

## INFORMATION SHEET

Waste Discharge Requirements Order No. R5-2009-XXXX  
Rodney and Sharlene DeJager, DBA Red Rock Dairy, Merced County

### INTRODUCTION

Rodney and Sharlene DeJager own the land where the new Red Rock Dairy is currently being built. The facility is located in Merced, County of Merced. Since the Red Rock Dairy was nonexistent before 2005, it is not covered under the General Order for Existing Milk Cow Dairies. Individual Waste Discharge Requirements are required for any dairy that was not operating as of 17 October 2005.

The EIR gives a maximum herd size (Holsteins) at the dairy as 5,636: 2,350 milking cows, 676 dry cows, 1,500 heifers (12-24 month), and 1,110 heifers (3-12 months). These are the herd size numbers that will be incorporated into the Individual WDRs.

The dairy will include corrals, freestall barns, milking parlor, feed storage, two mechanical separators and two wastewater storage lagoons. Both storage lagoons will be lined with a 60-mil HDPE liner over a 12" thick layer of native material reworked into a low permeability subbase. Wastewater will be land-applied to at least 1206 acres for agricultural production. All of the fields are able to direct their tailwater to tailwater ponds. Solid manure is applied to cropland or used onsite as bedding.

Merced County's Planning and Community Development Division is the lead agency for CEQA. An Environmental Impact Report (EIR) was prepared for the project and circulated through the California State Clearing House 15 May 2007 to 28 June 2007. The final EIR was adopted by County of Merced on 26 September 2007.

These Waste Discharge Requirements will permit the Red Rock Dairy to operate as a dairy and to house the number of cows allowed under the approved EIR. A Report of Waste Discharge dated 1 June 2009 has been submitted for the dairy. Additional information has been submitted to the Regional Board including a certified Nutrient Management Plan, a Waste Management Plan, and a Monitoring Well Installation and Sampling Plan.

### CURRENT CONDITIONS

The site of the dairy is zoned A-1 (General Agriculture). The cropland has been historically used for growing crops (primarily alfalfa and forage crops). The Merced County Soil Survey found soils at the Red Rock Dairy to be comprised of Lewis, Landlow, and Traver silty-clay loam soils.

## WASTE GENERATION AT FACILITY

Waste produced at the facility consists of wastewater from facility wash down operations and storm water containing manure, urine, milk products, spoiled feed material, bedding (litter), soil, and cleaning compounds. Solid wastes are also produced at the facility and primarily consist of manure with additional fractions of spoiled feed, bedding material and soil. An estimated 100,000 gallons per day (gpd) of clean water from the on-site water supply wells is used to wash down the holding pen, wash pen, and milking parlor floors, rinse the cows, and wash down miscellaneous dairy equipment. Over 120 days, the volume of barn wastewater generated will be 12,000,120 gallons. One hundred twenty days (December 1 through March 30) is the maximum amount of time that waste needs to be stored at the facility between land applications. Operation of the dairy is estimated to generate 5,733,000 gallons of manure wastewater over 120 days for the 3026 milk and dry cows that are housed in the barns. Rainfall onto impervious areas of the facility, onto the lagoons, and onto corrals is estimated at 25,832,000 gallons over the December through March storage period, using average rainfall figures and including rainfall from one 25-year, 24-hour storm.

The total amount of wastewater requiring storage over the 120-day maximum storage period, after removing losses due to evaporation and adding one 25-year 24-hour storm, is 39,760,330 gallons.

## WASTE MANAGEMENT AT FACILITY

There will be two solid separators and two wastewater storage lagoons at the dairy. The dimensions of the first storage lagoon will be 372' wide x 922' long x 16' deep. The dimensions of the second storage lagoon will be 312' wide x 992' long x 16' deep. Both lagoons will have 10' of the total depth above grade. The ponds will be lined with a 60 mil HDPE liner over a 12" thick layer of native material reworked into a low permeability sub base. The total storage capacity of the lagoons allowing for two feet of freeboard will be 41,782,411 gallons.

## LAND APPLICATION OF WASTEWATER TO CROPS

Wastewater and solid manure will be applied to land at agronomic rates to grow primarily alfalfa and forage crops in accordance with the certified field by field Nutrient Management Plan.

All fields that receive solid manure or liquid wastewater have tailwater recovery systems.

The Order requires that solid manure and wastewater samples be collected and analyzed, and the tons of solid manure and volume of wastewater applied to

each field determined. This information will be used to refine the Nutrient Management Plan on an ongoing basis.

The dates and volume of each irrigation application (without wastewater) will be recorded. These data are used to ensure that wastewater is not applied when the ground is at or above field moisture capacity, and to limit the flushing of nutrients below the root zone due to excessive application of irrigation water. In addition, samples of the irrigation water are tested to determine if there are nitrogen compounds present in the groundwater such that the Nutrient Management Plan should be amended to reflect nitrogen added from the irrigation water.

Soil monitoring and plant tissue monitoring are also required and the results used to further refine the Nutrient Management Plan.

## GROUND WATER AND SURFACE WATER MONITORING PROVISIONS

Four groundwater monitoring wells have been installed onsite in December 2005. The groundwater monitoring wells have been sampled on a semi-annual basis. Two of six irrigation wells on the property have also been sampled. The two wells sampled have exceeded the maximum contaminant level for Nitrate-Nitrogen, MW-3 having the highest level in February 2006 at 17.2 mg/l, and MW-1 highest level in February 2006 at 13.1 mg/l. MW-2 and MW-3 were below the MCL for nitrogen. The remaining two monitoring wells were below the MCL for nitrogen. There are at least three other dairies in close proximity to the facility. Cropland directly north, west and south of the facility are farmed by other dairy operations. Formerly the facility's cropland had been farmed by the Rock-Shar Dairy. It is likely that the nearby dairy and agricultural operations have contributed to the elevated nitrate-nitrogen contaminant levels found at the facility. Previous to the construction of the facility there was no animal activity on the property. The Individual WDRs will require that the monitoring wells be sampled quarterly for the first year and semiannually thereafter. The sampling data will be evaluated to confirm that the cropland management practices and the pond liners are effective at protecting groundwater quality. Additionally groundwater standards in the WDRs will be set to reflect the existing, pre-dairy, groundwater quality.

The four drilled monitoring well data will be used to characterize groundwater flow direction and gradient beneath the site, and characterize groundwater quality downgradient of the corrals, downgradient of the storage lagoon, and upgradient and downgradient of the cropland. Any additional groundwater monitoring wells required in the future will be installed in accordance with Attachment D. In addition, the Discharger will monitor existing domestic and agricultural production wells for changes in water quality.

Regional ground water flow is regionally to the west to southwest towards the San Joaquin River and the depth to groundwater in the area are typically less than 30 feet below ground surface.

Because all fields receiving solid manure or liquid wastewater have tailwater recovery systems, it is not anticipated that there will be off-property discharges of waste, which would be in violation of the Water Code. It is expected that, if the Nutrient Management Plan and other conditions of the Order regarding waste application are followed, any discharges of storm water from fields receiving solid manure or wastewater should not contain significant quantities of waste constituents. To verify this, representative samples of storm water will be collected from a portion of the fields each year to determine if waste constituents are present. Storm water monitoring will be adjusted based on the results from these samples.

## REPORTING REQUIREMENTS

By January 15 of each year, the Discharger will submit an Annual Report containing the information on facility operations outlined in the Monitoring and Reporting program and covering the period from 1 November through 31 October of the previous year. The initial annual report will cover the period from the date that operation starts through 31 October 2010. The initial annual report will also include documentation from a trained professional that no cross connections exist between the waste management system and any water supply or irrigation well.

By 30 June 2010, and annually thereafter, the Discharger will submit the results of groundwater monitoring and storm water monitoring conducted pursuant to the Monitoring and Reporting Program.

In the event of any noncompliance with the requirements of the Order that endangers human health or the environment, or any noncompliance with the prohibitions in the Order as listed in the Noncompliance Reporting provisions of the Monitoring and Reporting Program, the Discharger shall notify the Board within 24 hours of becoming aware of the occurrence. Information about the situation shall be collected and submitted in accordance with the Priority Reporting of Significant Events requirements in the Monitoring and Reporting Program.

## APPLICABLE WATER QUALITY STANDARDS

The Central Valley Water Board has adopted a Water Quality Control Plan (Basin Plan) for the Sacramento River and San Joaquin River Basins (4<sup>th</sup> ed.). This Basin Plan designates the beneficial uses of groundwater and surface waters of the Region, specifies water quality objectives to protect those uses, and includes

implementation programs for achieving water quality objectives. The Basin Plan also includes plans and policies of the State Water Board incorporated by reference, including State Water Board Resolution No. 68-16 (*Statement of Policy with Respect to Maintaining High Quality Waters in California*), State Water Board Resolution 88-63 (*Sources of Drinking Water Policy*), and State Water Board Resolution No. 92-49 (*Policies and Procedures for Investigation and Cleanup or Abatement of Discharges Under Water Code Section 13304*).

#### Beneficial Uses of Surface Water and Groundwater

Pursuant to Chapter II of the Basin Plan, the beneficial uses of surface water may include: municipal and domestic supply; agricultural supply; agricultural stock watering; industrial process supply; industrial service supply; hydro-power generation; body contact water recreation; canoeing and rafting; other non-body contact water recreation; warm freshwater aquatic habitat; cold freshwater aquatic habitat; warm fish migration habitat; cold fish migration habitat; warm spawning habitat; cold spawning habitat; wildlife habitat; navigation; rare, threatened, and endangered species; groundwater recharge; freshwater replenishment; aquaculture; and preservation of biological habitats of special significance. The Basin Plan contains a Table that lists the surface water bodies and the beneficial uses and where not listed, the Basin Plan designates beneficial uses based on the waters to which they are tributary or applicable state or federal requirements. These beneficial uses are protected in this Order by, among other requirements, the prohibition of a direct or indirect discharge of waste and/or storm water from the production area to surface waters, the prohibition of discharge of wastewater to surface waters from cropland, the prohibition of any discharge of storm water to surface water from the land application areas unless the land application area has been managed consistent with a certified Nutrient Management Plan, and the prohibition of discharge of waste from existing milk cow dairies to surface waters which causes or contributes to an exceedance of any applicable water quality objective in the Basin Plan or any applicable state or federal water quality criteria, or a violation of any applicable state or federal policies or regulations.

Chapter II of the Sacramento River and San Joaquin River Basin Plan states: “*Unless otherwise designated by the Regional Water Board, all groundwaters in the Region are considered as suitable or potentially suitable, at a minimum, for municipal and domestic water supply, agricultural supply, industrial service supply, and industrial process supply.*” These beneficial uses are protected in this Order by, among other requirements, the specification that the discharge of waste at an existing milk cow dairy shall not cause a violation of water quality objectives or cause pollution or nuisance.

#### Water Quality Objectives

Pursuant to the California Water Code Section 13263(a), WDRs must implement the Basin Plans, which require consideration of the beneficial uses of water, water quality objectives reasonably required to protect the beneficial uses, other

waste discharges, the need to prevent nuisance conditions in the disposal area, and the receiving water. The water quality objectives are implemented in WDRs consistent with the Basin Plan's *Policy for Application of Water Quality Objectives*. The Basin Plan requires that WDRs apply the most stringent objective for each constituent to ensure that discharges do not cause adverse affects to any beneficial use.

Water quality objectives are the limits or levels of water quality constituents or characteristics that are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area. Water quality objectives apply to all waters within a surface water or groundwater resource for which beneficial uses have been designated. Water quality objectives are listed separately for surface water and groundwater in Chapter III of the Basin Plan and are either numeric or narrative.

The primary waste constituents of concern due to discharges of waste from dairies are ammonia, nitrates, phosphorus, chloride, boron, salts, pathogens, and organic matter. The discharge of waste from dairies must not cause surface water or groundwater to exceed the applicable water quality objectives for those constituents.

#### *Water Quality Objectives and Federal Criteria for Surface Water<sup>1</sup>*

Water quality objectives that apply to surface water include, but are not limited to, (1) the numeric objectives, including the bacteria objective, the chemical constituents objective (includes listed chemicals and state drinking water standards, i.e., maximum contaminant levels (MCLs) promulgated in Title 22 CCR Division 4, Chapter 15 Sections 64431 and 64444 that are applicable through the Basin Plan to waters designated as municipal and domestic supply), dissolved oxygen objectives, pH objectives, and the salinity objectives; and (2) the narrative objectives, including the biostimulatory substances objective, the chemical constituents objective, and the toxicity objective. The Basin Plan also contains numeric water quality objectives that apply to specifically identified water bodies, including for example, electrical conductivity objectives for the Delta.

Federal water quality criteria that apply to surface water are contained in federal regulations referred to as the California Toxics Rule and the National Toxics Rule. See 40 CFR Sections 131.36 and 131.38.

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<sup>1</sup> It is important to note that this Order prohibits the direct or indirect discharge of waste and/or storm water from the production area to surface waters, the discharge of wastewater to surface waters from cropland, and requires the monitoring of discharges of storm water to surface water from the land application areas where manure or process wastewater has been applied as well as implementation of a certified Nutrient Management Plan.

### Water Quality Objectives for Groundwater

Water quality objectives that apply to groundwater include, but are not limited to, (1) numeric objectives, including the bacteria objective and the chemical constituents objective (includes state MCLs promulgated in Title 22 CCR Division 4, Chapter 15 Section 64431 and 64444 and are applicable through the Basin Plan to municipal and domestic supply), and (2) narrative objectives including the chemical constituents, taste and odor, and toxicity objectives.

### Implementation of Water Quality Objectives

The Basin Plan includes an implementation program for water quality objectives called the *Policy for Application of Water Quality Objectives*, which applies to implementation of both numeric and narrative water quality objectives. To evaluate compliance with narrative objectives, the Policy requires the Regional Board to consider, on a case-by-case basis, various factors and information, including direct evidence of beneficial use impacts (e.g., a fish kill), information submitted by the discharger and other interested parties (e.g., levels that constitute natural background or site-specific conditions, such as soil types), and “*relevant numerical criteria and guidelines developed and/or published by other agencies and organizations*”, such as the State Water Resources Control Board, California Department of Health Services, Department of Fish and Game, and the United States Environmental Protection Agency (USEPA). The Policy requires the Regional Board to consider this information and determine what specific numerical limit is “*relevant and appropriate*” to the situation at hand, and, therefore should be used in determining compliance with the narrative objective.

### Narrative Water Quality Objectives

Some of the considerations of relevant numerical criteria and guidelines developed or published by other agencies and organizations include:

#### *Agriculture*

The Basin Plan contains a narrative chemical constituents objective for both groundwater and surface water that states that “[*waters*] shall not contain chemical constituents in concentrations that adversely affect beneficial uses.” This objective applies to the protection of agricultural beneficial uses. Relevant numerical criteria and guidelines for agricultural uses of groundwater are included in publications from the National Academy of Sciences, the University of California Cooperative Extension, and the Food and Agricultural Organization of the United Nations. This information is summarized in a 1985 publication *Water Quality for Agriculture, Food and Agriculture Organization of the United Nations - Irrigation and Drainage Paper No. 29*, (hereafter U.N. Guidelines) and includes detailed information to evaluate the quality of irrigation water necessary to sustain various crops.

The major constituents used to assess the quality of water for beneficial uses of irrigated agriculture are salinity (expressed as total dissolved solids, or TDS), boron, chloride, and sodium. Salinity reduces crop growth by reducing the ability

of plant roots to absorb water. Boron is an essential element in very low concentrations but can become toxic to plants when concentrations in water even slightly exceed the amount required for optimal growth. While boron sensitivity appears to affect a wide variety of crops, sodium and chloride toxicities are mostly limited to tree crops and woody perennials (e.g., citrus, stone-fruit, and vineyard). A predominance of sodium relative to other ions in irrigation water may also disperse soil aggregates, which in turn, affects virtually all crops by decreasing the permeability of the soil to water and air.

Nitrogen in the form of nitrate and ammonium can also affect some nitrogen sensitive crops such as sugar beets, grapes, apricots, citrus, avocado, and some grain crops. Production of nitrogen sensitive crops may be affected at nitrogen concentrations above 5 mg/L nitrate (as nitrogen) or ammonium-nitrogen.

The University of California report titled "Managing Dairy Manure in the Central Valley of California" determined through both in-field studies and modeling simulations (ENVIRO-GRO) that 1.4 to 1.65 times the crop uptake was the lowest nitrogen application rate that would still allow good crop yields. Specifically the report states that, "investigations of the crop N recovery in several field experiments showed that the appropriate N loading rate that minimizes N leaching and maximizes N harvest is between 140 to 150% of the N harvested and computer models indicated a somewhat larger range of 140% to 165%." The report also indicated that a nitrogen "loading rate of 1.4 to 1.65 times the crop N harvest removal are practical and...achievable if the production field is properly managed." If a crop fails, all of the nitrogen applied is available as runoff or goes to groundwater. Therefore, an NMP incorporating the 1.4 to 1.65 standard is currently considered BPTC for control of nitrogen to groundwater and surface water. In addition, groundwater monitoring will be used to verify the effectiveness of the NMP.

The U.N. Guidelines conclude that salt tolerance of crops and yield reductions can vary depending on various factors, such as irrigation management, the crop being grown, and the site conditions. The U.N. Guidelines recommend that a site-specific assessment be conducted to determine if water quality above or below the U.N. Guidelines would provide protection of irrigated agricultural uses. The U.N. Guidelines divide water quality characteristics as having "No Problem – Increasing Problems – Severe Problems" and show numerical criteria that protect a full range of crops and would likely be protective under all irrigated agricultural uses. The numerical criteria for agricultural irrigation use are:

<u>Problem and Related Constituent</u>	<u>No Problem</u>	<u>Increasing Problems</u>
Salinity of irrigation water (micromhos per centimeter (µmhos/cm))	< 700	700 – 3,000
Salinity of irrigation water (total dissolved solids (mg/L))	< 450	450 – 2,000
<b>Specific Ion Toxicity</b>		
From ROOT absorption		
Sodium (mg/L)	< 69	69 – 207
Chloride (mg/L)	< 142	142 – 355
Boron (mg/L)	< 0.7	0.7 – 3.0
From FOLIAR absorption		
Sodium (mg/L)	< 69	> 69
Chloride (mg/L)	< 106	> 106
<b>Miscellaneous</b>		
NH <sub>4</sub> -N (mg/L) (for sensitive crops)	< 5	5 – 30
NO <sub>3</sub> -N (mg/L) (for sensitive crops)	< 5	5 – 30
HCO <sub>3</sub> (mg/L) (only with overhead sprinklers)	< 90	90 – 520
pH	normal range =	6.5 – 8.4

In determining the concentrations of the constituents listed above that will not result in adverse affects on agricultural beneficial uses in a given area, multiple criteria can apply. While the most stringent concentration becomes the constraining criterion, it is not necessarily the concentration that is required to protect all crops typically grown in the area. The U.N. Guidelines reflect the highest tolerable level of quality necessary to sustain the most sensitive crops but those crops may or may not be grown in the area. An evaluation of the existing crops grown in an area and crops that could be grown in that area is necessary to determine what the most stringent water quality criteria are that will protect all beneficial uses of water in that area. The highest water quality that is reasonable must be maintained.

*Animal Drinking Water*

As shown in the U.N. Guidelines, water quality needed to protect dairy animal drinking water uses are less sensitive than irrigated agriculture for all constituents shown above.

*Municipal and Domestic Supply*

With respect to water quality needed to protect municipal and domestic supply, the Basin Plan contains the narrative taste or odor objective that state in summary that waters shall not contain taste- or odor-producing substances in concentrations that cause nuisance, adversely affects any beneficial use, or impart undesirable tastes or odors in fish flesh or other edible products. Waste from a dairy contains organic nitrogen, a decomposition by-product of which is ammonia, a taste-producing substance that, if present in excessive concentrations, can adversely affect the beneficial use of groundwater for municipal and domestic supply. J.E. Amooore and E. Hautala have determined an

odor threshold for ammonia-nitrogen of 1.5 mg/L (*Odor as an Aid to Chemical Safety: Odor Thresholds Compared with Threshold Limit Values and Volatilities for 214 Industrial Chemicals in Air and Water Dilution*, Journal of Applied Toxicology, Vol. 3, No. 6 (1983)). While this numeric level is a value that is to be met at the point of use (i.e., the tap, rather than the receiving water), the Basin Plans state that “[w]ater quality objectives apply to all waters within a surface water or ground water resource for which beneficial uses have been designated, rather than at an intake, wellhead or other point of consumption.” In accordance with the *Policy on Application of Water Quality Objectives*, it is relevant, appropriate, and reasonable to use this numeric level of 1.5 mg/L ammonia-nitrogen to protect beneficial use of area groundwaters and surface waters for human consumption.

#### *Aquatic Life*

Ammonia is known to cause toxicity to aquatic organisms in surface waters. Waste from a dairy contains both ammonia and un-ionized ammonia, both of which can cause impact to aquatic life. The US EPA has established Ambient Water Quality Criteria for Ammonia for the protection of freshwater aquatic life. These criteria include an acute criterion (1-hour average) for total ammonia (including ionized and un-ionized ammonia) that is dependent on pH and fish species and a chronic criterion (30-day average) that is dependent on pH and temperature, and at temperatures less than 15 degrees centigrade (59° F) is also dependent on fish species. For freshwater aquatic life protection, the acute criterion for total ammonia-nitrogen ranges from 0.885 (at pH 9.0) to 32.6 (at pH 6.5) milligrams nitrogen per liter (mg N/L) when salmonids are present and from 1.32 (at pH 9.0) to 48.4 (at pH 6.5) mg N/L when salmonids are absent. The chronic criterion for total ammonia-nitrogen ranges from 0.179 (at pH 9.0) to 10.8 (at pH 6.5). These criteria are based on total (un-ionized plus ionized) ammonia.

The California Department of Fish and Game criteria to protect freshwater aquatic life is 0.02 mg/L un-ionized ammonia. The equilibrium between un-ionized and ionized ammonia is controlled by temperature and pH. The California Department of Fish and Game determines the concentration of un-ionized ammonia based on the known percentage of un-ionized ammonia in a concentration of total ammonia at a given temperature and pH.

#### *Numeric Water Quality Objectives*

##### *Maximum Contaminant Levels (Drinking Water Standards)*

The Basin Plan’s incorporation of MCLs by reference is prospective to incorporate changes to MCLs as changes in Title 22 CCR take effect. Should a change occur to an MCL and that MCL thereby becomes the most or more stringent objective, implementation of the changed objective would be affected through reopening of this Order.

### *Water Quality Objectives for Bacteria*

The majority of waste collected at a dairy is fecal matter or manure. This waste contains pathogenic bacteria and can impact water quality if not properly handled. The Basin Plan contains numeric water quality objectives for bacteria in surface waters and in groundwater. For surface water, the Basin Plan specifies that “[i]n waters designated for contact recreation (REC-1), the fecal coliform concentration based on a minimum of not less than five samples for any 30-day period shall not exceed a geometric mean of 200/100 ml, nor shall more than ten percent of the total number of samples taken during any 30-day period exceed 400/100 ml.” For groundwater, the Basin Plan specifies that “[i]n ground waters used for domestic or municipal supply the most probable number of coliform organisms over any seven-day period shall be less than 2.2/100 ml.”

### Receiving Water Limitations for Dairies

The numeric water quality objectives and numeric limits that are relevant and appropriate to implement narrative water quality objectives applicable to the primary waste constituents of concern in discharges of waste at dairy facilities that could affect groundwater and surface water are as follows: For groundwater, the most stringent limitations to implement narrative and numeric water quality objectives are for total coliform 2.2/100 milliliter (ml), for ammonia-nitrogen 1.5 mg/L, for boron 0.7 mg/L, for chloride 106 mg/L, for nitrate-nitrogen 5 mg/L, for EC 700 µmhos/cm, and for TDS 450 mg/L. For surface water, the most stringent limitations to implement narrative and numeric water quality objectives and criteria are for total coliform 2.2/100 ml, for chloride 106 mg/L, for nitrate-nitrogen 5 mg/L, for EC 700 umhos/cm, and for TDS 450 mg/L. For surface water, the appropriate limitation for ammonia is 0.02 mg/L un-ionized ammonia or a concentration of total ammonia determined by the pH and fish species, whichever is less. Less stringent limitations may apply to different areas but can only be determined through a site-specific assessment. The Discharger may propose the application of less stringent limitations for consideration in the Monitoring and Reporting Program. Dairy waste may include other waste constituents not mentioned here. This Order requires the discharge to comply with all water quality objectives and federal water quality criteria for surface waters applicable to the discharge.