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**Tentative Waste Discharge Requirements Order for Caruthers Raisin Packing Company, Inc. and Jon Robinson, Raisin Processing Plant, Fresno County**

This letter transmits my written comments on the subject Tentative Waste Discharge Requirements Order. I am a resident of Fresno County and a California registered civil engineer with expertise in evaluating the effects to soil and groundwater from discharges of food processing and winery wastewater to land for treatment and disposal. I submit the following recommendations in the hope that Central Valley Water Board staff will revise the Tentative Order accordingly, or provide technical justification to the Central Valley Water Board why staff does not concur with my recommendations.

1. Finding 2 indicates that Caruthers Raisin Packing Company, Inc. ("Caruthers Raisin" or "Discharger") has discharged raisin processing wastewater to a 5-acre parcel adjacent to its Plant property since 1985 and states, "This discharge was not regulated by waste discharge requirements." **Recommendation 1:** This finding should be revised to explicitly state that the Discharger initiated the discharge without filing a report of waste discharge as required by California Water Code (CWC) § 13260 and, as such, conducted the discharge for almost two decades in violation of CWC § 13264. [A violation of § 13264 carries an administrative civil liability of up to \$1,000 per day of violation per CWC § 13265.] It is appropriate for the Central Valley Water Board to find that this Discharger had conducted its discharge in violation of CWC § 13264, particularly because elsewhere the Tentative Order finds that the unauthorized discharge has degraded groundwater passing under the 5-acre parcel from salt and metal constituents, and caused it to contain iron and manganese in concentrations exceeding applicable water quality objectives.
2. Findings 6 and 7 characterize the Plant's current production and wastewater flow patterns, and indicate that the Plant's average annual wastewater discharge flow is about 24 million gallons. In 2006, the discharge's biochemical oxygen demand (BOD) concentration averaged 7,300 mg/L. Assuming that the Plant's annual wastewater flow (24 million gallons) and discharge BOD are similar to that characterized in 2006 during the decades the Discharger conducted the unauthorized discharge, the discharge's annual BOD loading to the 5-acre disposal area was about 1,500,000 lbs or 800 lbs/acre/day as a daily average.<sup>1</sup>

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<sup>1</sup> (24 million gallons/year)(7,300 mg/L BOD)(8.34 conversion factor) ~ 1,500,000 lbs BOD/year, and (1,500,000 lbs BOD/year)/(365 days/year)/(5 acres) ~ 800 lbs BOD/acre/day.

It is instructive to express this loading in terms of population equivalents. Assuming a typical per capita domestic wastewater flow of 100 gallons per day (gpd) and an average domestic wastewater BOD content of 200 mg/L, the population equivalent of the unauthorized discharge to the 5-acre disposal area was equivalent to the wastewater flow of about 650 people,<sup>2</sup> and BOD loading of about 25,000 people.<sup>3</sup> Given this concentrated loading to the 5-acre disposal area, it is not surprising that the discharge degraded underlying groundwater. **Recommendation 2:** The Tentative Order should identify the loadings of waste constituents (BOD, nitrogen, salts) to the 5-acre disposal area prior to the Discharger's initiation of treatment in 2006. This information will support the Central Valley Water Board's inclusion in the Tentative Order (recommended below) of a provision prohibiting discharge to the original 5-acre disposal area. **Recommendation 3:** Finding 7 should identify where in the wastewater treatment process flow the Discharger installed a flow meter. Does the meter monitor flow entering or exiting the three 9,000-gallon aerated tanks? This is relevant because the Tentative Order's Monitoring and Reporting Program requires the Discharger to monitor effluent flow, but only estimate discharge flow to the Land Application Area.

3. Finding 14 states that the Land Application Area's irrigation system is divided into seven sections and wastewater application is rotated between the sections on a seven-day cycle, and that additional irrigation water may be needed to meet crop demand. **Recommendation 4:** The Tentative Order should include a finding describing the Discharger's water balance, which is typically included in a report of waste discharge to land and calculated on a monthly basis using an annual rainfall total representing a wet year of 100-year frequency. While additional irrigation water may be required during the summer months, do wastewater application rates exceed crop demand during the late summer and fall, as well as winter and spring? A description of the Discharger's water balance should answer these questions. **Recommendation 5:** The Tentative Order should identify the acreage of these seven sections (e.g., are they equal-sized sections of about four acres each?). This information is necessary to evaluate staff's characterization of the discharge's anticipated BOD loadings cited in Finding 22. Assuming the irrigation sections are about four acres each and that the discharge BOD is about 3,500 mg/L (2009 characterization described in Finding 10), the instantaneous BOD loading at the proposed 0.13 mgd monthly average discharge flow limit will be almost 950 lbs BOD/acre.<sup>4</sup> This loading represents a significant organic shock load that will rapidly deplete soil oxygen. The reducing conditions that occur under such high organic loading are necessary to denitrify applied nitrogen, but may also mobilize arsenic, iron, and manganese, which, absent sufficient attenuation in the soil profile, may be released to groundwater in concentrations exceeding applicable water quality objectives. **Recommendation 6:** The Tentative Order should require the Discharger to monitor soil-pore liquid at the bottom of the effective soil treatment zone (i.e., the bottom of the root zone) for, at a minimum, total organic carbon, iron and manganese, and nitrate. This requirement is reasonable and appropriate to monitor the effectiveness of soil treatment in decomposing applied BOD and nitrogen and attenuating other applied waste constituents. The resulting data are necessary to evaluate: (a) whether BOD loading rates authorized by the Tentative

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<sup>2</sup> (24 MG/yr)(1,000,000 gal/MG)(1 person/100 gpd)(1 yr/365 days) ~ 660 persons

<sup>3</sup> (1,500,000 lbs BOD/yr)(1 yr/365 days)(person/100 gpd)(1/200 mg/L BOD)(1/8.34 conversion factor)(10<sup>6</sup> gallons/MG) ~ 25,000 persons

<sup>4</sup> (0.13 mgd)(3,500 mg/L BOD)(8.43 conversion factor)/(4 acres) ~ 950 lbs BOD/acre on day of application

Order are sufficiently conservative to ensure that adequate organic decomposition occurs within the treatment or root zone and will not cause excessive mobilization of iron and manganese, and (b) whether waste application practices (e.g., instantaneous loadings and rest intervals) are optimized to preclude the leaching of nitrate below the root zone.

4. Finding 22 includes the following regarding the Guidance Manual prepared by the California League of Food Processors:

The Guidance Manual prepared by the California League of Food Processors (CLFP) establishes risk categories for land application of food processing wastewater. Based on current BOD loading rates, the discharge falls within Risk Category 1 for organic loading during the light processing season (November through June), and Risk Category 2 for the peak processing season (July through October). According to the CLFP Guidance Manual, organic loading which falls within Risk Category 1 poses a de-minimus risk indistinguishable from common agronomic conditions and Risk Category 2 poses a minimal risk of unreasonable degradation of groundwater provided reasonable care is taken to evenly distribute the wastewater and properly manage the land application area.

While CLFP consulted Central Valley Water Board staff during its preparation of its Guidance Manual, Central Valley Water Board public records include staff correspondence to CLFP describing the Guidance Manual's positive aspects as well as its deficiencies. As described in this correspondence, the Guidance Manual's theoretical model of land treatment relies upon untested assumptions on the rate of oxygen transfer into soil following applications of high-BOD wastewater. The Guidance Manual describes how to use the theoretical model to design a land application system, including its maximum BOD loading rates and minimum drying intervals. It has not, however, been subjected to a scientific peer review and has not, to date, been proposed by staff for consideration by the Central Valley Water Board to approve its use by staff as a technical guidance document. **Recommendation 7:** The Tentative Order should delete all references to the Guidance Manual. This includes references in Finding 22 and Finding 46, which states, the Discharger "provides treatment and control of the discharge that incorporates ... organic loading rates consistent with those recommended by the California League of Food Processors as unlikely to cause unacceptable groundwater degradation." This also includes references to the Guidance Manual in the Tentative Order's Information Sheet.

5. Finding 29 characterizes the Plant's source water, which is supplied by two on-site wells, has exhibiting 300 micromhos per centimeter ( $\mu\text{mhos/cm}$ ) electrical conductivity at 25 degrees Centigrade (EC) and less than 3 mg/L  $\text{NO}_3\text{-N}$ . Finding 30 presents average concentrations in the Discharger's three shallow groundwater monitoring wells based on data collected from 2005 to 2008. The data show that upgradient groundwater exhibits an EC of 840  $\mu\text{mhos/cm}$ , which is below the Title 22 recommended secondary maximum contaminant level of 900  $\mu\text{mhos/cm}$ . As such, groundwater underlying and upgradient from the discharge area is high quality water and the Central Valley Water Board is obligated to ensure that the Waste Discharge Requirements Order it adopts to authorize the discharge is consistent with State Water Resources Control Board Resolution 68-16, (*Policy with Respect to Maintaining High Quality Waters of the State*).
6. Finding 33 discusses the data presented in Finding 30 and indicates that the concentrations of iron and manganese in groundwater downgradient of the 5-acre disposal area exceed applicable water quality objectives of 0.3 mg/L and 0.05 mg/L, respectively. As stated in Finding 43, Resolution

68-16 "prohibits degradation of groundwater unless it has been shown that the degradation does not result in water quality less than that prescribed in state and regional policies, including violation of one or more water quality objectives...." Finding 45 describes the public benefits of the Discharger's operation and states, "Provided that discharges from the Plant comply with State and Central Valley Water Board plans and policies, authorized degradation due to the continued operation of Caruthers Raisin is to the maximum benefit to the people of the State." The discharge has already caused groundwater to contain iron and manganese in concentrations exceeding applicable water quality objectives. Excessive past loadings to the 5-acre disposal area have likely saturated the soil profile with waste constituents in concentrations that threaten continued groundwater degradation.

**Recommendation 8:** The Tentative Order should be revised to prohibit discharge to the original 5-acre disposal area, because past discharges to this area have degraded groundwater, caused exceedances of water quality objectives for iron and manganese, and caused groundwater to contain excessive amounts of total organic carbon, which exerts an oxygen demand and promotes reducing conditions that, in turn, promote the mobilization of iron and manganese, as well as arsenic. This prohibition is necessary for the Tentative Order to comply with Resolution 68-16, and will require the Discharger to modify its discharge. The Tentative Order should establish a time schedule for the Discharger to either (a) acquire additional land application acreage, (b) reduce wastewater flows, and/or (c) reduce concentrations of decomposable waste constituents to levels that will not overload portions of the land application area that have not been used for waste disposal.

7. Finding 34 states, "It is anticipated that with the reduced organic load and implementation of best management practices (BMPs) that water quality beneath the site will improve over time. This Order includes a provision requiring Caruthers Raisin to expand its monitoring well network including replacement of dry monitoring wells and continued groundwater monitoring to confirm this."  
**Recommendation 9:** The Tentative Order should provide technical information that supports this conclusionary statement, as explained below.
8. Finding 44 identifies the constituents of concern in the discharge that have the potential to degrade groundwater and states, "Groundwater iron and manganese degradation from historic operations should self-remediate over time and this Order requires Caruthers Raisin to expand the Plant's groundwater monitoring well network to monitor remediation progress." **Recommendation 10:** The Tentative Order should provide technical information to support this finding's assumption that groundwater conditions underlying the original 5-acre disposal area will "self-remediate over time," especially since the proposed discharge will continue to load the area with organic and salt waste constituents. Given the extremely high loadings to the original 5-acre disposal area (recall that above I estimated the past discharge's BOD loading as equivalent to that of 25,000 people!), the Central Valley Water Board should not authorize the continued discharge of high-BOD wastewater to the original 5-acre disposal area with the hope that someday, somehow, groundwater conditions will improve over time. Indeed, the issue of groundwater degradation caused by the Discharger's past practices is better addressed through the issuance of a Cleanup and Abatement Order pursuant to CWC § 13304 rather than in a Waste Discharge Requirements Order that ostensibly complies with the Basin Plan and Resolution 68-16. **Recommendation 11:** In the event staff does not concur with Recommendation 8 to prohibit further discharge to the original 5-acre disposal area, the Tentative Order should be revised to prohibit discharge to this area at least until concentrations of total organic carbon in groundwater downgradient of the 5-acre disposal area decrease to levels representative of background conditions.

9. Finding 44.c indicates that groundwater salinity as measured by EC and Total Dissolved Solids (TDS) is elevated in downgradient monitoring wells compared to background and states, "It is believed that the elevated EC and TDS concentrations are, in part, the result of increased bicarbonate in down-gradient wells due to past organic overloading of the Land Application Area. The reduced organic load and implementation of BPTC measures should result in the reduction of groundwater for EC and TDS increases due to organic loading." Projections of what groundwater conditions will be under the improved discharge operation should be based on site-specific technical evidence and sound technical assumptions, not on faith. Indeed, this sentence appears to reflect staff's uncertainty in identifying the discharge's potential to impact groundwater from salinity constituents that are released to groundwater from the soil treatment of applied BOD. The BOD loadings authorized by the Tentative Order – almost 1,000 lbs BOD/acre on the day of application – will continue to create bicarbonate alkalinity, as well as elevated hardness (calcium and magnesium), which will continue to leach into and degrade groundwater. While the Basin Plan does not establish water quality objectives for bicarbonate alkalinity and hardness, these constituents contribute to groundwater EC and TDS, which do have water quality objectives. **Recommendation 12:** Finding 44.c should be revised to provide convincing technical evidence that groundwater conditions will improve under the improved discharge operation.
10. Finding 55 describes the Mitigated Negative Declaration that Fresno County adopted in March 2005 in accordance with the California Environmental Quality Act (CEQA). The Mitigated Negative Declaration covers the Discharger's Plant upgrades and reuse of processing wastewater for irrigation on crops. **Recommendation 13:** The Tentative Order should also cite and describe the CEQA document for the Plant's construction and operation and its associated wastewater disposal operation.
11. Finding 59 indicates the discharge should be classified as Category 2 threat to water quality and Category B complexity. **Recommendation 14:** The discharge complexity should be classified as Category A because the Tentative Order requires the Discharger to install and operate a groundwater monitoring well network. This is consistent with the definition of Category A complexity in Title 23, California Code of Regulations, § 2200, which defines Category A complexity as: "Any discharge of toxic waste, any small volume discharge containing toxic waste or having numerous discharge points **or ground water monitoring**, or Class 1 waste management unit" (emphasis added).
12. The Tentative Order prescribes several effluent limitations (i.e., for EC, boron, and chloride) but fails to prescribe an effluent limitation for BOD to reflect the Discharger's operation of the Plant's wastewater treatment system. Without an effluent limitation for BOD and regular BOD monitoring of the discharge for compliance with this effluent limitation, how can the Central Valley Water Board be assured that the Discharger will continue to optimally operate and maintain the Plant's wastewater treatment system? Evaluation of discharger's compliance with prescribed BOD loading rates is complicated by the large amount of land application monitoring that is required. Often times, dischargers do not expend the necessary resources to conduct this monitoring as specified. Establishment of an effluent BOD limit will expedite staff's evaluation of the discharger's compliance with the Tentative Order's BOD loading rates. **Recommendation 15:** The Tentative Order should prescribe an effluent limitation for BOD that reflects the optimal operation of the Plant's wastewater treatment system, which the Tentative Order in Findings 11 and 34 indicates is capable of reducing influent BOD by 50 percent. The effluent limitation may be expressed as a monthly average BOD removal of 50 percent or a monthly average BOD concentration of 3,500 mg/L. Either limit

would require the Discharger to operate and maintain the Plant's wastewater treatment system as designed. Establishment of a BOD effluent limitation will also facilitate staff's evaluation of the Discharger's compliance with Prohibition A.2, which concerns treatment bypass.

13. Land Application Area Requirement D.4 establishes monthly average BOD loading rates of 125 lbs/acre/day from July through October and 50 lbs/acre/day from November through June. The Tentative Order does not provide sufficient technical information to justify these BOD loading rates as protective of groundwater quality. Indeed, the question of what constitutes a protective BOD loading in land treatment systems has not been satisfactorily addressed in the technical literature. The issue of BOD loading and its potential to degrade groundwater was discussed in two staff presentations to the Central Valley Water Board on 28 January 2005 and 17 March 2006.<sup>5</sup>

**Recommendation 16:** The Tentative Order should identify the prescribed BOD loadings as those reflecting the Discharger's proposed soil treatment and disposal operation, and not assert that these prescribed rates are protective of groundwater quality. The Tentative Order should require the Discharger to periodically monitor soil-pore liquid to assess the potential for the discharge – as conducted in accordance with the prescribed loadings – to unreasonably degrade groundwater. Simply put, if the soil-pore liquid contains excessive concentrations of total organic carbon, then the BOD loading rates should be reduced until total organic carbon concentrations are comparable to background groundwater levels (i.e., around 0.75 mg/L, as indicated in Finding 30). The Tentative Order should include a provision allowing the Central Valley Water Board to reopen the Order to prescribe lower BOD loading rates in the event that soil-pore liquid monitoring (and groundwater monitoring) demonstrates prescribed loading rates threaten to violate the Order's groundwater limitations.

14. The Tentative Order's Monitoring and Reporting Program identifies the constituents to be monitored in the Plant's wastewater treatment system's influent and effluent, as well as soil, source water, and groundwater.

14.1. **Recommendation 17:** The MRP should require monitoring of influent and effluent for BOD and nitrogen compounds to occur on the same day, so that the data can be used to accurately calculate the percent BOD and nitrogen removals provided by screening and aeration treatment.

14.2. **Recommendation 18:** The MRP should include total phosphorus in General Mineral list of constituents and parameters. Phosphorus data are necessary to allow for periodic evaluations of discharge quality, in part, to determine whether there is sufficient phosphorus in the discharge for optimal biological decomposition of applied decomposable waste. The data are also useful to evaluate groundwater conditions and the effectiveness of soil treatment.

14.3. **Recommendation 19:** The MRP should include potassium as a constituent to be monitored in soils (both background and affected soils). Raisin processing wastewater typically contains very high potassium concentrations. Unless applied potassium is sufficiently attenuated in the soil profile (e.g., by plant uptake or soil absorption), the discharge may release potassium to groundwater in concentrations that threaten exceedances of the groundwater limitation for EC.

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<sup>5</sup> Documents regarding these two staff presentations are currently available for download from [http://www.swrcb.ca.gov/centralvalley/water\\_issues/waste\\_to\\_land/](http://www.swrcb.ca.gov/centralvalley/water_issues/waste_to_land/)

Monitoring for soil potassium will provide necessary data to evaluate the extent of soil attenuation of this constituent.

- 14.4. **Recommendation 20:** The MRP should require effluent flows to the Land Application Areas to be monitored continuously via meter, not merely estimated. Accurate flow data are necessary to generate accurate results for waste constituent loadings.
- 14.5. **Recommendation 21:** The MRP should specify that samples collected from groundwater monitoring wells should be filtered prior to acid preservation to ensure accurate analytical data on groundwater metals (e.g., iron and manganese).
- 14.6. **Recommendation 22:** The MRP should require the Discharger to submit a map showing the locations of the parcels comprising the Land Application Area that are irrigated separately, and the parcels' identification numbers and acreages. It should require the Discharger to identify on a daily basis the parcel receiving the discharge. It should also require reporting of monthly average BOD loadings for each parcel (as opposed to cycle average BOD loadings) in quarterly monitoring reports. This is necessary to allow staff to evaluate on a quarterly basis the Discharger's compliance with the Tentative Order's BOD loadings, which are expressed in terms of monthly average rates.

In closing, while Caruthers Raisin provides a level of treatment exceeding that of most Central Valley dischargers of raisin processing wastewater, it nevertheless enjoyed an economic benefit while it conducted an unauthorized discharge to land for almost 20 years and, in so doing, degraded groundwater and caused it to contain waste constituents (iron & manganese) in concentrations exceeding applicable water quality objectives. The Central Valley Water Board should recognize the Discharger's history of noncompliance, and err on the side of caution to prohibit discharge to the original 5-acre disposal area.

The Central Valley Water Board should further recognize that the issue of what constitutes a safe BOD load is not something that should be based on staff's "belief" because it is far from resolved. Instead, it should exert its regulatory authority to require dischargers of high-strength food processing and winery wastewater to monitor soil-pore liquid at the bottom of the treatment zone to ensure that waste constituent loadings do not overwhelm the land application area's treatment capacity and threaten to unreasonably degrade groundwater. Monitoring of soil-pore liquid provides data critical in fine-tuning a land treatment system's BOD loading rate to levels that ensure that the beneficial uses of affected groundwater are protected for current and future generations.

  
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