

INFORMATION SHEET

WASTE DISCHARGE REQUIREMENTS ORDER NO. R5-2008-_____
DE JONG INVESTMENT GROUP, CLOVERDALE DAIRY, LLC,
AND MICROGY, INC.
CLOVERDALE DAIRY, KINGS COUNTY

Background

Mr. Pete de Jong and Mr. Karel de Jong, are general partners of the De Jong Investment Group who with Cloverdale Dairy, LLC, and Microgy, Inc., a New Hampshire Corporation (collectively hereafter "Discharger") own and operate the Cloverdale Dairy (facility). The facility is located approximately nine miles south of Hanford, Kings County. This dairy is regulated by the Waste Discharge Requirement General Order R5-2007-0035 for Existing Milk Cow Dairies (Dairy General Order) which was adopted on 3 May 2007.

On 12 September 2007, owners of the facility submitted an application form (Form 200) and a technical report generally describing the dairy operation and containing a plan to install a thermophilic anaerobic digester system (digester) on the facility to treat waste from the dairy operations and imported waste from various sources to produce biogas for sale to the regional gas utility company. Herd population data reported in the 2007 RWD is 5,865 milking and dry cows. The reported herd size is within the variation allowed by the General Order (i.e., no more than a 15% increase over the maximum total number of mature cows reported in October 2005).

The digester will be owned and operated by Microgy Inc., and will include a 262,000-gallon capacity steel above ground tank (AGT) to store the supplemental feedstock, a 318,000-gallon capacity steel AGT mix tank, and two 1.5 million gallon AGT digester tanks, with appurtenant pumps and piping. Digester operations will require the feed lanes and free stalls to be vacuumed or scraped rather than routinely flushed. The manure gathered will be added to the mix tank and diluted with freshwater and/or recycled digester effluent to about eight percent (8%) solids.

Supplemental feedstock will also be used in the digester. This supplemental feedstock has been described as food processing waste that may include: non-saleable (off-spec or out-of-date) materials, used cooking oil, grape seed oil, cottonseed oil, floor sweepings from food processing, (protein powders and sugary flavorings), stillage from the manufacture of corn-based ethanol, and fatty water skimmings. Because the project is new, no information is yet available about feedstock in California. Microgy does operate three digesters in Wisconsin and estimated concentrations of some of the constituents are summarized in Table 1.

Table 1
Selected Constituents and Estimated Concentrations
for Supplemental Feedstock

Constituent	Estimated Concentration
Calcium	984 mg/L
Chloride	2,874 mg/L
Iron	320 mg/l
Sodium	2,062 mg/L
Sulfur	867 mg/L

mg/L – milligrams per liter

Approximately 76,600 gallons of manure from the mix tank and 32,400 gallons of supplemental feedstock from the storage tank will be added to the two digesters daily. The digesters will function as complete-mix reactors with a hydraulic retention time of approximately 21 days. Digester effluent will be removed from the digesters daily and pass through a screw press separator. Separated effluent liquid will be recycled to the manure mix tank or conveyed to the wastewater retention system for holding until it is applied to cropland. Separated digester solids will be stored on a concrete pad until they are used either onsite for animal bedding, or exported from the facility. The biogas will be exported prior to treatment to remove hydrogen sulfide and carbon dioxide: there will be no effluent from gas treatment generated or disposed of on the facility.

The anticipated characteristics of the dairy and digester wastewaters are summarized in Table 2.

Table 2
Wastewater Characteristics

Constituent	Dairy Wastewater	Digester Effluent ¹
Bicarbonate	1,689 mg/L ²	Not reported
Calcium	167 mg/L ²	1,505 mg/L
Carbonate	ND ²	Not reported
Chloride	255 mg/L ³	1,185 mg/L
Electrical Conductivity	3,800 µmhos/cm ²	Not reported
Magnesium	83 mg/L ²	Not reported
Nitrate	7 mg/L ³	Not reported
Nitrogen (Total Kjeldahl)	271 mg/L ³	3,014 mg/L
pH	7.4 ²	8.3
Potassium	424 mg/L ³	758 mg/L
Sodium	296 mg/L ³	1,092 mg/L
Sulfate - Sulfur	24 mg/L ³	362 mg/L
Total Dissolved Solids	2,774 mg/L ³	12,841 mg/L

1 – Source: Larry Walker Associates email of 24 October 2007 from Robert Smith to David Sholes

2 - Based on average of 178 samples collected from 21 dairies in southern San Joaquin Valley

3 - Based on average of 13 samples collected on this facility from 2001 to 2007.

mg/L – milligram per liter

µmhos/cm – micromhosper centimeter

ND - not detected

There will be three waste streams entering the wastewater retention ponds: process wastewater from the milk parlor, digester effluent, and storm water runoff from the production area. The Discharger reports that dilution water (fresh water) will be added to the wastewater retention system to reduce salt concentration. Given the operational parameters described in the Report of Waste Discharge, the annual average salinity concentration in the wastewater retention ponds should not exceed 3,800 mg/L total dissolved solids (TDS) or 7,500 micromhos per centimeter (µmhos/cm) electrical conductivity (EC).

The anticipated dairy and digester operations are estimated to generate approximately 8.5 million cubic feet of wastewater during a typical rainy season. The currently existing wastewater retention system appears to have adequate capacity (approximately 8.9 million cubic feet) to meet the Title 27 CCR §22562 and §22563 requirements.

Groundwater Conditions and Existing Land Use

The facility is underlain by a shallow, semi-confining clay layer (the “A” clay) which supports a shallow water zone that can be encountered a depths from 5 to 10 feet bgs.

The shallow water zone is recharged by infiltration of surface water applied with irrigation and underflow from unlined canals and ditches. Vertical flow toward the regional unconfined aquifer is impeded by the A clay. The average salinity of this shallow water exceeds the Title 22 CCR short-term exposure maximum contaminant level (MCL) for total dissolves solids (TDS).

The facility production area and cropland is underlain by a network of tile drains buried to approximately nine feet below ground surface (bgs). The tile drain effluent is discharged into an evaporation pond operated by the Tulare Lake Drainage District. Annual reports submitted consistent with the MRP 99-803 report the characteristics of the tile drain sump effluent, which are summarized in Table 3.

Table 3
Characteristics of the Tile Drain Sumps Effluent

Constituent	Average Concentration	Maximum Concentration
Chloride	137 mg/L	263 mg/L
Nitrate	110 mg/L	253 mg/L
Potassium	6.2 mg/L	15.8 mg/L
Sodium	466 mg/L	969 mg/L
Sulfate	283 mg/L	805 mg/L
Total Dissolved Solids	1,646 mg/L	4,559 mg/L

Source of data: Cloverdale Dairy annual reports 2001 to 2007 sixteen sampling events reported).

The first encountered regional production aquifer lies below the A-Clay. This zone of groundwater is typically unconfined to semi-confined and may be encountered in the area of the facility at depths about 180 feet bgs based on Department of Water Resources hydrographs for water supply wells within one mile of the facility (those screened in the upper aquifer). The shallowest groundwater depth recorded in this aquifer since 1963 was at 57.5 feet below ground surface (bgs) in February 1984.

A semi-confined to confined aquifer occurs below the E-Clay member of the Tulare Formation at depths below 500 feet bgs. The E-Clay separates the upper aquifer from this lower aquifer. Although flow between the two aquifers was originally restricted, some agricultural wells within the vicinity are likely screened within the both upper and lower aquifers. The uppermost aquifer has the potential to have hydraulic continuity with the lower aquifer though wells that penetrate both, allowing lower quality water from

the uppermost aquifer to migrate into the higher quality waters just above and below the E-Clay.

There is currently no groundwater monitoring system installed on the facility other than the monitoring of the tile drains. A groundwater samples was collected from the single, on-site water supply well in June 2007. Previously submitted well construction information indicates this well is screened at between 320 and 480 feet bgs (i.e., in the upper aquifer and above the E-Clay). The analytical data summary information is transcribed in Table 4.

Table 4
Selected Constituents from Domestic Supply Well

Constituent	Units	Results
Calcium	mg/L	1.8
Chloride	mg/L	15.0
Iron	mg/L	<0.01
Magnesium	mg/L	<0.1
Manganese	mg/L	<0.01
Nitrate as Nitrogen	mg/L	<0.1
Potassium	mg/L	<0.5
Sodium	mg/L	55
Sulfate	mg/L	1.7
Total Dissolved Solids	mg/L	182
Electrical Conductivity	µmhos/cm	268

mg/L - milligrams per liter

µmhos/cm - micromhos per centimeter

< - less than

Land use surrounding the facility is predominantly agricultural with scattered farmsteads according land use data published in 2003 by DWR. Nearby crops include: corn, cotton, wheat, alfalfa, and sorghum.

The most prevalent soils on the facility are classified as: Westcamp loam of very slow permeability; Armona loam with moderate to moderately slow permeability; and Kimberlina sandy loam with moderate to moderately slow permeability.

Basin Plan, Beneficial Uses, and Regulatory Considerations

The Basin Plan indicates the greatest long-term problem facing the entire Tulare Lake Basin is increasing salinity in groundwater, a process accelerated by man's activities and particularly affected by intensive irrigated agriculture. Although a valley-wide salt drain is a desired future alternative for concentrated salt sources, Basin Plan policies and programs focus on controlling the rate of increase of salt in the Basin from all controllable sources, and particularly point sources of waste.

The procedure for the Regional Water Board to follow in establishing numerical limitations in waste discharge that will implement Basin Plan narrative objectives is described in pages IV-21 through IV-23 of the Basin Plan. The Regional Water Board must consider, among other things, information submitted by a Discharger and other interested parties and relevant numerical criteria and guidelines developed or published by other agencies and organizations on harmful concentrations of constituents.

The constituent concentrations to be included in the proposed Order and summarized in Table 5 below are what the Basin Plan and referenced documents of recognized authorities indicate cannot be exceeded without causing some adverse impact on the listed beneficial uses. For agricultural use and the waste constituents listed, crop application is consistently more sensitive than animal uses, but there may be several concentration thresholds that apply dependent upon the crop and how irrigation takes place.

While insufficient data has been reported to establish background groundwater conditions, it appears that groundwater in the regional production aquifer beneath the facility is of good quality and suitable for all beneficial uses. This Order requires the installation of a groundwater monitoring network to monitor the impact of the discharge and help develop long-term groundwater limits, the development of which is discussed further in the Antidegradation section below.

The Order uses the constituent concentrations summarized in Table 5 as interim groundwater limitations while a Groundwater Limitations Analysis is performed to determine if more stringent groundwater limitations are needed to protect water quality. These interim groundwater limitations are based on either the maximum contaminant level (MCL) for the constituent as published in Title 22 CCR or other designated Basin Plan objectives.

Table 5
Summary of Interim Receiving Water Numerical Limitations

Constituent	Units	Value	Beneficial Use	Criteria or Justification
Boron	mg/L	1.0	AGR ²	Boron sensitive crops ³
Chloride	mg/L	250	MUN ¹	Recommended Secondary MCL ⁵
Conductivity (EC)	µmhos/cm	900	MUN ¹	Recommended Secondary MCL ⁵
Nitrate as N	mg/L	10	MUN ¹	Primary MCL ⁴
Total Coliform Organisms	MPN/100 mL	2.2	MUN ¹	Basin Plan
Total Dissolved Solids	mg/L	500	MUN ¹	Recommended Secondary MCL ⁴

Notes:

¹ – Municipal and domestic supply

² – Agricultural supply

³ – Ayers, R. S. and D. W. Westcot, Water Quality for Agriculture, Food and Agriculture Organization of the United Nations – Irrigation and Drainage Paper No. 29, Rev. 1, Rome, (1985)

⁴ – Title 22, CCR, § 64431, Table 64431-A

⁵ – Title 22, CCR, § 64449, Table 64449-B

Antidegradation

The antidegradation directives of State Water Board Resolution No. 68-16, “Statement of Policy With Respect to Maintaining High Quality Waters in California,” or “Resolution 68-16” require that waters of the State that are better in quality than established water quality objectives be maintained “consistent with the maximum benefit to the people of the State.” Policy and procedures for complying with this directive are set forth in the Basin Plan.

Certain dairy and digester wastewater constituents are not fully amenable to waste treatment and control and it is reasonable to expect some impact on groundwater. Degradation is likely to occur from waste handling and storage and application of wastes to cropland. However, there is some uncertainty over the degree of that degradation given that the combined dairy discharge has not been initiated.

Digester effluent quality data used to develop this Order comes from one of Microgy’s digesters in Wisconsin and while it is sufficient to provide a general understanding of the character of the discharge it is insufficiently detailed to perform a Best Practicable Treatment and Control (BPTC) analysis or set consistent long-term groundwater limits that reflect full implementation of BPTC. Given the limited information, this Order takes a phased approach. Interim groundwater limitations assure protection of the existing beneficial uses of groundwater while this process takes place.

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The Order first requires technical reports in the form of a BPTC technical evaluation for each component of the facility's waste treatment and control to determine for each waste constituent BPTC as used in Resolution 68-16, a Nutrient Management Plan (NMP) for the cropland, and Salinity Evaluation and Minimization Plan for salinity control of facility waste. The results of these technical evaluations and water quality data from required groundwater monitoring will be used to develop numeric groundwater limitations for each waste constituent that reflects full implementation of BPTC and compliance with the most stringent applicable water quality objectives for each constituent. Lastly, the Order may be reopened to incorporate changes to the interim groundwater water limitations, or waste handling and treatment technologies, deemed necessary to implement BPTC.

Proposed Order Terms and Conditions

The recently adopted Waste Discharge Requirement General Order R5-2007-0035 for Existing Milk Cow Dairies (Dairy General Order) has set new standards for waste management on dairy facilities. The requirements specified in the propose Order largely reflect those of the Dairy General Order expect where specific circumstances require different or more stringent discharge specifications or provisions.

California Environmental Quality Act (CEQA)

This Order rescinds the dairy's coverage under the Waste Discharge Order No. 96-270 General Waste Discharge Requirements for Milk Cow Dairies.

For the digester project at this facility, the San Joaquin Valley Air Pollution Control District (SJVAPCD) is the lead agency pursuant to CEQA and has prepared an Initial Study and a Mitigated Negative Declaration. The Regional Water Board, as a responsible agency for the purposes of CEQA, reviewed and will considered the Mitigated Negative Declaration prepared by SJVAPCD in _____. [As of the date of the draft Information Sheet, the Regional Water Board has not received the lead agency's CEQA documents but has consulted regarding water quality issues. The findings and, if necessary, requirements of the proposed Order will be revised following review of the Mitigated Negative Declaration.]

Discharge Prohibitions, Specifications and Provisions

The proposed Order prohibits the discharge of wastes to surface water. This includes natural and man-made water bodies and conveyances whether surface water is present or not at the time of discharge. In the event such a discharge occurs due to a failure of

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proper waste management, the proposed Order specifies monitoring and mitigation of the surface water body affected. The actions required by the proposed Order include:

- Immediate termination of the discharge.
- Notification of regulatory agencies (Regional Water Board, County Health Department, Fish & Game, etc.) within 24 hours of discovery.
- Investigation to determine the extent and magnitude of the discharge impact.
- Mitigation of the degradation caused by the discharge.
- A plan to prevent recurrence of the discharge.

This proposed Order prohibits discharge of waste to groundwater that causes or contributes to exceedances of water quality objectives. This proposed Order reduces the threat of degradation of groundwater by requiring the Discharger to:

- Submit a hydrogeologic report for the area affected or potential affected by the facility to the Executive Officer. The technical report shall describe the underlying geology, existing wells (active or otherwise), well restrictions, and hydrogeology. The report shall include a Monitoring Well Installation Work Plan that recommends a monitoring well network to collect data from the unconfined to semi-confined, regional production aquifer up gradient from the influence of the facility and down gradient from each of the waste management areas (e.g., corrals, wastewater retention ponds, digester works, and cropland). The network shall be sufficient to evaluate performance of BPTC measures and to determine compliance with the Order's Groundwater Limitations. The recommendations shall be reviewed and approved by the Executive Officer.
- Conduct a performance evaluation of existing waste handling equipment, facilities, and an evaluation of BPTC for the waste handling and disposal activity. A critical waste management element to be evaluated is the existing wastewater retention system. The wastewater retention ponds must be evaluated for their effectiveness to control seepage of wastewater to the upper regional aquifer below the shallow water zone. The report must include a review of treatment and control technologies, and propose BPTC measure for retention ponds.
- Develop and implement a Waste Management Plan (WMP) to document waste handling and management measures. If the existing conditions do not comply with Title 27 confined animal facility regulations, interim modifications would be proposed to mitigate the problems. The WMP will include a schedule of milestones and completion dates for any necessary construction and/or retrofitting of the existing physical plant.

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- Develop and implement and a Nutrient Management Plan (NMP) to implement waste application practices in the cropland. The NMP will provide a schedule of waste and irrigation water application formulated to meet the crop needs in each field. The NMP will provide for sampling plan for wastewater, soil, crop tissue, and irrigation water, to collect the data needed to manage waste applications.
- Develop a Salinity Evaluation and Minimization Plan that identifies sources of salt in waste generated at the facility both in the dairy and digester operations. The report should evaluate measures that can be taken to minimize salt in the facility waste, and provide a schedule to implement these measures identified to minimize salt in the waste with the NMP.
- Develop and implement groundwater monitoring to assess the performance of the facility in meeting this proposed Order's specifications and limitations.
- Prepare a final Groundwater Limitations Analysis to propose specific numeric groundwater limitations for each waste constituent that reflects full implementation of BPTC and compliance with the most stringent applicable water quality objectives for each constituent. The data from the groundwater monitoring program and the monitoring provisions of the NMP will be used to measure the facility's performance. This data will be used in the the Groundwater Limitations Analysis to formulate the subsequent final groundwater limitations.

Initial Compliance Monitoring

This Order prescribes monitoring of digester effluent, tile drain effluent, wastewater in the retention ponds, and fresh irrigation water. Monthly (and weekly during the rainy season) monitoring of wastewater retention ponds' freeboard to ensure the wastewater retention systems has sufficient capacity to meet the requirements of Title 27 §22562 (a) (i.e., sufficient to retain facility wastewater generated and stormwater runoff from the 25-year, 24-hour storm). Monitoring of the wastewater application amount(s) to cropland by field and monthly monitoring of the mineral and nitrogen character of the digester effluent, wastewater in the retention ponds, and fresh irrigation water are necessary to determine: 1) the amount and basic quality characteristics of the discharge, 2) if the contents of the wastewater retention system are complying with discharge limits for TDS or EC, 3) if the application to cropland is meeting crop needs and not exceeding the salt application limitations, and 4) if there is a material change in the discharge.

The Discharger must monitoring groundwater for waste constituents expected to be present in the discharge, capable of reaching groundwater, and exceeding the groundwater limitations if treatment, control, and environmental attenuation, proves

inadequate. For each constituent listed in Section D Interim Groundwater Limitations, of the Order, the Discharger must, as part of each monitoring event compare concentrations of constituents found in each monitoring well (or water supply well) to the background concentration or to prescribe numerical limitations to determine compliance.

Reopener

The conditions of discharge in the proposed proposed Order were developed based on currently available technical information and applicable water quality laws, regulations, policies, and plans, and are intended to assure conformance with them. However, information is presently insufficient to develop final groundwater limitations, so the proposed Order sets limitations for the interim while site-specific, constituent-specific limits are developed in conjunction with a BPTC evaluation. Additional information must be developed and documented by the Discharger as required by schedules set forth in the proposed Order. As this additional information is obtained, decisions will be made concerning the best means of assuring the highest water quality possible that could involve substantial cost. It may be appropriate to reopen the Order if applicable laws, regulations, or site conditions change.