

INFORMATION SHEET

WASTE DISCHARGE REQUIREMENTS ORDER NO. R5-2008-XXXX
BAR 20 PARTNERS, LTD., A LIMITED PARTNERSHIP BETWEEN
JOHN SHEHADEY AND RICHARD SHEHADEY
BAR 20 DAIRY NO. 2, AND MICROGY, INC.

Background

John Shehadey and Richard Shehadey, the general partners of Bar 20 Partners, LTD. own and operate the recently expanded Bar 20 Dairy No. 2 (hereafter "Facility"). The Facility is located approximately ten miles west of Kerman in Fresno County. The original portion of the dairy (that portion which exists north of Whitesbridge Road) 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, Bar 20 Partners, LTD. submitted a Report of Waste Discharge (RWD) outlining the already completed expansion of the original dairy, and a plan to install a thermophilic anaerobic digester system within the boundaries of the expanded portion (that portion which exists south of Whitesbridge Road). The thermophilic digester would be owned and operated by Microgy, Inc., a New Hampshire Corporation to treat waste from the dairy operations and imported supplemental feedstock from various sources to produce biogas for sale to the regional gas utility company. Hereafter, Bar 20 Partners, LTD. and Microgy, Inc. are collectively referred to as "Discharger." Herd population data for the expanded dairy is summarized in Table 1.

Animal	Head	AU Factor*	Animal Units
Milk Cow	9,400	1.40	13,160
Dry Cow	1,057	1.12	1,184
Large Heifer	2,125	1.02	2,168
Small Heifer	2,125	0.49	1,041
Calves	700	0.29	203
Total	15,407		17,756

* AU factor based on 1,000 pound animal

The digester system will include a 546,000-gallon capacity steel above ground tank (AGT) to store the imported supplemental feedstock, a 775,000-gallon capacity steel AGT mix tank, four 1.34-million gallon AGT digester tanks, a screw press separator, a gas treatment system (biogas scrubber), and appurtenant pumps and piping. Digester operations will require the feed lanes and free stalls to be vacuumed or scraped rather than routinely flushed. The vacuumed semi-liquid manure will be added to the mix tank and diluted with freshwater and/or recycled digester effluent to about eight percent (8%) solids.

The supplemental feedstock has been described as food processing waste that may include: non-saleable (off-spec or out-of-date) materials, used cooking oil, grape seed oil, cottonseed oil, floor sweepings from food processing, (protein powders and sugary flavorings), stillage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. The anticipated characteristics of the feedstock are summarized in Table 2.

TABLE 2	
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 154,500 gallons of manure from the mix tank and 65,000 gallons of the supplemental feedstock from the storage tank will be added to the digester daily. The digester will function as a complete-mix reactor with a hydraulic retention time of approximately 21 days. Digester effluent will be removed from the digester 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.

Biogas produced during the digestion will be continuously extracted and conveyed to a moisture removal system on site. The biogas will then be piped to an on-site central cleaning facility (biogas scrubber) where carbon dioxide and hydrogen sulfide will be removed from the biogas prior to its delivery to the natural gas pipeline. The digester project has not yet been constructed. A diagram of the digester installation is shown on Attachment E. The biological reaction with the biogas scrubber removes sulfur from the gas stream. Periodically, the biogas scrubber will be flushed with fresh water to remove the accumulated effluent from the reaction surfaces. The biogas scrubber effluent will consist mostly of sulfuric acid (H₂SO₄) and will be discharged into the facility's wastewater retention system. The anticipated characteristics of the dairy wastewater, the digester effluent, and the biogas scrubber effluent are summarized in Table 3.

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TABLE 3 Waste Characteristics			
Constituent	Dairy Wastewater¹	Digester Effluent²	Biogas Scrubber Effluent³
Bicarbonate	2,206 mg/L	NR	NR
Calcium	175 mg/L	1,505 mg/L	ND
Carbonate	ND	NR	NR
Chloride	208 mg/L	1,185 mg/L	ND
Electrical Conductivity	4.230 µmhos/cm	NR	NR
Magnesium	85 mg/L	NR	27 ppm
Nitrate	3 mg/L	NR	NR
Nitrogen (Total)	320 mg/L	3,014 mg/L	159 mg/L
pH	7.4	8.3	1.4
Potassium	361 mg/L	1,928 mg/L	ND
Sodium	178 mg/L	1,092 mg/L	6 ppm
Sulfur	30 mg/L	362 mg/L	1,403 ppm
Total Dissolved Solids	2,283 mg/L	12,841 mg/L	4,000 mg/L

¹ Based on average of 200 samples collected from 22 dairies in southern San Joaquin Valley
² Reported by Larry Walker Associates email of 24 October 2007
³ Midwest Laboratories, Inc., Report of Analysis, Ref Lab # 212718, Report Number 07-297-5046 dated 10/30/07
mg/L – milligram per liter µmhos/cm – micromhos per centimeter ppm – parts per million
ND - not detected NR – not reported

There will be four waste streams entering the wastewater retention ponds: process wastewater from the milk parlor, digester effluent, biogas scrubber effluent, and stormwater runoff from the production area. Dilution water (fresh water) will be added to the wastewater retention ponds to reduce the salt concentration. The Discharger reports that it will dilute the wastewater in the retention ponds. Given the operational parameters described in the RWD, the annual average salinity concentration in the wastewater retention ponds should not exceed 4,100 milligrams per liter (mg/L) total dissolved solids (TDS) or 7,700 micromhos per centimeter (µmhos/cm) electrical conductivity (EC).

The anticipated dairy and digester operations are estimated to generate approximately 109 million gallons or 14.5 million cubic feet of wastewater during a typical rainy season. The currently existing wastewater retention system appears to have adequate capacity (approximately 14.8 million cubic feet) to meet the Title 27 CCR §22562 and §22563 requirements. However, no water use study has been conducted to determine actual water use. This Order requires the submission of a Waste Management Plan (WMP) to demonstrate that waste management facilities, equipment, and practices in the production area meet the requirement of the Order.

Groundwater Conditions and Existing Land Use

In early-2005, a groundwater monitoring network was installed at the expanded portion of the dairy. The monitoring network includes three dedicated groundwater monitoring wells which are depicted in the map of that portion of the Facility (Attachment C). The monitoring network has been sampled eight times since its installation in June 2005, five times prior to the Facility initiating discharge in December 2005 and three times since. The groundwater elevation data collected during the eight sampling events are summarized in Table 4, below.

TABLE 4 GROUNDWATER DEPTH MEASUREMENTS (June 2005 through August 2007)		
MONITORING WELL ID	DATE OF SAMPLING EVENT	DEPTH TO GROUNDWATER (feet below ground surface)
MW-1	6/30/2005	34.83
	7/7/2005	34.85
	7/19/2005	34.92
	8/17/2005	35.14
	11/11/2005	35.38
	8/17/2006	35.02
	12/13/2006	37.85
	8/12/2007	37.86
MW-2	6/30/2005	22.98
	7/7/2005	23.33
	7/19/2005	23.05
	8/17/2005	22.97
	11/11/2005	22.71
	8/17/2006	23.85
	12/13/2006	27.67
	8/12/2007	27.25
MW-3	6/30/2005	38.90
	7/7/2005	38.93
	7/19/2005	38.97
	8/17/2005	39.23
	11/11/2005	39.32
	8/17/2006	38.63
	12/13/2006	41.57
	8/12/2007	41.77

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On the Site Map attachment to the 2007 RWD, twenty irrigation and domestic water supply wells are depicted at the Facility and within the boundaries of the associated cropland. Thirteen of the wells were sampled in April and May 2002, and the analytical results are summarized in Table 6, below. The same thirteen wells were sounded in July, August, and September 2006. Groundwater intercepted by these wells during the 2006 events measured between 127 and 178 feet below site grade.

TABLE 6		
Summary of Selected Analytical Results from Water Supply Wells		
Well Identification	Total Dissolved Solids (mg/L)	Nitrate – Nitrogen (mg/L)
14	185	<0.1
15	289	<0.1
16	444	<0.1
5-1	1,428	<0.1
5-4E	1,103	<0.1
5-4W	743	<0.1
SF-12	465	<0.1
SF-11	454	<0.1
SF-13	413	<0.1
SF-15	424	<0.1
9-3E	481	<0.1
10-4	564	<0.1
SF-15-4	312	<0.1

mg/L - milligrams per liter

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, almonds, grapes, wheat, alfalfa, and plums. The most prevalent soils on the facility are classified as: Chino loam, Hesperia sandy loam, Pond loam and Pond fine sandy loam, and Traver sandy loam.

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 7 are what the Basin Plan and referenced documents of recognized authorities indicate cannot be exceeded without causing some adverse impact on the listed beneficial use. 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.

The combined dairy digester discharge has not been initiated. Regional Water Board staff cannot yet determine what impact the discharge may have on beneficial uses of groundwater. Insufficient data has been reported to establish background groundwater conditions but it appears that the groundwater in the regional production aquifer beneath the facility is 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 7 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.

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TABLE 7
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 or 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 proposed Order largely reflect those of the Dairy General Order except where specific circumstances require different or more stringent discharge specifications or provisions.

California Environmental Quality Act (CEQA)

This Order rescinds the original portion of the dairy's coverage under the Waste Discharge Requirement General Order R5-2007-0035 for Existing Milk Cow Dairies (Dairy General Order). The Dairy General Order was found to be exempt from CEQA provided that the original portion of the dairy did not expand its cow numbers beyond those that existed as of 17 October 2005. Prohibition A.10. of this Order prohibits the Discharger from exceeding their October 2005 herd numbers, with a 15 percent increase allowance to accommodate normal fluctuations in herd size.

- For the digester project at this facility, Fresno County is the lead agency pursuant to CEQA and has prepared an Initial Study and a Mitigated Negative Declaration. Between 21 December 2007 and 24 January 2008, Fresno County Department of Public Works and Planning circulated for public comment an Initial Study and a Notice of Intent to Adopt a Mitigated Negative Declaration for the digester project. Fresno County concluded in the Initial Study that impacts related to hydrology and water quality from the project will be considered "less than significant" with adherence to the rules, regulations, and permits under the jurisdiction of the Regional Water Board, and required compliance with waste discharge requirements and a comprehensive nutrient management plan as mitigation measures. The relevant protections required by this Order include: Prohibitions A.4. and A.9.; Discharge Specifications B.1.a., B.1.b., B.1.c., and B.1.d., Waste Application to Cropland Specification C.1; and Interim Groundwater Limitations D.1., and D.2. On

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24 January 2008, the Fresno County Planning Commission adopted a Mitigated Negative Declaration and Conditional Use Permit for the facility. The Regional Water Board, as a Responsible Agency, considered the Mitigated Negative Declaration and concurs that the identified mitigation measures reduce all impacts on water quality to a less-than-significant level.

- For the expansion of the facility, the San Joaquin Valley Air Pollution Control District is the lead agency pursuant to the California Environmental Quality Act (CEQA). A Mitigated Negative Declaration (MND) was prepared by the District in September 2007. A revised version of the MND was circulated for public review between 24 December 2007 and 24 January 2008. The revised MND indicated that there would be no potentially significant impacts to water quality at the expanded facility which would be regulated by the Regional Water Board through this Order. After reviewing comments, the San Joaquin Valley Air Pollution Control District prepared and circulated for public review, a second revised MND, addressing greenhouse gas threshold limits for the expanded dairy. [This may change following San Joaquin Valley Air Pollution Control District action.]

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 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.

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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.
- Develop and implement 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

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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, wastewater in the retention ponds, the biogas scrubber effluent, 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 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.