during the summer month only. The plant is operated on a year-round basis.
>
> The Discharger proposes to add a 26-acre parcel for land disposal that will be planted with 40 rows of grape vines. The remainder of the parcel will be divided into several checks by a series of levees. The Discharger will plant corn or grain crops in these checks once a year to use up any of the nitrogen in the soil.

The Current Order carries over the previous order's discharge flow limitation of 0.65 million gallons per day (mgd) applicable to "monthly average dry weather discharge flow" (Discharge Specification B.4). This qualifier is usually employed in WDRs for discharges from municipal wastewater treatment plants with areally extensive sewage collection systems. The Current Order does not prescribe discharge limits for maximum daily flow or total annual flow.

The Discharger's 2019 Report of Waste Discharge (RWD)[5] cited in the Tentative Order's Finding 1 indicates the monthly average wastewater flow ranged from 0.29 to 0.58 mgd from January 2013 to August 2019. The RWD employs in its water balances and nutrient management plan an annual design wastewater flow volume of 414.80 acre feet, or 135 million gallons (MG). Based on the Tentative Order's characterization of Facility operation (Finding 9), the Facility operates approximately 300 days per year. Wastewater storage capacity is limited to two 0.5-MG tanks, consequently the Facility typically discharges wastewater on days it is in operation. The RWD's design annual discharge flow of 135 MG divided by 300 yields an annual average working day discharge flow of 0.45 mgd.

The Tentative Order indicates that annual discharge flow volumes from 2019 through 2022 ranged from 110 to 144 MG (Finding 14). This information yields an estimate of 0.5 mgd for the average discharge flow per working day from 2019 through 2022. Data from January 2021 to September 2023 in Discharger self-monitoring reports (SMRs) required by the Current Order's Monitoring and Reporting Program (MRP) show that monthly average discharge flows during crush ranged from 0.35 mgd to 0.51 mgd, and from 0.20 mgd to 0.32 mgd during the rest of the year. The highest daily wastewater flow of 0.675 mgd was on 28 September 2023.

The Tentative Order does not indicate whether the Discharger proposes to increase the design annual wastewater discharge flow of 135 MG used in its RWD to characterize its discharge operation. The RWD discloses the Discharger's expectation for future flow increases:

> The volume or rate of process wastewater flow is not expected to increase in the future. Grape crush tonnage is expected to remain fairly consistent with historical harvests, and grape processing is limited to current capacity of onsite wine storage tanks (RWD Page 7).

[5] Report of Waste Discharge dated September 2019 prepared for Bronco Wine Company by NV5

Discharge Characterization. The Tentative Order indicates that Facility's sump collects wastewater and storm water. From this sump, comingled wastewater and storm water is discharged to land directly or after storage in two tanks with a combined capacity of 1 MG. The Current Order's MRP requires monitoring of discharge flow to the LAAs and IBs. It also requires the discharge be monitored by grab samples weekly for EC and pH; monthly for 5-day biochemical oxygen demand (BOD), Total Suspended Solids (TSS), Total Kjeldahl Nitrogen (TKN), and Nitrate (N); and, annually for Standard Minerals. The Tentative Order characterizes discharge flows and quality using monitoring data from 2019 to 2022. Finding 14 presents annual wastewater flows to the LAAs and to the IBs; Finding 15 presents annual average and maximum values for seven constituents of concern (COCs), including BOD and total nitrogen (TN). It does not characterize the discharge for standard mineral constituents.

The Discharger's annual reports contain discharge standard minerals results. Data in Discharger's annual reports from 2018 to 2020 show higher concentrations of chloride, iron, and sulfate concentrations in the discharge compared to source water (characterized in the Tentative Order's Finding 10). Average values calculated from 2018 to 2020 data include 190 mg/L potassium, 240 mg/L sulfate, and 0.6 mg/L iron. The sulfate average is below the recommended secondary drinking water maximum contaminant level (MCL) of 250 mg/L, and the iron average exceeds the secondary drinking water MCL of 0.5 mg/L. The elevated iron concentrations in the discharge suggest that the predominantly acidic wastewater is dissolving metals from Facility piping and appurtenances.

Recommendation: Revise Finding 14 include a table presenting average values for select standard mineral COCs calculated by averaging yearly values submitted from 2019 to 2022. The COCs should include, at a minimum, TDS, fixed dissolved solids (FDS), bicarbonate alkalinity, calcium, magnesium, sodium, chloride, potassium, sulfate, and total phosphorus. The resulting data will be useful for comparing concentrations of these COCs in the discharge with those in groundwater affected by the discharge. Elevated concentrations of bicarbonate alkalinity, calcium, and magnesium in groundwater compared to the discharge, for example, are indicators of excessive organic loading. Lower concentrations of chloride in groundwater compared to the discharge reveal the influence of canal seepage on groundwater passing through MW-10 and MW-12R, which are near the canal.

And, revise Finding 14 to disclose the elevated iron concentrations in the discharge, and present a plausible explanation for the increase (e.g., dissolution of metals in Facility piping due to the acidic nature of the wastewater).

The Tentative Order characterizes two discharges to land. The first is the discharge to 77 acres of land application area (LAA) comprised of three separately-managed and cropped LAAs: Reno Ranch 1 (RR-1), RR-2, and RR-3. Winery wastewater is discharge via flood irrigation to Sudan grass and forage crops at loading rates not exceeding agronomic demands for water and nitrogen. The second is the discharge to 15.7 acres containing five equally-sized infiltration basins (IB-1 to IB-5) that are not cropped but instead tilled "as needed to maintain sufficient capacity and percolation rates" (Finding 22).

Table 1 below includes data from Findings 14 and 15, along with calculated values of percent annual flow to LAAs and to IBs and averages for all columns.

Table 1. Wastewater Discharge Flow, BOD, and TN

	Total Flow (MG)	Flows (MG)		% Flow		BOD (mg/L)	TN (mg/L)	FDS (mg/L)
Year		LAA	IB	LAA	IB			
2019	143	101	42	71%	29%	3,067	21	624
2020	115	74	41	64%	36%	2,363	17	600
2021	118	89	29	75%	25%	2,725	19	528
2022	109	76	33	70%	30%	1,762	14	533
Average	121	85	36	70%	30%	2,480	18	571

Table 2 below uses values in Table 1 to calculate each year's loadings of wastewater, BOD, TN, and FDS.

Table 2. Wastewater Hydraulic, BOD, TN, and FDS loading

	Hydraulic Loading (ft/yr)		BOD loading (lbs/ac/d)		TN loading (lbs/ac/yr)		FDS loading (tons/ac/yr)	
Year	LAA	IB	LAA	IB	LAA	IB	LAA	IB
2019	4.0	8.2	89	182	230	469	7.6	15.5
2020	3.0	8.0	51	178	136	370	3.4	9.3
2021	3.5	5.7	70	126	183	293	3.7	5.9
2022	3.0	6.5	39	143	115	245	4.6	9.8
Average	3.4	7.1	62	157	167	344	4.8	10.1

In the LAA discharge, annual wastewater and TN loadings from 2019 to 2022 do not exceed agronomic demands for LAA crops (i.e., Sudan grass, forage), and annualized daily BOD loadings are below the 100 lbs/ac/day rate prescribed in many winery WDR orders, including State General Winery Order. However, the Discharger also irrigates LAA crops with supplemental irrigation water supplied by Turlock Irrigation District (TID). Total hydraulic loadings to RR-1 and RR-2 of wastewater and supplemental irrigation water at times appear excessive. For example, in 2022, RR-1 and RR-2 received six feet of wastewater, which is reasonable, and an additional three to four feet of supplemental irrigation water, which appears excessive without justification.

Also, it appears that the Discharger applies supplemental irrigation water to LAA crops on days it also discharges wastewater to the IBs. So, even though the Discharger has wastewater available to irrigate LAA crops, it instead opts to discharge wastewater to the IBs and use supplemental irrigation water on LAA crops. In 2020, for example, it applied

29.25 inches of supplemental irrigation water to the LAAs from May through September while, during the same period, applied 64 inches of wastewater to the IBs.

Comment: Please explain why the Discharger uses supplemental water to irrigate LAA crops on days when it has available wastewater that it instead discharges to the IBs.

Recommendation: Include a new LAA discharge specification requiring hydraulic loading of wastewater and supplemental water to not exceed reasonable agronomic rates and minimize percolation. For example, LAA Specification G.5 in WDR Order R5-2023-0028 for Central Valley Meat, Inc. et al., Hanford Beef Processing Facility, Kings County:

> Hydraulic loading of wastewater and irrigation water shall be at reasonable agronomic rates designed to minimize the percolation of wastewater and irrigation water below the root zone (i.e., deep percolation).

The Tentative Order establishes Mass Loading Limitation E.1 for the sump discharge to the LAAs of 100 lb/ac/day for BOD (cycle average) and TN matching crop demand. It also establishes LAA Specifications H.1 to H.9. These include one requiring crops to be grown on the LAAs that are selected "maximize crop uptake" of applied wastewater and nutrients (H.2), and another requiring discharge to the LAA "not be initiated when the ground is saturated" (H.8).

The main purpose of the IB discharge is wastewater disposal, not beneficial reuse on LAA crops. Because the Discharger is authorized use the IBs for wastewater disposal and has access to high-quality supplemental irrigation water, it has no incentive to maximize the amount of wastewater it beneficially reuses on LAA crops. Annual wastewater loadings to the IBs are over twice those to the LAAs. No crops are grown on the IBs to uptake applied nitrogen. Consequently, the IB discharge relies solely on soil treatment processes for nitrogen removal.

The Tentative Order establishes Mass Loading Limitation E.1 for the LAA discharge for BOD and TN to prevent nuisance and protect groundwater. It does not establish mass loading limitations for the IB discharge. BOD loadings to the IBs are at times very high, especially during crush. For example, in September 2023, discharge BOD was 3,200 mg/L, yielding BOD loadings to the IBs averaging 690 lbs/ac/day, with a maximum loading to IB-2 of 1,470 lbs/ac/day. And, with respect to high TN loadings to the IBs, just because the IBs are not cropped does not mean the Tentative Order should not evaluate the discharge's nitrogen loading to soil. Some applied nitrogen is taken up in the biomass of microorganisms responsible for soil treatment, and some is lost through ammonia volatilization (the RWD estimates this loss at 15%). Microbially mediated processes such as denitrification are responsible for the majority of nitrogen removal. If TN loadings exceed the denitrification treatment capacity of IB soils, then nitrate will "pass through" the unsaturated treatment zone and enter groundwater.

A Sidebar on Total Suspended Solids. The Tentative Order does not characterize discharge for TSS, even though the Current Order's MRP requires monthly discharge TSS monitoring. The RWD's Table 3 indicates that average and maximum discharge TSS were 182 mg/L and 590 mg/L, respectively, from 2013 to 2018. The TSS loading to the IBs at an annual discharge flow of 40 MG and average TSS concentration of 182 mg/L is 30 tons, or almost 2 tons/ac/year. The accumulation of these solids on IB bottoms retard the exchange of gasses critical in the soil treatment of high-strength wastewater (i.e., diffusion of oxygen from the atmosphere into the soil, and of carbon dioxide and nitrogen gas from the soil into the atmosphere). Treatment to remove suspended and settleable solids (i.e., dissolved air flotation, clarification) could provide a significant reduction of discharge BOD and TN concentrations.

Recommendation: Revise Table 3 to include average and maximum values of discharge TSS for the years 2019 to 2022.

The IB discharge relies entirely on soil treatment to decompose and otherwise attenuate discharged waste constituents to levels that, once released to groundwater, will not cause or contribute it to contain these constituents (and decomposition by-products) in concentrations exceeding applicable water quality objectives (WQOs). Granted, soil treatment *is* capable of removing vast quantities of applied BOD in the upper soil profile, provided hydraulic and BOD loadings are not too great and rest periods between discharge applications are long enough for the soil profile to drain and allow heavier-than-air carbon dioxide in the soil created by the decomposition of applied organic carbon to diffuse to the atmosphere, and atmospheric oxygen to diffuse into soil pores.

In September 2002, Kennedy/Jenks Consultants began a two-year field study at Bronco Winery featuring test plots in an IB equipped with lysimeters that received four cycles of BOD and TN loadings. The study's findings are in the August 2004 report, *Land Application of Winery Stillage and Non-Stillage Process Water, Study Results and Proposed Guidelines,* prepared for Wine Institute by Kennedy Jenks Consultants (hereafter K/J Report).

In the first year of field studies, cycle average BOD loading ranged from 142 to 553 lbs/ac/day, TN loading, from 14 to 86 lbs/ac on the day of application. The duration of the four cycles ranged from 6 to 29 days. BOD levels in soil pore liquid decreased "by 35 to more than 99% in the cycles with an average of 75% removal at five feet" (K/J Report Page 3-3). While impressive on face value, the resulting percolate draining below five feet depth still contains concentrations of BOD and TN comparable to high-strength municipal wastewater. To my knowledge, no follow-up field studies have been reported for this winery that investigates the BOD and TN removal performance of IB soils below five feet.

Comment: Explain staff's confidence in the efficacy of soil treatment below the root zone to attenuate applied waste constituents, especially nitrogen, to levels protective of groundwater. Due to the apparent lack of field studies on the effectiveness of soil treatment below the root zone for removing or otherwise attenuating applied BOD, TN, and other COCs (e.g., potassium, *sulfate), staff will likely be hard-pressed to provide technical justification that the IB discharge is protective of groundwater and compliant with the Basin Plan.*

Recommendation: Please revise the Tentative Order to explain why it does not require the IBs to be cropped like the LAAs; why it allows excessive loadings to the IBs of BOD, TN, and other COCs; and why it does not apply Mass Loading Limitation E.1 to the IB discharge.

Sidebar on Groundwater Impacts from Winery Wastewater Discharges. Board case files for winery and food processing wastewater discharges contain substantial evidence demonstrating that excessive loadings to land of salts, nitrogen, and BOD typically degrade groundwater for salinity, often for nitrate, and, at times, for iron, manganese, and arsenic.

The salinity impacts, beyond those attributable to discharge salinity, generally include significant increases over background in byproducts of organic carbon decomposition. Salinity decomposition byproducts include bicarbonate alkalinity, calcium, and magnesium. The decomposition of applied organic carbon creates carbon dioxide gas, which is heavier than air and soluble in water. If rest periods are inadequate for the gas to diffuse to the atmosphere, it accumulates in the soil profile and dissolves in soil pore water and forms carbonic acid, a weak acid. While the acidity of soil pore liquid is buffered by the formation of bicarbonate, it can dissolve calcium and magnesium carbonates in the soil and release calcium, magnesium and more bicarbonate alkalinity. Granted, these "decomposition byproducts" do not have WQOs, but they do contribute to groundwater EC and TDS, which do have WQOs.

The nitrogen impacts, typically from nitrate but occasionally from ammonia, result from nitrogen loading in excess LAA soil treatment capacity (i.e., nitrification and denitrification). Soil treatment for nitrogen removal requires fluctuating aerobic and anoxic conditions to mineralize applied organic nitrogen to ammonia, nitrify ammonia to nitrate, and denitrify nitrate to nitrogen gas.

Field study findings documented in the K/J Report relevant to the IB discharge include: (1) preferential flow pathways created by discing allow rapid percolation of wastewater through the upper five-foot treatment zone; (2) applications following weeks of rest flushed and mobilized nitrate and ammonia stored in the soil, evident by spikes of these constituents in soil pore liquid; (3) "following application, soils remained saturated for 3 to 8 days before drying/drainage began" (K/J Report Page 3-2).

The impacts from iron, manganese, and arsenic occur under sustained anoxic conditions created by excessive organic carbon loading and are typically associated with low or non-detect nitrate concentrations. Iron, manganese, and arsenic mobilized as a result of soil treatment for BOD removal may, under aerobic groundwater conditions, oxidize, solidify, and return to soil matrix at some point downgradient of the discharge. Beneficial uses designated for groundwater in the Basin Plan do not include waste treatment for the purpose of meeting WQOs for iron, manganese and arsenic.

***Discharge Characterization – Area Soils and Groundwater**.* Finding 33 describes discharge area soils as "generally shallow, coarse textured soils characterized by alluvium derived from granite and are moderate to very permeable." Finding 34 provides information on the Facility's groundwater monitoring well network, which currently consists of 12 wells, eight along the Facility Boundary depicted in Attachment B and four internal: two at the northern corners of the IBs (MW-3 and MW-5), one near the Solids Storage Area (MW-4), and one between RR-1 and RR-2 (MW-7), about 450 feet east of MW-5. This finding's Table 5, Well Construction Details, does not include each well's reference elevation, data necessary to interpret groundwater depth data presented elsewhere.

Recommendation: Revise Table 5 to include each well's reference elevation and clarify when tabulated values for water depth were obtained (e.g., installation date, most recent monitoring date).

Finding 36 indicates groundwater flow direction is "generally west-southwest" regionally, and in the discharge area, varies "widely, between south and north-northwest, due to pumping of agricultural wells in the area." Finding 37 characterizes groundwater as occurring at depths ranging from 19 to 30 feet below ground surface (bgs).

Comment: A more informative tabular summary would display groundwater elevation data and, for this discharge situation, annual averages for representative well clusters.

Recommendation: Revise Finding 37 to present average annual groundwater elevations for wells predominately upgradient (or cross-gradient) and otherwise representative of groundwater uninfluenced by the discharge (i.e., MW-1R, MW-8, MW-12R), for those within or downgradient areas affected by the discharge (i.e., MW-2 through MW-7), and for those immediately adjacent to the infiltration basins (i.e., MW-3 and MW-5).

My 6 August 2020 letter commenting on the 2020 version of the Tentative Order included the following recommendation:

> The Board's consideration of the Tentative Order must be postponed in order for staff to request Bronco (via invoking section 13267 if necessary) to sample groundwater in all monitoring wells for constituents already identified in the MRP along with calcium and magnesium (hardness), bicarbonate alkalinity, total organic carbon, iron, manganese, and arsenic. Only until staff receives these data can staff revise this finding [regarding salinity impacts] to the level of specificity required for Board consideration.

Unfortunately, staff did not act on my recommendation, and three years have passed during which time groundwater could have been monitored quarterly and characterized for the above-cited constituents. The resulting data would have allowed for an assessment of the extent to which salinity impacts to groundwater are attributable to the discharge or to area agricultural land uses. Consequently, the Tentative Order's presentation of available groundwater salinity data is limited to EC and TDS.

Finding 38 identifies upgradient wells as including MW-9, MW-10, and MW-12R. Its Table 7 presents data derived by averaging values from 2019 to 2022 from all three wells to yield annual average concentrations for four COCs including EC, TDS, and Nitrate as N. This approach conceals relevant differences in groundwater quality in these wells, which are located along the perimeters of LAAs. As groundwater flow direction varies widely, it is likely that groundwater passing through MW-9 and MW-10 is, at times, not representative of upgradient groundwater uninfluenced by the discharge. Further, MW-10 and MW-12 are each about 50 feet west of a TID canal. Groundwater passing through these two wells is also likely influenced by the canal's seepage of high-quality surface water.

Fluctuating groundwater flow directions and canal seepage diminish the suitability of MW-9, MW-10, and MW-12 to serve as upgradient wells for regulatory purposes. Constituent concentrations in groundwater passing through MW-8, located about 3,500 feet due west of MW-9, is consistent from year to year and, with respect to EC and TDS, lower than MW-9 and MW-10. While cross-gradient of the discharge, the Tentative Order should acknowledge MW-8 as representative of area groundwater uninfluenced by the discharge and therefore appropriate for designation as background well for regulatory purposes.

More informative and transparent than presenting four years of annual blended data in Table 7, is presenting constituent values for each well averaged from 2019 to 2022 data, as was done in Attachments F, G, and H. The table below presents TDS and Nitrate as N data from the Discharger's September 2023 SMR, along with 'blended' values from Table 7 derived from averaging annual averages from 2019 to 2022. While this data appears in the cited attachments, it is appropriate for this finding to characterize upgradient groundwater in a similarly transparent manner.

Table 3. TDS and Nitrate as N concentrations in background groundwater

Constituent	Units	MW-8	Blended	MW-9	MW-10	MW-12
TDS	mg/L	580	780	1,150	800	370
Nitrate as N	mg/L	21	10	25	1.5	2.2

Groundwater data from the Discharger's September 2023 SMR shows a marked increase in EC and TDS in MW-9 after 2008 to levels comparable to downgradient well, MW-6, in all years except 2019-2022. It is likely that when groundwater is monitored for additional salinity COCs, data from MW-9 (and likely MW-10) will reveal higher concentrations of alkalinity and hardness compared to MW-8, and relatively low concentrations of chloride in MW-10 and MW-12R attributable to the seepage of high-quality surface water.

Recommendation: Revise Finding 38 to include a disclaimer about the suitability of MW-9 and MW-10 to represent upgradient groundwater uninfluenced by the discharge. Identify MW-8 as a background well that, while apparently cross-gradient of the discharge, is nevertheless reasonably representative of area groundwater uninfluenced by the discharge. Revise Table 7 to present average values for EC, TDS, and Nitrate as N for MW-8, MW-9, MW-10, and MW-

12R based on 2019 to 2022 data. Omit TKN data from table, and instead mention in finding that TKN concentrations in all wells are consistently low (< 2 mg/L).

Finding 39 states downgradient wells include MW-1 through MW-8 and MW-11R and presents Table 8, Downgradient Annual Average Concentrations for 2019 through 2022. Like Table 7, Table 8 presents annual values derived from averaging the annual average concentrations of each well. While the RWD characterizes MW-8 as a cross-gradient well, it does not characterize MW-1 (or MW-1R) as an upgradient, cross-gradient, or downgradient well. MW-1 is about 1,400 feet south-southwest of MW-8 and 1,700 feet west of MW-3. The Tentative Order's Attachments F, G, and H identify a south-southwest groundwater flow direction indicating MW-8 and MW-1R as cross-gradient of the IBs and LAAs. This information suggests it is premature to designate MW-1R and MW-8 as downgradient wells until groundwater passing through them is monitored for additional COCs, including chloride, alkalinity, hardness (calcium and magnesium), and TOC.

Recommendation: Revise Finding 39 to exclude MW-1R and MW-8 from the wells identified as downgradient and recalculate values in Table 8 accordingly.

Finding 41 discloses that groundwater in the mound created by the IB discharge contains higher concentrations of waste constituents attributable to the discharge compared to upgradient or unaffected groundwater. Its Table 9, Groundwater Mounding Associated with the Infiltration Basins, summarizes recent EC, TDS, and nitrate data for MW-9, cited as upgradient, MW-3 and MW-5 next to the IBs, and MW-2 and MW-4, cited as downgradient. Table 9 values indicate that discharge-dominated groundwater underlying the IBs contains nitrate as nitrogen in concentrations two to three times the primary drinking water Maximum Contaminant Level (MCL) of 10 mg/L for nitrate and nitrite as nitrogen, and TDS in concentrations exceeding both the upper and short-term secondary drinking water MCLs of 1,000 mg/L and 1,500 mg/L, respectively. Average discharge FDS is generally less than 700 mg/L, meaning salinity decomposition byproducts likely contribute to the elevated TDS in mounded groundwater.

Recommendation. Please reconsider using MW-9 as the upgradient well in Table 9 and replace it with cross-gradient well, MW-8, as the EC, TDS, and nitrate as N concentrations in groundwater passing through this well (i.e., 800 µmhos/cm, 570 mg/L, and 17 mg/L, respectively) *appear representative of groundwater unaffected by the IB and LAA discharges. This change provides the Board and public a clearer comparison between the quality of groundwater uninfluenced by the discharge and groundwater within the mound created (and dominated) by the IB discharge.*

Finding 42 summarizes groundwater quality data near the Facility that indicates average values in area groundwater for nitrate, TDS, chloride, sodium, iron, and manganese, all are less than their applicable WQOs, indicating area groundwater is of high quality for these constituents.

Recommendations: Revise Finding 41 to include a conclusion that the IB discharge is polluting or contributing to pollute groundwater from salinity (TDS and EC) and nitrate and, as such, does not comply with the Basin Plan and the State Antidegradation Policy.

Antidegradation Analysis. Findings 61 through 71 summarize staff's analysis of the discharge for compliance with the Antidegradation Policy. Finding 62 identifies several COCs in the discharge with the potential to degrade groundwater and affect beneficial uses. It does not include BOD, even though soil treatment for BOD removal often causes groundwater to contain elevated concentrations of salinity constituents (i.e., bicarbonate alkalinity, calcium, and magnesium) compared to the discharge and to upgradient groundwater. It also does not include iron, even though annual monitoring results indicates discharge iron concentrations of 0.81, 0.80, and 0.18 mg/L in 2018, 2019, and 2020, respectively.

Recommendation: Include BOD and iron in the list of identified constituents/parameters.

Finding 63 presents Table 11, Data Comparison, displaying values characterizing EC, TDS, FDS, Nitrate as N, and TKN in 2021 and 2022. Earlier, I presented my reasons for questioning the suitability of the wells selected to represent groundwater upgradient and downgradient of the discharge. Whether suitable or not to represent upgradient groundwater conditions, the selected upgradient wells (MW-9, MW-10, and MW-12) are generally upgradient from the other wells. Groundwater elevation and concentration data do not support the inclusion of MW-1R and MW-8 in the list of downgradient wells.

Recommendation: Please revise Finding 63 to disclose the possible influence of the discharge on groundwater passing through MW-9 and MW-10, and remove MW-1R and MW-8 from the set of downgradient quality data summarized in Table 11.

Finding 63.a regarding EC cites the range in average annual values from MW-9 and MW-10 from 2019 to 2022 (1,405 to 1,644 µmhos/cm) as demonstrating upgradient "groundwater quality in the area is poor with regards to salinity." Yet, Finding 38's characterization of upgradient groundwater includes MW-12R data. Annual average EC values in this well from 2019 through 2022 averaged 560 µmhos/cm. Additionally Finding 42 presents an average TDS value of 418 mg/L for groundwater near the Facility. Using a TDS/EC ratio of 0.55 yields a value for EC of 750 µmhos/cm. This information indicates area groundwater, and groundwater passing through MW-12R, is of high quality with regards to EC for domestic and municipal beneficial use. By excluding MW-12R from the upgradient well data set, the finding presents a less-than-accurate characterization of upgradient groundwater quality.

Recommendation: Revise the finding to include MW-12R EC data, along with a disclaimer that groundwater passing through MW-9 and MW-10 may be influenced by the discharge and therefore their use as upgradient wells for compliance purposes is preliminary and subject to revision. Reconsider the finding's characterization of upgradient groundwater quality as "poor with regards to salinity."

Finding 63.b regarding TDS employs discharge FDS in its analysis of groundwater TDS, and indicates discharge FDS values ranged between 260 to 860 mg/L between 2019 and 2022.

Recommendation: Since soil treatment can produce TDS impacts in groundwater independent of those potentially resulting from discharge FDS, the first paragraph should end with a sentence disclosing this fact. For example:

> *Soil treatment for BOD removal creates bicarbonate alkalinity and can dissolve calcium and magnesium from the soil. If not attenuated in the soil profile, these constituents can leach into underlying groundwater and increase its TDS.*

Finding 63.c states, in part:

> The average TDS concentration in upgradient well MW-9 for data collected between 2019 and 2022 is 1,113 mg/L, which exceeds the potential water quality objective for TDS of 1,000 mg/L. This indicates the groundwater in the vicinity of the Facility is considered poor quality in regard to salinity, likely the result of long term agricultural use of the area. MW-3, located adjacent to the infiltration basins, is the only well to show an increasing concentration trend for TDS. However, concentrations in wells downgradient from upgradient well MW-9 and the infiltration basins are relatively equivalent to or less than concentrations in MW-9.

Like the Antidegradation Analysis for EC in Finding 63.b, this finding's conclusion that "groundwater in the vicinity of the Facility is considered poor quality in regard to salinity" is not based on information provided elsewhere in the Tentative Order. Finding 42 presents a value of 418 mg/L for the average TDS in groundwater in the Facility area. From 2019 to 2022, average TDS concentrations were typically lower than 1,000 mg/L in MW-10 (and MW-8) and lower than 500 mg/L in MW-12. Despite this information, this finding selects MW-9, which has the highest average TDS among the cited upgradient wells, to support its conclusion that area groundwater is of poor quality with respect to salinity.

Finding 63.c cites MW-3, within the IB discharge mound, at as being "the only well to show an increasing concentration trend for TDS." While true, the finding omits disclosing that groundwater passing through MW-5, the other well in the mound, contains TDS in concentrations approaching 2,000 mg/L. The finding states, "concentrations in wells downgradient from upgradient well MW-9 and the infiltration basins are relatively equivalent to or less than concentrations in MW-9." Again, staff uses MW-9 to represent upgradient groundwater TDS even though this well may be influenced by discharge and has the highest TDS of the three upgradient wells. And, this finding omits inclusion of MW-7, which is downgradient of RR-1, and presumably monitors groundwater influenced by the LAA discharge. From 2019 to 2022, the average annual TDS in groundwater passing through this well ranged from 1,600 to 1,725 mg/L.

Finding 63.b indicates the Tentative Order requires the Discharger to participate in the CV SALTS Salt Control Program. Finding 63.c cites the Tentative Order's Performance-Based

Effluent Limit of 1,000 mg/L for FDS as being protective of groundwater, and indicates the Discharger has elected to participate in the Prioritization and Optimization Study under Pathway Option 2 for the Salt Control Program.

Comment: Even a discharge FDS of 800 mg/L cannot account for the obvious TDS impacts to groundwater within the IB discharge mound or downgradient of RR-1. It is likely that the TDS created by BOD soil treatment contributes significantly to the TDS impacts. Because BOD can be removed prior to discharge, Antidegradation Analysis for TDS must address TDS impacts resulting from BOD soil treatment.

Recommendation: Revise this finding to explain that the increased TDS in groundwater underlying the IBs and downgradient of RR-1 may be partly attributable to the release of bicarbonate alkalinity, calcium, and magnesium to groundwater as a result of BOD soil treatment. Include MW-5 and MW-7 in the analysis and, by doing so, offer a conclusion that the IB discharge, and possibly LAA discharge, appears to be causing groundwater to contain TDS in concentrations that impair its beneficial uses.

Finding 63.c regarding Nitrate as Nitrogen states, in part, "While the discharge to land from the Facility is likely impacting groundwater, the groundwater quality in the area is considered poor in regard to nitrate as nitrogen." Again, this conclusion conflicts with data presented for area groundwater in Finding 42, which cites 6.0 mg/L as the average nitrate as nitrogen concentration. Also, nitrate as nitrogen concentrations are typically less than 2 mg/L in groundwater passing through MW-10 and MW-12. It may be that the low nitrate levels are the result of the seepage of high-quality surface water from the nearby TID canal. The finding does not disclose that nitrate concentrations in groundwater passing through MW-5 are three to four times the WQO of 10 mg/L.

Finding 63.c indicates the Discharger has chosen to participate in Pathway B of CV SALTS Nitrate Control Program. The Discharger's participation in CV SALTS Salt and Nitrate Control Programs is useful from a regional perspective. However, it is up to the Tentative Order to prescribe requirements that ensure a discharge does not cause pollution or nuisance and reflects the implementation of best practicable treatment or control (BPTC) for discharges to high-quality groundwater. To this end, the Tentative Order establishes limitations for discharge flow and FDS, and for BOD and TN mass loadings to the LAAs. It does not, however, establish limitations on the IB discharge for loadings of wastewater, BOD, or TN. Provided the Discharger complies with discharge specifications related to freeboard (F.5), nuisance odors (F.4) and vectors (F.8), it could increase IB discharge flows beyond current levels, further loading underlying groundwater with waste constituents in the discharge and created as a result of the discharge.

In its Antidegradation Analysis, the Tentative Order appears to purposefully distort groundwater monitoring data by using the highest salinity well to characterize upgradient groundwater quality as poor, and not fully disclosing the salinity and nitrate impacts to groundwater within the mound (MW-5) and downgradient of RR-1 (MW-7). It appears to reason that the localized pollution caused by the IB discharge is acceptable, as long as groundwater TDS and nitrate concentrations decrease downgradient from the IBs. Until the Board amends the Basin Plan to authorize otherwise, beneficial uses designated for groundwater do not include waste dilution for the purpose of meeting WQOs. Rather, the WQOs established to protect beneficial uses apply to all groundwaters, unless de-designated, not just to groundwater extracted from nearby domestic or agricultural wells.

Finding 67 states, "This Order establishes effluent limits for the facility that will not unreasonably threaten present and anticipated beneficial uses or result in groundwater quality that exceeds water quality objectives set forth in the Basin Plan."

Comment: This finding's conclusion is not supported by information presented elsewhere in the Tentative Order. The Tentative Order's FDS limit of 1,000 mg/L is higher than current discharge FDS, indicating it authorizes even more salt degradation than the current discharge. Sufficient evidence is included in the Tentative Order and Discharger SMRs to allow the Board to reasonably conclude that the IB discharge is causing groundwater pollution from salinity (TDS and EC) and nitrate and, as such, does not comply with the Basin Plan and the Antidegradation Policy.

The Tentative Order can mitigate the TDS and nitrate impacts to groundwater caused by the IB discharge by requiring the Discharger to propose and implement changes in IB discharge operations to achieve and maintain compliance with Mass Loading Limitation E.1 and all LAA Specifications. Given that the Discharger is among the top ten wine companies in the United States, it should be able to complete these changes within three years following order adoption.

Recommendation: Revise the Tentative Order to (1) require the IB discharge to comply with Mass Loading Limitation E.1 and all LAA Specifications by three years following order adoption, and (2) include a provision requiring the Discharger to submit by six months a technical report proposing discharge modifications, and an implementation schedule not to exceed two years, to achieve compliance with the newly-imposed requirements for the IB discharge.

Comment: While it is up to the Discharger to propose these modifications, they could include converting to LAAs all or portions of agricultural parcels within the Facility Boundary, such as the 28.4-acre parcel directly west of the Facility (APN 041-046-007) or the 76.35-acre parcel south of Keyes Road between Crows Landing Road and Bystrum Road (APN 041-046-001).

Finding 68 lists BPTC measures that it claims "will minimize the extent of water quality degradation resulting from the Facility's discharge." Finding 69 claims that the Discharger's implementation of the cited BPTC measures "will minimize the extent of further water quality degradation resulting from the Facility's continued discharge."

Comment: The identified measures may reduce the discharge's impact, but will not minimize it. For this to occur, the Discharger would have to implement additional BPTC measures (e.g., cessation of the IB discharge as currently conducted, pretreatment for TSS and BOD removal).

Finding 70 characterizes the groundwater degradation caused by the discharge as "limited" and reflects the Discharger's "best efforts," and that the Facility's importance in the Central Valley economy warrants justifying the degradation as being in the public benefit. Finding 71 concludes the Antidegradation Analysis with: "Based on the foregoing, the adoption of this Order is consistent with the State Water Board Resolution 68-16."

Comment. Please explain how Finding 70 can claim that the degradation is limited in the absence of monitoring data from off-site downgradient groundwater monitoring wells. Also, explain how this finding can claim the degradation reflects the Discharger's best efforts when it discharges 30% of the Facility's wastewater to the IBs for disposal by percolation and evaporation. Despite its clear deficiencies, explain how Finding 71 can claim the IB discharge is consistent with Resolution 68-16.

Other Regulatory Considerations. Finding 76 states, "This Order, which prescribes WDRs for discharges of wastewater, is exempt from the prescriptive requirements of California Code of Regulations, title 27 (Title 27), section 20005 et seq. (See Cal. Code Regs., tit. 27, section 20090, subd. (a) - (b).)"

Recommendation: Revise Finding 76 to eliminate reference to 27 CCR 20090(a), as this applies to discharges of domestic sewage regulated by WDRs.

Comment: Because the IB discharge is causing or contributing to pollution from TDS and nitrate, it is not in compliance with the Basin Plan and, as such, does not qualify for an exemption from the Title 27's prescriptive containment standards.

Finding 78 states that all the Facility's storm water "is collected and discharged to the storm water basin or used for on-site irrigation." Elsewhere, the Tentative Order indicates that storm water from the winery discharges to the Facility's sump. The RWD describes improvements in Facility storm water management:

> Bronco initiated a storm drain improvements project in 2016 to partially segregate storm runoff from process wastewater flows that comingle in the collection sump. Project construction is completed and was accomplished through disconnecting the combined stormwater and process wastewater drainage system at three locations, and constructing additional storm drainage piping, manholes, and catch basins. The stormwater runoff watershed encompasses the existing parking lot, roof, and driveway areas that do not come in contact with wastewater generated from wine-making activities. The watershed includes two zones, a northwest zone and a southwest zone. Stormwater collected in the northwest zone is discharged to a new stormwater retention basin located on an adjacent northerly vineyard owned by a Bronco affiliate. Stormwater collected in the southwest zone is discharged to a southerly stormwater spreading area, consisting of an adjacent vineyard owned by a Bronco affiliate, and stormwater is spread through irrigation systems. [RWD Page 7].

It would appear, then, that all Facility storm water is not maintained onsite, but instead is also discharged to storm water retention basin and spreading area located on property "owned by a Bronco affiliate."

Comment: The Facility's 3-acre unlined storm water retention basin is located due north of the winery on a parcel that, according to the RWD is owned by a Bronco affiliate. Please confirm that the Discharger currently owns this parcel. And, please identify the location of the vineyard parcel in which Facility storm water is "spread through irrigation systems."

Has the Discharger characterized the quality of storm water retained in the new basin or discharged to the vineyard spreading area?

Recommendation: Consider revising the Tentative Order to thoroughly characterize the Facility's current storm water collection and disposal operations.

Discharge Flow Limitation. In general, to ensure a discharge is conducted in a manner described in a discharger's RWD, WDR orders typically prescribe effluent limitations for flow and other parameters that reflect the discharge as represented in the RWD.

The Tentative Order establishes two new discharge flow limitations in one requirement (C.1): maximum daily flow of 0.65 mgd and total annual flow of 175 MG. An annual average discharge flow of 175 MG divided by 300 working days per year yields an annual average discharge flow per working day of 0.6 mgd. Flow Limitation C.1 states, in part: "Supplemental irrigation water volumes shall only be included if the water is added to the wastewater sump prior to discharging to the infiltration basins and LAAs."

Comment: The Current Order indicates supplemental irrigation water is applied separately to the LAAs. Has this changed? Does the Discharger have the capability to add supplemental irrigation water to the Facility's sump? If so, how often is this done. Please clarify.

The Tentative Order does not provide technical justification for its discharge flow limits of 0.65 MG daily maximum and 175 MG total annual. It does not explain why its 175 MG total annual flow limit is 40 MG greater than the 135 MG annual design wastewater flow value cited in the RWD. It does not explain why it kept the Current Order's 0.65 mgd discharge flow limit, but changed its applicability from monthly average daily discharge flow to maximum daily discharge flow. It does not characterize daily discharge flows to confirm the Discharger's ability to consistently comply with this new limit. Further, it does not explain why it does not prescribe a limit for monthly average discharge flow that would ensure compliance with the total annual flow limitation.

Recommendation: Please revise the Tentative Order to prescribe a monthly average daily discharge flow limitation of 0.5 mgd, determined as a 12-month running average, and a total annual discharge flow limitation of 150 MG. These limitations reflect the discharge characterized in the Discharger's RWD and SMRs. Alternatively, please revise the Tentative Order to address the deficiencies identified above.

Please see my comments above regarding Mass Loading Limitation E.1 recommending it should apply to all areas receiving wastewater applications.

The preface to Groundwater Limitations G.1 and G.2 does not specify the IBs as being within the Facility: "Discharge of waste at or from any portion of the Facility and LAAs shall not cause or contribute to groundwater containing constituent concentrations in excess of the concentrations specified below or in excess of natural upgradient quality, whichever is greater"

Recommendation: Revise the preface to read: Discharge of waste at or from any portion of the Facility*, infiltration basins,* and LAAs shall not cause or contribute to groundwater…"

Please see my comments above regarding applicability of Land Application Area Specifications to all areas receiving wastewater applications.

Land Application Area H.1 states: "The Discharger shall ensure that all water is applied and distributed with reasonable uniformity across each LAA field, consistent with good agricultural irrigation practices and reasonable agronomic rates."

Recommendation: To ensure total hydraulic loadings to the LAAs (i.e., from wastewater and supplemental irrigation water) do not exceed reasonable agronomic demand, consider including the following language in this specification or in a new, stand-alone specification:

> Hydraulic loading of wastewater and irrigation water shall be at reasonable agronomic rates designed to minimize the percolation of wastewater and irrigation water below the root zone (i.e., deep percolation).[6]

Land Application Area H.8 states: "Discharge to the LAAs or on-site landscaped areas shall not be initiated when the ground is saturated."

Recommendation: The Tentative Order does not mention any "on-site landscaped areas." Consider deleting this phrase or explain why it applies to the discharge.

*Also, consider inserting after "saturated" clarifying language in parentheses. For example, WDR Order R5-2023-0028, G.8 includes the following: (e.g., during or immediately after significant precipitation events). Also, land application specifications in the General Winery Order (Order WQ 2021-0002-DWQ) include the following: Process water and process solids shall not be applied to the LAA within **24 hours** of forecasted precipitation with a greater than 50-percent probability of occurring, during precipitation events, or when the ground is saturated.*

[6] LAA Specification G.5 in WDR Order R5-2023-0028 for Central Valley Meat, Inc. et al., Hanford Beef Processing Facility, Kings County

Comment: Has staff confirmed the Discharger has the necessary infrastructure and operational flexibility to consistently comply with Land Application Area Specification H.8? Discharger SMRs show wastewater is sometimes discharged to LAAs on days with appreciable precipitation. For example, on two days in December 2021 (13 & 14), when rainfall was over 2.8 inches, 1,379,760 gallons of wastewater was applied to RR-2.

Provisions. Provision J.5, requiring compliance with Standard Provisions, is redundant as Standard Provision A.1 already requires this.

Recommendation: Consider deleting Provision J.5 or explain why it is appropriate to include a provision for this apparently reductant requirement.

Please see my earlier recommendation to include a provision requiring the Discharger to submit by six months a technical report and implementation schedule for discharge modifications to the IB discharge to achieve and maintain compliance with Mass Loading Limitation E.1 and all Land Application Area Specifications.

Monitoring and Reporting Program. The MRP header does not include the Facility name.

Recommendation: Include Bronco Winery in the MRP header.

The MRP does not include a table of Monitoring Location Designations that is typically found in recently-adopted WDR orders (see R5-2023-0028).

Recommendation: Revise the MRP to include a table listing monitoring location designations.

The MRP does not define Standard Minerals in a way that is applicable to the entire MRP. For example (from R5-2023-0028):

> Analysis shall include; alkalinity (as $CaCO_3$), bicarbonate (as $CaCO_3$), boron, calcium, carbonate (as $CaCO_3$), chloride, iron, magnesium, manganese, nitrate as N, phosphate, potassium, sodium, sulfate, and verification that the analysis is complete (i.e., cation/anion balance).

Recommendation: Revise the MRP to include a definition of Standard Minerals that includes the constituents listed above and total phosphorus.

Source Water Monitoring. Standard minerals are defined as including, at a minimum, chloride, sodium, dissolved iron, and dissolved manganese. This list should include additional constituents as described above.

Infiltration Basin Monitoring. Dissolved oxygen (DO) monitoring does not specify it should be performed in the morning, when DO levels may be low as a result of algae growth.

Recommendation: Include a footnote for DO monitoring (adapted from R5-2023-0028):

> *Samples for DO shall be collected from the ponds between 8:00 am and 10:00 a.m. when there is more than one foot of water in the pond. If there is insufficient water in the pond no sample shall be collected, and the Discharger shall report that in the appropriate monitoring report.*

Wastewater Effluent Monitoring. The table specifies sample type as "Composite" but does not specify sample time span. Because the Facility operates 24 hours per day (Finding 9), the table should specify 24-hour composite samples.

The table specifies sampling be performed monthly. Because of the variability of winery wastewater, and for the need to accurately characterize discharge BOD and TN for calculating loading rates, the sampling frequency for BOD and TN should be increased from monthly to weekly. And, since EC is easy to measure and is a useful monitoring parameter, it should also be monitored weekly. The table includes monthly monitoring for FDS. It should also include TDS to provide ongoing data characterizing the discharge for volatile dissolved solids (VDS).

There is no requirement for pH monitoring. Due to the discharge's fluctuating pH, the MRP should require weekly discharge pH monitoring by grab samples.

Elevated iron concentrations in the discharge, evident from annual standard mineral monitoring results, suggests that the wastewater's corrosivity is apparently capable of dissolving metals from the Facility's piping. Accordingly, the MRP should require monthly monitoring of the discharge for dissolved metals (i.e., chromium, copper, iron, lead, manganese, and nickel).

Elevated concentrations of sulfate and potassium in the discharge, evident from annual standard minerals monitoring, indicate these two constituents are major contributors to discharge salinity. To provide an ongoing characterization of the discharge for these salinity constituents, the MRP should include monthly monitoring of sulfate and potassium via 24-hour composite samples.

Monitoring of discharge total phosphorus provides data useful in assessing whether the discharge has sufficient phosphorus to support microbial BOD and TN decomposition. Low phosphorus concentrations in the discharge (and in groundwater) may reveal that phosphorus is a rate-limiting constituent for BOD and TN soil treatment.

And, to provide an ongoing characterization of the discharge for standard minerals, monitoring for standard minerals should be performed annually, as it is required under the Current MRP.

Recommendation: Revise the Wastewater Effluent Monitoring table to:

- *Specify 24-hour composite samples for all constituents except pH*

- *Include weekly monitoring of pH by grab samples*
- *Include monthly monitoring of TDS, TSS, total phosphorus, potassium, sulfate, and dissolved metals (i.e., chromium, copper, iron, lead, manganese, and nickel) by 24-hour composite samples.*
- *Include annual monitoring for standard minerals by 24-hour composite samples*
- *Include annual monitoring for chromium, lead, and nickel*
- *Increase monitoring frequency of BOD, TN, and EC from monthly to weekly*

Routine Monitoring. The MRP does not apply this requirement to the IB discharge. The Tentative Order currently does not require the Discharger to monitor and report on loadings to the IBs of wastewater, BOD, TN, and FDS. To provide an ongoing characterization of the IB discharge with respect wastewater and waste constituent loadings, the MRP should require this routine monitoring also for the IB discharge.

Recommendation: Revise the MRP to require Routine Monitoring be performed also of the IB discharge.

Groundwater Monitoring. The MRP requires the Discharger to submit plans and specifications for the construction of additional groundwater monitoring wells. Most WDRs with this requirement include a 'boilerplate' attachment, "Requirements for Monitoring Well Installation Work Plans and Installation Reports" (see R5-2023-0028, Attachment E).

Recommendation: Include as a WDR order attachment the above-cited Requirements for Monitoring Well Installation Work Plans and Installation Reports. Revise the Groundwater Monitoring section to reference this attachment:

> Prior to construction of any additional groundwater monitoring wells, the Discharger shall submit plans and specifications to the Central Valley Water Board for review and approval. *The technical report containing the plans and specifications shall satisfy the information requirements of Attachment X, Requirements for Monitoring Well Installation Work Plans and Installation Reports"*

The MRP requires semiannual monitoring of new groundwater monitoring wells, apparently for an indefinite period, even though the sampling frequency for existing wells is quarterly.

The MRP requires groundwater monitoring for TKN but not also for ammonia as nitrogen. As TKN measures organic nitrogen and ammonia, it is important that the suite of monitored constituents include ammonia (as N) to assess the efficacy of crop uptake and soil treatment for nitrogen removal.

The MRP has inexplicitly dropped groundwater monitoring for pH, which is inappropriate given the naturally acidic nature of the discharge and the need to assess whether it is impacting groundwater pH. TOC is an important indicator of the extent to which the discharge is causing groundwater TOC to increase over background. Elevated TOC concentrations in groundwater affected by the discharge, along with elevated VDS, indicates the potential for additional impacts to groundwater downgradient of the discharge from decomposition byproducts, including dissolved iron, manganese, and arsenic. Dissolved arsenic is also important indicator of organic carbon overloading and should also be added to the suite of monitored groundwater constituents.

Recommendation: Revise the Groundwater Monitoring section to require new groundwater monitoring wells be sampled on a quarterly basis. And revise the table identifying monitored groundwater constituents to include pH, FDS, VDS, ammonia, TOC, and dissolved arsenic. And, refer to the definition of Standard Minerals that I recommended above.

The MRP does not include soil monitoring of LAA and IB soils. The lack of soil monitoring suggests that staff lacks an appreciation of the utility of soil monitoring data to assess the extent to which waste constituents (salinity, nitrogen) accumulates in the upper soil profile and pose a threat to groundwater quality. The Facility is one of the largest wineries in the Central Valley Region, and its discharge to land has been ongoing for 50 years. Current groundwater monitoring data shows the discharge has already adversely impacted groundwater. Soil monitoring data can reveal the extent to which the discharge poses an ongoing threat to groundwater quality. Essentially, soil monitoring yields data on potential groundwater impacts, making it akin to the canary in the coal mine.

The MRP should require soil monitoring comparable to that specified in MRP R5-2015-0040 for E&J Gallo Winery, Fresno Winery:

> The Discharger shall establish, with the concurrence of Central Valley Water Board staff, representative soil profile monitoring locations within and outside of the land application areas and at least two representative background location(s) (i.e., that historically have not received process wastewater). The Discharger shall submit a map to the Central Valley Water Board with the identified sample locations no fewer than **60 days** prior to the first soil sampling event following adoption of this Order…

MRP R5-2015-0040 requires soil monitoring of the following constituents/parameters: Soil pH, Buffer pH, sodium, chloride, nitrate as nitrogen, and TKN, and requires samples be taken at four depths (0.5, 2, 4, and 6 feet bgs.).

Recommendation: Revise the MRP to include soil monitoring comparable to that required by MRP R5-2015-0040 for E&J Gallo Winery, Fresno Winery.

Quarterly Monitoring Reports. The MRP requires BOD loading rates be calculated using the BOD concentration based on the most recent monitoring report. I earlier recommended BOD monitoring frequency be increased to weekly. To account for the variability in discharge BOD and TN concentrations, some WDRs for food processing and winery discharges specify that BOD and TN concentrations used in determining BOD and TN loading rates be based on the average of the four most recent results for BOD and TN (e.g., MRP R5-2015-0040 for E&J Gallo Winery, Fresno Winery).

Recommendation: Provided the MRP is revised to increase discharge BOD and TN monitoring to weekly, consider specifying that values used for BOD and TN concentrations in calculating loading rates be based on the average of the four most recent results for BOD and TN.

Annual Monitoring Reports. The MRP does not require a summary of the LAA discharge operation comparable to other MRPs for LAA discharges. The following is from MRP R5-2015-0040 for E&G Gallo Winery, Fresno Winery:

Land Application Area Reporting

1. The type of crop(s) grown, planting and harvest dates, and the quantified nitrogen and fixed dissolved solids uptake (determined by representative plant tissue analysis). Include any soil and/or tissue sampling results.

2. The monthly and annual discharge volumes during the reporting year expressed as million gallons and inches.

3. A monthly balance for the reporting year that includes:

    a. Monthly average ET0 (observed evapotranspiration) – Information sources include California Irrigation Management Information System (CIMIS) http://www.cimis.water.ca.gov/

    b. Monthly crop uptake

        i. Crop water utilization rates are available from a variety of publications available from the local University of California Davis extension office.

        ii. Irrigation efficiency – Frequently, engineers include a factor for irrigation efficiency such that the application rate is slightly greater than the crop utilization rate. A conservative design does not include this value.

    c. Monthly average precipitation – this data is available at http://www.cimis.water.ca.gov/ or http://www.ncdc.noaa.gov/oa/climate/online/ccd/nrmlprcp.html.

    d. Monthly average and annual average discharge flow rate.

4. A summary of daily and cycle average BOD loading rates.

5. The total pounds of nitrogen applied to the land application areas from all sources (wastewaters, fertilizers, and irrigation waters) as calculated from the sum of the monthly loading to the land application areas in lbs/ac/yr.

6. The total pounds of FDS that have been applied to the land application areas, as calculated from the sum of the monthly loadings to the land application areas in lbs/ac/yr.

Recommendation: Revise the MRP's Annual Monitoring Report Section to require a summary of the LAA discharge comparable to MRP R5-2015-0040.

Also, if staff agrees with my recommendation to include soil monitoring, the Annual Monitoring Report requirements should include a summary of soil monitoring data. The following is from MRP R5-2015-0040:

Soils Reporting

1. The results of soil monitoring specified on page 9. The analytical results should be presented in tabular form and include depth of sample. If no sample is collected at a specified depth it should be noted in the table along with the reason no sample was collected.

2. A site map showing the location of each sampling point. The map shall also include the locations of all monitoring wells and wastewater storage and/or discharge areas.

Additional Comments. The Tentative Order does not identify the attachments in its table of contents.

Recommendation: Revise the Tentative Order to identify its attachments in the Table of Contents.

Lastly, because the Current Order's MRP requires groundwater monitoring for TDS and EC, and not for other salinity constituents, staff's interpretation on the discharge's impact on groundwater from salinity is limited to TDS and EC. Had staff acted on the recommendation I offered three years ago to require the Discharger to monitor groundwater for an expanded suite of constituents (including bicarbonate alkalinity, calcium, magnesium, and TOC), there would have been sufficient data available to distinguish the discharge's impact to groundwater from salinity from that caused by area agricultural land uses.

Recommendation: Prior to preparing future updated tentative WDR orders for winery wastewater discharges with groundwater monitoring requirements, staff should review the existing suite of monitored COCs in groundwater to check whether it includes those necessary to evaluate the discharge's impact to groundwater from organic carbon loading. These *include bicarbonate alkalinity, calcium and magnesium (hardness), TOC, and dissolved iron, manganese, and arsenic.*

Total phosphorus is also an important constituent to monitor in groundwater as low or non-detect concentrations of total phosphorus in groundwater along with elevated nitrate and TOC may indicate that phosphorus is a rate-limiting constituent for successful nitrogen removal treatment.

Due to the elevated concentrations of potassium and sulfate in winery wastewater, groundwater should also be monitored for these two constituents. Note that applied potassium, in general, tends to accumulate in the soil profile but if loadings exceed the soil's capacity to sequester applied potassium, this constituent can break through and cause significant salinity impacts to groundwater from salinity (see for example Finding 46 in WDR Order R5-2014-0045 for O'Neill Beverages Company, LLC, Reedley Winery, Fresno County).

And, lastly, if discharge monitoring data show elevated concentrations iron, manganese, and other metals, the groundwater should also include monitored for metals including chromium, copper, iron, lead, manganese, and nickel.

Thank you for your time and consideration.

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