

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
CENTRAL VALLEY REGION

ORDER NO. R5-2008-0003

WASTE DISCHARGE REQUIREMENTS  
FOR  
MADDOX DAIRY LTD, MADDOX DAIRY GENERAL, MADDOX FARMS,  
BURREL FARMS, INC., VININVEST, INC., AND MICROGY, INC.  
MADDOX DAIRY  
FRESNO COUNTY

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Regional Water Board) finds that:

1. Maddox Dairy LTD, a California limited partnership between Douglas Maddox, Patrick Maddox, Stephen Maddox, and Julia Maddox Chow; Maddox Dairy General, a California general partnership between Stephen Maddox, Patrick Maddox, and Julia Maddox Chow; Maddox Farms, a California general partnership between Doug Maddox, Matilda Maddox, Stephen Maddox, Patrick Maddox, Mary Maddox, Julia Chow, and Gerald Chow; Burrel Farms, Inc., a California Corporation, and Vininvest, Inc., a California corporation, owners and operators of the Maddox Dairy, submitted a Report of Waste Discharge (RWD) on 12 September 2007, describing the proposed addition of a thermophilic anaerobic digester (hereafter "digester system") to the current waste handling and treatment system at the Maddox Dairy. The digester system will be owned and operated by Microgy Inc., and will digest a mixture of manure generated at the facility and a supplemental feedstock composed of organic waste materials, to generate biogas. Maddox Dairy LTD, a California limited partnership between Douglas Maddox, Patrick Maddox, Stephen Maddox, and Julia Maddox Chow; Maddox Dairy General, a California general partnership between Stephen Maddox, Patrick Maddox, and Julia Maddox Chow; Maddox Farms, a California general partnership between Doug Maddox, Matilda Maddox, Stephen Maddox, Patrick Maddox, Mary Maddox, Julia Chow, and Gerald Chow; Burrel Farms, Inc., a California Corporation, Vininvest, Inc., and Microgy, Inc., a New Hampshire Corporation, are collectively referred to in this Order as "Discharger". The Maddox Dairy, including the digester system after it is installed, is referred to in this Order as "facility."
2. The facility currently operates under Order No. R5-2007-0035, Waste Discharge Requirements General Order for Existing Milk Cow Dairies (hereafter "General Order"), which prohibits the disposal of waste not generated by on-site animal production activities except where a Report of Waste Discharge (RWD) for the disposal has been submitted to the Executive

Officer and the Regional Water Board has issued or waived Waste Discharge Requirements (WDRs).

3. The facility occupies portions of Sections 16, 17, 18, 19, 20, 21, and 22, Township 16 South, Range 18 East Mount Diablo Base Line and Meridian, and Sections 12 and 13, Township 16 South, Range 17 East, Mount Diablo Base Line and Meridian. The facility (80 acres of production area and 3,400 acres of cropland) occupies Fresno County Assessor Parcel Numbers 40-090-05S, 41-060-17S, 41-060-19S, 41-060-37S, 41-060-50S, 41-060-55S, 41-060-57S, 41-060-58S, 41-060-58S, 41-060-59S, 41-060-60S, 41-060-62S, 41-060-63S, 41-060-65S, 41-070-18S, 41-070-19S, 41-100-31S, 41-100-40S, 41-100-42S, 41-100-43S. The facility address is 12863 West Kamm Avenue, approximately four miles east of the town of Helm, Fresno County, as shown on Attachment A, which is attached hereto and made a part of this Order by reference.

#### **Existing Dairy Facility**

4. Maddox Dairy has operated as a dairy since 1982. The RWD submitted by the Discharger in October 2005 reported the facility houses 4,100 milking and dry cows.
5. The existing dairy includes a milking parlor, wash pens, free stalls, feed lanes, open corrals, six settling basins, and one retention ponds as shown in Attachment B, which is attached hereto and made a part of this Order by reference.
6. Currently, manure is washed from the milk barn and wash pens using fresh water recycled from the milk cooling and cleaning operations. Manure in feed lanes is periodically removed by flushing with recycled wastewater from one of the wastewater retention ponds. Stormwater runoff that contacts manure or waste feed in corrals, and leachate from feed and manure storage areas are conveyed to the wastewater retention ponds. Manure in corrals is currently removed by periodic scraping and is applied to facility cropland or removed from the facility for use elsewhere.

#### **Proposed Digester Facility and Operation**

7. The September 2007 RWD describes the proposed addition of two thermophilic anaerobic digesters that will generate biogas for sale to the regional gas company. The digester installation will include a 200,000-gallon capacity steel above ground tank (AGT) to store the supplemental feedstock, a 325,000-gallon capacity steel AGT mix tank, and two 1.2 million-gallon AGT digester tanks, with appurtenant pumps and piping. The digester system has

not yet been constructed. A diagram of the proposed digester system installation is shown on Attachment C, which is attached hereto and made a part of this Order by reference.

8. Digester operations will require some modification in dairy waste handling. Feed lanes and free stalls will be vacuumed or scraped rather than routinely flushed. Manure gathered by vacuuming or scraping will be added to the mix tank and diluted with freshwater and recycled digester effluent to about eight percent (8%) solids.
9. Approximately 54,068 gallons of manure from the mix tank and 20,932 gallons of supplemental feedstock from the supplemental feedstock 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 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.
10. Biogas produced during the digestion will be continuously extracted and conveyed to a moisture removal system off site. Gas from the Maddox Dairy will be piped to a central cleaning facility on the Lone Oak Farms Dairy #2 where carbon dioxide and hydrogen sulfide will be removed prior to delivery to the natural gas pipeline.
11. To optimize gas production, a supplemental feedstock material will be imported to the facility and combined with manure for digester feedstock. The character of this supplemental feedstock is not known at this time, but reportedly, may include a combination of materials such as non-saleable ice cream or salad dressing, used frying oil from fast food restaurants, grape seed oil, cotton seed oil protein powders and sugary flavorings, stillage from corn-based ethanol manufacturing, and fatty water skimmings. Cheese process wastewater, or whey, will not be used.
12. Wastewater will be blended with irrigation water in the wastewater retention system prior to application to cropland. The total dissolved solids (TDS) concentrations will vary over the storage period (November to February) with the input of stormwater runoff into the wastewater retention system. The expected range of constituents concentrations are: total nitrogen between 500 and 1,500 mg/L, total phosphorous between 150 to 1,200 mg/L, and total dissolved solids between 2,500 and 7,700 mg/L, depending upon the season.

13. For purposes of this Order, "waste" includes, but is not limited to, manure, leachate, process wastewater, digester effluent, gas treatment effluent, precipitation that contacts raw materials, products, or byproducts such as manure, supplemental feedstock, digester effluent, compost piles, silage, milk, or bedding.

### **Wastewater Ponds and Volume of Liquid Waste**

14. The wastewater retention system consists of a main retention pond and six settling basins with an approximate total retention capacity of 6.4 million cubic feet (with one foot of freeboard). The main retention pond was constructed in 1981 and no details regarding its construction are available. The six settling basins were built 2001 and were certified as meeting the Confined Animal Regulations in Title 27 of the California Code of Regulations (Title 27 CCR) § 22562 (d) minimum clay content (10 percent) requirement for confined animal facility retention ponds by Mr. James L. Howard, California Registered Civil Engineer No. 27036 in April 2002.
15. Title 27 CCR § 22563(a) requires that application of manure and wastewater to cropland shall be at rates reasonable for the crop, soil, climate, special local situations, management system, and type of manure. The generally accepted best management practice for dairies is to provide for 120 days of wastewater storage during the winter months (December to March) when there is little, if any, irrigation demand. The existing retention capacity of the facility is sufficient to hold dairy wastewater through the winter months. However, digester operation could add over 2.6 million cubic feet of effluent and dilution water during the 120-day storage period.

### **Waste Application to Cropland**

16. Best management practices for protection of water quality underlying the croplands include application of waste at rates, which are reasonable for the crop, soil, climate, special local situations, management system, and type of manure consistent with Title 27 CCR § 22563(a). Reasonable application is considered to be application of wastes at a rate that does not unreasonably degrade and does not pollute the waters of California or create a nuisance condition. The constituents of concern in this facility's wastes are nutrients (primarily nitrogen compounds, but also potassium and phosphorus) and non-nutrient salts. Recent information published by the University of California (UC) indicates that an appropriate nutrient loading rate is between 1.4 to 1.65 times the nitrogen harvest rates<sup>1</sup>. Reasonable application requires careful

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<sup>1</sup> University of California, Division of Agriculture and Natural Resources, Committee of Experts on Dairy Manure Management, Managing Dairy Manure in the Central Valley of California, September 2003, Revised February 2004, July 2004, and June 2005, pp 47.

timing and prudent monitoring of crop nutrient requirements, available nutrients in the soil, and water inputs. Reasonable application is achieved by the implementation of an appropriate Nutrient Management Plan (NMP) to maximize harvest and minimize leaching. Reasonable application of irrigation water (including leaching fraction) results in an irrigation efficiency of no less than 75 percent.

17. Based on a study conducted by J.L. Meyer in 1973<sup>2</sup>, “reasonable” salt loading rates under normal situations were determined to help prevent the vertical migration of salts within the soil profile. Unless environmental conditions show differently, “reasonable” is accepted to be a maximum annual non-nitrate salt loading rate of 2,000 pounds per acre for single-cropped land and 3,000 pounds per acre for double-cropped land.
18. The Discharger owns and farms 3,400 contiguous acres of cropland (hereafter “cropland”) divided into 45 separate fields where dairy waste is applied as shown in Attachment D, which is attached hereto and made a part of this Order by reference. The 2007 RWD proposes the following cropping pattern: 2,050 acres of grapes, 720 acres of double cropped wheat and corn silage, and 630 acres of alfalfa. The current dairy operation is estimated to produce liquid and dry waste containing approximately 340 pounds of nitrogen and 1,200 pounds of inorganic salts per acre of cropland, respectively.

### **Site Specific Conditions**

19. The facility is in an arid climate characterized by hot dry summers and mild winters. The rainy season generally extends from November through March. Occasional rains occur during the spring and fall months, but summer months are dry. Average annual precipitation and pan evaporation rates in the discharge area are about 7.0 inches and 63 inches, respectively, according to information published by the California Department of Water Resources (DWR). The 25-year, 24-hour precipitation event for the area around the facility is approximately 2 inches, according to National Weather Service data for the Fresno County area near the facility (Mendota).
20. Area soils are classified as Temple Series, a loam or clay loam; Rossi Series, a fine sandy loam; Chino Series, a fine sandy loam; and Merced Series, a

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<sup>2</sup> Meyer, J. L., 1973, *Manure Waste Ponding and Field Application Rates*, U. C. Agricultural Extension, Stanislaus, San Joaquin, and Merced Counties.

clay, according to the USDA Natural Resources Conservation Service.  
Permeability of these soil series is slow to very slow.

21. As documented in the Federal Emergency Management Agency, Flood Insurance Rate Map for Fresno County, Community Panel 065029-2600F (dated 19 July 2001), the dairy production area is not within a 100-year floodplain. The map does show that portions of facility's cropland adjacent to Fresno Slough (south of Kamm Avenue) and Fish Slough (north of Kamm Avenue) are inside the 100-year floodplain.
22. Land use in the facility vicinity is agricultural with scattered farmsteads, including other confined animal operations. Crops grown within five miles of the facility include: grain and hay crops; alfalfa; field crops including: cotton, safflower, sugar beets, corn, sudan, and beans; pasture; truck crops including: melons, squash and cucumbers, onions and garlic, tomatoes, flowers, nursery and Christmas tree farms; deciduous fruits and nuts; and vineyards according to California Department of Water Resources land use maps for 2000.
23. Irrigation water is supplied from a network of 18 wells located within the cropland area. The irrigation distribution system consists of a network of buried low-head pipes as shown in Attachment D.
24. The RWD indicates that almonds are grown at the facility but whose acreage has not been counted towards the 3,400 acres of cropland that is proposed to receive wastewater. The RWD indicates that almonds orchards at the facility do not receive wastewater based on concern for e-coli contamination.
25. Consistent with the United States Clean Water Act (CWA) § 502 (14) and 40 CFR § 122.2 and 122.23, the facility is a "concentrated animal feeding operation" and a "point source" and subject to the National Pollutant Discharge Elimination System (NPDES) permit program for any discharge to waters of the United States, other than discharges of agricultural storm water as defined in 40 CFR § 122.23(e).

### **Groundwater Considerations**

26. Regional unconfined to semi-confined groundwater is approximately 170 feet below ground surface (bgs), according to information in *Lines of Equal Depth to Water in Wells, Unconfined Aquifer, San Joaquin Valley*, published by DWR in Spring 2005. According to Department of Water Resources hydrographs for wells within one mile of the facility, the shallowest groundwater depth recorded in water supply wells was 42 feet below ground surface (bgs) in 1957.

Groundwater depth measurements made in March 2001 on four of the facility's supply wells within a mile of the production area ranged from 167 feet to 182 feet bgs.

27. The E-Clay layer of the Tulare Formation occurs about 575 feet bgs, and separates the upper aquifer from a lower, sometimes confined aquifer below the E-Clay. Although flow between the two aquifers was originally restricted, some agricultural wells within the vicinity may be screened within the upper and lower aquifers. The uppermost aquifer has the potential to have hydraulic continuity with the lower aquifer through wells that penetrate both, resulting in lower quality water from the uppermost aquifer migrate into the higher quality waters below the E-Clay.
28. The facility obtains its source water from three domestic supply wells in the facility's dairy production area and from approximately 18 irrigation supply wells within its cropland. Samples collected from one domestic supply well and five irrigation supply wells were sampled on 16 January 2003 and were analyzed for general mineral constituents. Water quality as indicated by the analytical results for the domestic well is excellent while the results for the irrigation supply wells ranged from good to excellent. The selected results of these analyses follow.

**Selected Constituents From Domestic and Irrigation Supply Wells**

	<b>Units</b>	<b>1D</b>	<b>21-3A</b>	<b>16-4 A</b>	<b>17-3 A</b>	<b>18-5A</b>	<b>19-3A</b>
Calcium	mg/L	17	25	16	32	43	78
Magnesium	mg/L	1.4	1.5	1.5	3.2	4.0	3.6
Potassium	mg/L	4.1	3.8	4.6	5.6	6.1	4.5
Sodium	mg/L	42	42	49	67	78	88
Bicarbonate	mg/L	120	110	120	180	250	240
Chloride	mg/L	23	29	35	36	23	19
Sulfate	mg/L	14	21	9.6	46	45	160
Nitrate-N	mg/L	ND	1.2	ND	3.1	ND	ND
Ammonia	mg/L	1.2	ND	ND	ND	ND	ND
TKN	mg/L	1.8	1.1	1.2	ND	1.8	ND
PH	std. units	7.7	7.8	7.7	7.7	7.6	7.7
TDS	mg/L	230	720	240	330	390	520
EC	µmhos/cm	310	250	250	520	600	590

mg/L - milligrams per liter

µmhos/cm - micromhos per centimeter

ND not detected

29. The Discharger has submitted well logs for the domestic well and three of the five irrigation wells sampled in January 2003 (i.e., 1D, 21-3A, 16-4A, 17-3A, respectively). The wells are drilled to 480 to 520 feet bsg with screened

intervals that begin at between 240 and 300 bgs. The domestic supply well has a 70-foot sanitary seal while the three irrigation supply wells have 20-foot sanitary seals.

### **Basin Plan, Beneficial Uses, and Water Quality Objectives**

30. The *Water Quality Control Plan for the Tulare Lake Basin, Second Edition, 1995, Revised 2004* (hereafter Basin Plan) designates beneficial uses, establishes water quality objectives, and contains implementation plans and policies for protecting waters of the basin.
31. The facility is in Detailed Analysis Unit (DAU) No. 237 of the Kings Basin Groundwater Hydrologic Unit. The Basin Plan identifies the beneficial uses of groundwater in this DAU as: municipal and domestic supply, agricultural supply, and industrial service supply.
32. The facility is in the Lower Kings River Hydrologic Area of the South Valley Floor Hydrologic Unit No. 551 within the Tulare Lake Hydrologic Basin. The beneficial uses of Valley Floor Waters designated by the Basin Plan include: agricultural supply; industrial service supply; industrial process supply; water contact recreation; non-contact recreation; warm freshwater habitat; wildlife habitat; rare, threatened, or endangered species; and groundwater recharge. The western edge of the facility's cropland abuts the Lower Fresno Slough, which becomes Fish Slough north of Kamm Avenue. Fish Slough becomes James Bypass several miles to the northwest on the downstream side of James Weir.
33. The Basin Plan includes water quality objectives for chemical constituents that, at a minimum, require water designated as domestic or municipal supply to meet the Maximum Contaminant Levels (MCLs) specified in Title 22, CCR. The Basin Plan recognizes that the Regional Water Board may apply limits more stringent than MCLs to ensure that waters do not contain chemical constituents in concentrations that adversely effect beneficial uses.
34. The Basin Plan establishes narrative water quality objectives for Chemical Constituents, Tastes and Odors, and Toxicity. The Toxicity objective, in summary, requires that groundwater be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life associated with designated beneficial uses.
35. The Basin Plan identifies the greatest long-term problem facing the entire Tulare Lake Basin as the increase in salinity in groundwater, which has accelerated due to the intensive use of soil and water resources by irrigated agriculture. The Basin Plan recognizes that degradation is unavoidable until there is a long-term solution to the salt imbalance.



### **Antidegradation**

36. State Water Resources Control Board Resolution 68-16 (“Policy with Respect to Maintaining High Quality Waters of the State”) (hereafter “Resolution 68-16”), prohibits degradation of groundwater unless it has been shown that:
- a. The degradation is consistent with the maximum benefit to people of the State;
  - b. The degradation will not unreasonably affect present and anticipated future beneficial uses;
  - c. 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; and
  - d. The discharger employs the best practicable treatment or control (BPTC) of the wastes to minimize degradation.
37. Constituents of concern that have the potential to degrade groundwater underlying the facility include salt (primarily sodium and chloride), nutrients (nitrogen), and boron. This Order requires the Discharger to implement BPTC of the wastes to minimize degradation. Degradation can occur from seepage to groundwater from three waste management areas on the facility: the corral area (including dry waste, and feed storage areas); the wastewater retention ponds; and the cropland. This Order, therefore, establishes schedules of tasks to evaluate BPTC for each waste management area of the facility and to characterize groundwater and all waste constituents. The evaluation of BPTC is required in the Order as outlined in the Provisions section below. Completion of this evaluation and implementation of the approved strategies developed from that work, will ensure that BPTC and the highest water quality consistent with the maximum benefit to the people of the State will be achieved.
38. The Regional Water Board finds that some short-term degradation of groundwater beneath the facility is consistent with Resolution 68-16 provided that:
- a. The degradation is confined to a localized area and is temporally limited;
  - b. The discharger minimizes the degradation by fully implementing, regularly maintaining, and optimally operating BPTC measures;
  - c. The degradation is limited to waste constituents typically encountered in confined animal operations as specified in the groundwater limitations in this Order; and

- d. The degradation does not result in water quality less than that prescribed in the Basin Plan.
39. Some degradation of groundwater by some of the typical waste constituents released with discharge from a confined animal facility (after effective source management, treatment, and control) is consistent with maximum benefit to the people of California. Global Warming Solutions Act (AB-32) signed by the Governor on 27 September 2006 requires the development of market mechanism that will reduce greenhouse gas emissions. The proposed project's reduction of greenhouse gas emissions from the dairy and the production of renewable energy are in keeping with the intent of AB-32. Secondary benefits include a reduction in ozone precursor compounds and hydrogen sulfide, which will improve air quality. Therefore, sufficient reason exists to accommodate groundwater degradation around the facility in the short term while the BPTC evaluation studies, required by this Order, are conducted. This Order requires that the terms of the Water Quality Control Plan for the Tulare Lake Basin are met. Degradation of groundwater by constituents (e.g., toxic chemicals) other than those specified in the groundwater limitations of this Order is prohibited.
  40. This Order establishes interim groundwater limitations for the facility that will not unreasonably threaten present and anticipated beneficial uses or result in groundwater quality that exceeds water quality objectives set forth in the Basin Plan. This Order contains tasks for assuring BPTC and the highest water quality consistent with the maximum benefit to the people of the State will be achieved. Accordingly, the discharge is consistent with the antidegradation provisions of Resolution 68-16. Based on the results of the scheduled tasks, the Regional Water Board may reopen this Order to consider groundwater and other limitations to comply with Resolution 68-16.

### **California Environmental Quality Act**

41. 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. On 24 August 2007, the Fresno County Department of Public Works and Planning received an application for a Conditional Use Permit (CUP) and a CEQA Initial Study Application to accommodate the installation and operation of thermophilic digesters at the facility. Fresno County is the lead agency for purposes of the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000, et seq.) and the CEQA guidelines (Title 14, Division 6, California Code of Regulations, as amended). 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 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.

### **General Findings**

42. Pursuant to California Water Code (CWC) § 13263(g), discharge is a privilege, not a right, and adoption of this Order does not create a vested right to continue this discharge. Failure to prevent conditions that create or threaten to create pollution or nuisance or that may unreasonably degrade waters of the State will be sufficient reason to modify, revoke, or enforce this Order, as well as prohibit further discharge.
43. This Order does not authorize violation of any federal, state, or local law or regulation. The requirements prescribed herein do not authorize the commission of any act causing injury to the property of another, nor protect the Discharger from his liabilities under federal, state, or local law.
44. CWC § 13267(b) states that “In conducting an investigation specified in subdivision (a), the regional board may require that any person who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste within its region, or any citizen or domiciliary, or political agency or entity of this state who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste outside of its region that could affect the quality of waters within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires. The burden, including cost, of these reports shall bear a reasonable relationship to the need for the report and the benefits to be obtained from the reports. In requiring these reports, the regional board shall provide the person with a written explanation with regard to the need for the reports and shall identify the evidence that supports requiring that person to provide the reports.”

45. The technical reports required by this Order and the attached Monitoring and Reporting Program No. R5-2008-0003 are necessary to assure compliance with these waste discharge requirements. The Discharger operates the facility that discharges the wastes subject to this Order.
46. These requirements are consistent with Title 27 CCR, Division 2, Chapter 7, Subchapter 2, regulating confined animal facilities.
47. The California Department of Water Resources set standards for the construction and destruction of groundwater wells, as described in *California Well Standards Bulletin 74-90* (June 1991) and *Water Well Standards: State of California Bulletin 94-81* (December 1981). These standards, and any more stringent standards adopted by the State or county pursuant to CWC § 13801, apply to all monitoring wells.

### **Public Notice**

48. The Discharger and interested agencies and persons have been notified of the intent to prescribe waste discharge requirements for this discharge, and they have been provided an opportunity for a public hearing and an opportunity to submit their written views and recommendations.
49. All comments pertaining to the discharge were heard and considered in a public meeting.

**IT IS HEREBY ORDERED** that, Waste Discharge Requirements Order No. R5-2007-0035 no longer applies to the Maddox Dairy LP, a California limited partnership between Douglas Maddox, Patrick Maddox, Stephen Maddox, and Julia Maddox Chow and that, pursuant to § 13263 and 13267 of the CWC, Maddox Dairy LP, a California limited partnership; Maddox Dairy General, a California general partnership between Stephen Maddox, Patrick Maddox, and Julia Maddox Chow; Maddox Farms, a California general partnership between Doug Maddox, Matilda Maddox, Stephen Maddox, Patrick Maddox, Mary Maddox, Julia Chow, and Gerald Chow; Burrel Farms, Inc., a California Corporation, Vininvest Inc., a California corporation, and Microgy Inc., a New Hampshire Corporation and their agents, successors, and assigns, in order to meet the provisions contained in Division 7 of the CWC and regulations adopted thereunder, shall comply with the following:

#### **A. Prohibitions**

1. The discharge of waste other than as defined in Finding 13 above, or of hazardous waste as defined in the CWC California Water Code § 13150 (p) and Title 22 CCR § 66261.3 et seq., respectively, is prohibited.

2. Bypass or overflow of undigested supplemental feedstock into the wastewater retention system or application cropland, is prohibited.
3. The direct or indirect discharge of waste and/or storm water from the production area of the facility to surface waters without an NPDES permit is prohibited. The production area is defined as the part of the facility that includes the animal confinement areas, manure storage area, raw material storage area, and waste containment area. It also includes the digester works, feedstock handling and storage area, and digester effluent handling area.
4. The discharge of wastewater to surface waters from the cropland without an NPDES permit, is prohibited. Irrigation supply water that comes into contact or is blended with waste or wastewater shall be considered wastewater under this Prohibition.
5. Precipitation-related discharges of manure, litter, or process wastewater from cropland without an NPDES permit are prohibited, unless the discharges are agricultural storm water discharges as defined in 40 CFR § 122.23(e).
6. The disposal of dead animals in any liquid manure or wastewater system is prohibited. The disposal of dead animals at the facility is prohibited except when federal, state, or local officials declare a State of Emergency and where all other options for disposal have been pursued and failed and the onsite disposal complies with all state and local policies for disposal of dead animals.
7. All animals shall be prohibited from entering any surface water within the animal confinement area (Title 27 CCR § 22561).
8. The application of waste to lands not owned, leased, or controlled by the Discharger as described in Finding 3 without written permission from the landowner or in a manner not approved by the Executive Officer, is prohibited.
9. The direct discharge of wastewater into groundwater via backflow through water supply or irrigation supply wells is prohibited.
10. Exceeding the mature herd size (milk and dry cows) as reported in Finding 4 by more than fifteen percent is prohibited.

#### **B. Discharge Specifications**

1. The collection, treatment, storage, or disposal of wastes at the facility shall not result in:

- a. Discharge of waste constituents in a manner or place, or at concentrations or in a mass, which could cause exceedance of water quality objectives of surface water or groundwater;
  - b. Contamination or pollution of surface water or groundwater;
  - c. A condition of nuisance; or
  - d. Unreasonably affect beneficial uses (as defined by the CWC § 13050 and the Basin Plan, Chapter 2).
2. The Discharger shall ensure that the annual average salinity concentration in the wastewater retention ponds will not exceed 3,600 milligrams per liter (mg/L) total dissolved solids (TDS) or 6,600 micromhos per centimeter ( $\mu\text{mhos/cm}$ ) electrical conductivity. This interim specification will be reconsidered upon completion of the BPTC review.
  3. Wastes shall not be stored on site for more than 12 months. Any wastes not used within this time period must be removed from the property and disposed of properly.

### **C. Waste Application to Cropland Specifications**

1. Title 27 CCR § 22563(a) requires that application of manure and wastewater to cropland shall be at rates reasonable for the crop, soil, climate, special local situations, management system, and type of manure. This Order requires a review of BPTC, which will better define what are "reasonable" application rates. In the interim, reasonable application shall mean: annual non-nutrient salt application rates shall not exceed 2,000 pounds per acre for fields that are single-cropped or 3,000 pounds per acre for fields that are double-cropped. For purposes of this Order, non-nutrient salts are defined as the mass of Total Dissolved Solids minus the mass of nitrogen, potassium, and phosphorus utilized by the crop(s) being grown in the field. For purposes of this Order, non-nutrient salts are defined as the mass of Total Dissolved Solids minus the mass of nitrogen, potassium, and phosphorus utilized by the crop(s) being grown in the field.
2. Land application of all waste from the facility shall be conducted in accordance with a NMP prepared by a specialist who is certified in developing NMPs. The NMP shall reflect actual crops grown at the facility, the actual form of nutrients and non-nutrient salts applied to each cropland field, and reasonable application rates. A certified specialist is a Professional Soil Scientist, Professional Agronomist, or Crop Advisor certified by the American Society of Agronomy or a Technical Service Provider certified in nutrient management in California by the Natural Resources Conservation Service (NRCS). The Executive Officer may approve alternative proposed specialists. Only NMPs prepared and signed by these parties will be considered certified.

3. The application of waste to the cropland shall be at rates that preclude development of vectors or other nuisance conditions and meet the conditions of the certified NMP. All wastewater applied to cropland must infiltrate completely within 72 hours after application. Tailwater must be conveyed back to the wastewater retention system for storage and reuse.
4. Application of waste shall be timed to minimize nutrient movement below the root zone. Wastewater shall not be applied to cropland during periods when the soil is at or above field moisture capacity.
5. Cropland that receives dry manure shall be managed to minimize erosion. Crops must be planted within one month of waste solids application.
6. Waste solids and wastewater shall not be applied closer than 100-feet to any down gradient surface waters, open tile line structures, sinkholes, or other conduits to surface waters unless a 35-foot wide vegetated buffer (for surface waters) or physical barrier is substituted for the 100-foot setback or alternative conservation practices or field-specific conditions will provide pollutant reductions equivalent or better than the reductions achieved by the 100-foot setback.
7. Waste and cropland shall be managed to prevent contamination of crops grown for human consumption. The term "crops grown for human consumption" refers only to crops that will not undergo subsequent processing which adequately removes potential microbial danger to consumers.

#### **D. Interim Groundwater Limitations**

1. These interim groundwater limitations are to be applied at the unconfined to confined aquifer below the shallow water zone beneath the facility. These limitations are based on either the maximum contaminant level (MCL) for the constituent as published in Title 22 CCR or other applicable Basin Plan objectives. Release of waste constituents from any treatment, storage, or disposal component associated with the facility shall not cause or contribute to groundwater:
  - a. Containing constituent concentrations in excess of the concentrations specified below or natural background quality (as determined in the Findings and updated as appropriate as a result of ongoing monitoring), whichever is greater:
    - i. Nitrate as nitrogen of 10 mg/L (Title 22 CCR MCL);
    - ii. Chloride of 250 mg/L (Title 22 CCR Secondary MCL);
    - iii. Boron of 1.0 mg/L (crop sensitivity);

- iv. Total Dissolved Solids of 500 mg/L (Title 22 CCR Secondary MCL);
  - v. Electrical Conductivity of 900 µmhos/cm (Title 22 CCR Secondary MCL);
  - vi. Most probable number of total coliform (either *E. coli* or fecal coliform bacteria) not to exceed 2.2/100 milliliters (Title 22 CCR MCL);
  - vii. For constituents identified in Title 22 CCR, the MCLs quantified therein; and
  - viii. For salinity, a maximum average annual EC increase of no more than 3 µmhos/cm (Basin Plan Groundwater Quality Objective).
- b. Containing taste or odor-producing constituents, toxic substances, or any other constituents, in concentrations that cause nuisance or adversely affect beneficial uses.
2. Final groundwater limitations will be developed based upon the results of the BPTC evaluations and monitoring conducted as directed by this Order and reported consistent with the Provisions below.

#### **E. Provisions**

1. The Discharger shall comply with all applicable provisions of the California Water Code, Title 27 CCR, and the Water Quality Control Plan for the Tulare Lake Basin, Second Edition, 1995, Revised 2004.
2. The Discharger shall comply with the attached Monitoring and Reporting Program No.R5-2008-003 which is part of this Order, and future revisions thereto as specified by the Regional Water Board or the Executive Officer.
3. The Discharger shall submit a complete Report of Waste Discharge in accordance with the CWC § 13260 at least 140 days prior to any material change or proposed change in the character, location, or volume of the discharge, including any expansion of the facility, addition of waste storage facilities or equipment, closure of the facility, or development of any new treatment technology.
4. In the event of any change in control or ownership of land or waste discharge facilities presently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be forwarded to the Regional Water Board at least 60 days in advance of the change.
5. If site conditions threaten to violate Prohibitions **A.3.** or **A.4.** or Discharge Specification **B.1.**, the Discharger shall take immediate action to preclude the violation, documenting the condition and all corrective actions. Such



actions shall be immediately reported to the Regional Water Board and summarized in the annual monitoring report. Alterations for the production area to avoid a recurrence shall be submitted as a modification to the facility's Waste Management Plan (WMP).

6. Any instance of non-compliance with this Order constitutes a violation of the California Water Code and its regulations. Such non-compliance is grounds for enforcement action, and/or termination of the authorization to discharge.
7. This Order shall become effective upon adoption by the Regional Water Board.
8. If during the performance of the inspections required by the MRP attached to this order, deficiencies, defects, and/or impending failures are observed in any of the wastewater conveyance, control, and/or retention structures, the Discharger shall take immediate action to correct and/or prevent unauthorized release. The corrective action(s) should be documented and these records attached to the pertinent inspection report.
9. Technical reports required by this Order must be certified by an appropriately licensed professional as required in this Order and its Attachments. If the Executive Officer provides comments on any technical report, the Discharger shall address those comments.
10. **By 30 May 2008**, the Discharger shall submit a hydrogeologic report for the area affected or potentially 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 first encountered groundwater 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.
11. The Discharger shall comply with the following compliance schedule in implementing the groundwater monitoring approved by the Executive Officer in Provision 10:

<u>Task</u>	<u>Compliance Date</u>
a. Complete Monitoring Well Installation	120 days following Work Plan approval by Executive Officer

- |                                                                                                                                       |                                               |
|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| b. Commence Groundwater Monitoring                                                                                                    | 30 days following completion of Task 11. a    |
| c. Submit Monitoring Well Installation Report of Results                                                                              | 60 days following completion of Task 11. b.   |
| d. Submit technical report that characterizes water quality in approved groundwater monitoring network for all monitored constituents | Two years following completion of Task 11. c. |
12. By **1 October 2008**, the Discharger shall submit a written work plan for a BPTC technical evaluation that sets forth a schedule for a systematic and comprehensive 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. The work plan shall contain a time schedule for completing the comprehensive technical evaluation. The schedule to complete the BPTC Technical Evaluation shall be as short as practicable, and shall not exceed two years. Upon written determination of adequacy of the technical report by the Executive Officer, the Provision shall be considered satisfied.
13. By **1 October 2008**, the Discharger shall formulate and implement a Waste Management Plan (WMP) to demonstrate that waste management facilities, equipment, and practices in the production area meet the requirements of this Order. Additional requirements for preparing the WMP can be found in Attachment B of the Waste Discharge Requirements General Order R5-2007-0035 for Existing Milk Cow Dairies (Dairy General Order) at:  
[http://www.waterboards.ca.gov/centralvalley/adopted\\_orders/GeneralOrders/R5-2007-0035.pdf](http://www.waterboards.ca.gov/centralvalley/adopted_orders/GeneralOrders/R5-2007-0035.pdf).
- The Discharger shall comply with all requirements of Attachment B of the Dairy General Order except as otherwise explicitly stated in this Order. If the design, construction, operation, and/or maintenance of the facility does not comply with those requirements, the WMP must propose modifications and a schedule for modifications that will bring the dairy facility into compliance. The schedule must comply with the due dates in this Order. If the Executive Officer determines that any provisions of Attachment B of the Dairy General Order do not apply to this facility, the Executive Officer shall notify the Discharger that compliance with those provisions is not required.

In addition to the elements outlined in Attachment B of the Dairy General Order, the elements of the WMP for this facility shall include a certification that the facility operations and maintenance (O&M) instructions for the dairy and digester operations that address each waste handling component of the facility (dairy and digester), and standard and emergency procedures. The O&M instructions should include the facility Emergency Response Plan. The O&M should contain instructions for the wastewater conveyance and storage features (including tailwater recovery), feed and waste storage areas, the digester area and handling of digester feed stock and effluent, and the handling and disposal/removal of cattle mortalities. The O&M instructions should be written to ensure that all specifications, limitations, and provisions of this Order are met and violations of prohibitions are prevented. A copy of these instructions should be available to employees at all times.

14. By **1 October 2008**, the Discharger shall formulate and implement an NMP for application of the facility waste to the facility's cropland. The NMP shall be submitted to the Executive Officer for review and approval. Failure to comply with the NMP is a violation of this Order. A copy of the NMP must be maintained at the dairy. The NMP must provide for protection of both surface water and groundwater. The purpose of the NMP is to control the recycling of waste generated on the facility to minimize their potential to degrade groundwater quality. The objective of the NMP is to manage the application of the waste to the cropland and disposal off-site to achieve a balance between nutrients and salts generated, crop requirements, and leaching to underlying groundwater. Additional requirements for preparing the NMP can be found in Attachment C of the Dairy General Order at:

[http://www.waterboards.ca.gov/centralvalley/adopted\\_orders/GeneralOrders/R5-2007-0035.pdf](http://www.waterboards.ca.gov/centralvalley/adopted_orders/GeneralOrders/R5-2007-0035.pdf).

The Discharger shall comply with all requirements of Attachment C of the Dairy General Order except as otherwise explicitly stated in this Order. If the Executive Officer determines that any provisions of Attachment C of the Dairy General Order do not apply to this facility, the Executive Officer shall notify the Discharger that compliance with those provisions is not required.

In addition to the elements outlined in Attachment C of the Dairy General Order, the elements of the NMP for this facility shall include:

- a. Formulating a water balance for the entire facility to estimate the amount of wastewater generated, the amount of irrigation water added to the wastewater retention system, and the amount of blended wastewater and irrigation water applied to the cropland. The NMP shall reflect a goal of 75 percent irrigation efficiency, determined for each field.

- b. Adoption of salt reduction actions as specified in the Salinity Evaluation and Minimization Plan (when approved).
  - c. Yearly evaluation of the results to modify the next year's NMP to maximize crop yield and minimize leaching potential and to be included in the facility's annual report.
  - d. By calendar year 1 January 2010, total nitrogen applied to the cropland shall not exceed 1.4 times the nitrogen removed by the harvested portion of the crop. Additional application of nitrogen is allowable if plant tissue testing indicates it is necessary to obtain typical crop yield on written recommendations from a professional agronomist and records are maintained documenting the need.
15. **By two years from satisfaction of Provision 12**, the written BPTC Technical Evaluation report shall be submitted with the Discharger's written recommendations for any facility modifications (e.g., component upgrade and retrofit) and/or operations modifications that are necessary to ensure BPTC. The proposed schedule for modifications shall be identified. The schedule shall be as short as practicable but in no case shall completion of the necessary improvements exceed four years past the Executive Officer's determination of the adequacy of the comprehensive technical evaluation submitted pursuant to this provision unless the schedule is reviewed and specifically approved by the Regional Water Board. The adequacy of the component evaluation, recommended improvements, and schedule are subject to the Executive Officer's review and determination.
16. **By 1 July 2009**, the Discharger shall submit a Salinity Evaluation and Minimization Plan that identify sources of salt in waste generated at the facility both in the dairy and digester operations. This report must evaluate measures that can be taken to minimize salt in the facility waste, and commit to implement these measures identified to minimize salt in the waste within the NMP. The report must include a proposed implementation schedule. The adequacy of the salinity evaluation, recommended measures to minimize salt in the wastes, and schedule are subject to the Executive Officer's review and determination.
17. The groundwater limitations set forth in this Order are not final and not an entitlement. **By 1 July 2012**, the Discharger shall submit a Groundwater Limitations Analysis report proposing specific numeric groundwater limitations for each waste constituent that reflects full implementation of BPTC and reflecting applicable water quality objectives for that waste constituent. The report shall describe in detail how these were determined considering actual data from monitoring wells comprising the approved groundwater monitoring program, impact reductions through full implementation of BPTC, the factors in CWC § 13241, Resolution 68-16, the

Basin Plan, etc. The Discharger may submit results of a validated groundwater model or other hydrogeologic information to support its proposal.

18. Upon completion of tasks set forth in Provision 17, the Regional Water Board shall consider the evidence provided and make a determination regarding (a) whether the Discharger has justified BPTC and (b) the appropriate final numeric groundwater limitations that comply with Resolution 68-16.
19. Modification of any existing pond or construction of any new pond shall not begin until the Executive Officer notifies the Discharger in writing that the design report is acceptable.
20. Waste shall not be placed into any new or modified wastewater retention pond until the Executive Officer notifies the Discharger in writing that the post construction report is acceptable.
21. In the event the monitoring implemented under this Order detects evidence of a failure to meet Discharge Specification **B.1.**, the NMP shall be modified within 90 days. The modifications must be designed to bring the facility into compliance with this Order. The Discharger shall notify the Regional Water Board in writing with details of any proposed changes before the changes are made in the field. Any plan shall be updated as necessary or if the Executive Officer requests that additional information be included.
22. If the Regional Water Board or Executive Officer notifies the Discharger that the NMP is not consistent with this Order, revisions shall be made by a specialist who is certified in developing Nutrient Management Plans and submitted to the Regional Water Board in writing within 30 days of notification.
23. Settling basins and retention ponds at the facility shall be managed and maintained to prevent breeding of mosquitoes and other vectors. In particular:
  - a. Small coves and irregularities shall not be allowed around the perimeter of the water surface;
  - b. Weeds shall be minimized through control of water depth, harvesting, or other appropriate method;
  - c. Dead algae, vegetation, and debris shall not accumulate on the water surface; and
  - d. Management shall be in accordance with the requirements of the Mosquito Abatement District.

24. All precipitation and surface drainage from outside of the facility (i.e., "run on") shall be diverted away from any manured areas unless such drainage is fully contained (Title 27 § 22562(b)).
25. All roofs, buildings, and non-manured areas located in the production area at the facility shall be constructed or otherwise designed so that clean rainwater, including roof drainage, is diverted away from manured areas, including corrals and waste containment facilities, unless such drainage is fully contained in the wastewater retention system (Title 27 § 22562(b)).
26. The milk parlor, animal confinement area (including corrals), manure and feed storage areas, and the digester equipment area shall be designed and maintained to convey all water that has contacted animal wastes or feed to the wastewater retention system and to minimize standing water and the infiltration of water into the underlying soils. The Discharger shall, at a minimum of once per year, backfill any slope loss with compacted, non-manured material to maintain pre-existing slopes.
27. Unlined ditches, swales, and/or earthen-berm channels may not be used for storage of wastewater, dry waste, or tailwater and may only be used for conveyance of wastewater from the retention lagoon to cropland, irrigation return water management, or temporary control of accidental spills.
28. The Discharger shall comply with all of the terms of this Order including the Standard Provisions and Reporting Requirements for Milk Cow Dairies dated 25 January 2008, attached to and made part of this Order.
29. The Discharger shall maintain a copy of this Order and its attachments at the site to be available at all times to site-operating personnel. The Discharger, landowner and key operating personnel shall be familiar with the content of this Order.
30. The Regional Water Board will review this Order periodically and may revise requirements when necessary. If upon completion of the BPTC Technical Evaluation Report, the Regional Water Board determines that waste constituents in the discharge have reasonable potential to cause or contribute to an exceedance of any Groundwater Limitation, this Order may be reopened for consideration of additional or revision of appropriate numerical effluent or groundwater limitations for the problem constituents.

I, PAMELA C. CREEDON, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 25 January 2008.

Original signature on file  

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PAMELA C. CREEDON, Executive Officer

WASTE DISCHARGE REQUIREMENTS ORDER NO. R5-2008-0003  
MADDOX DAIRY LTD, MADDOX DAIRY GENERAL, MADDOX FARMS,  
BURREL FARMS, INC., VININVEST, INC., AND MICROGY, INC.  
MADDOX DAIRY, FRESNO COUNTY

-23-

Order Attachments:

Monitoring and Reporting Program

A. Location Map

B. Production Area Map

C. Dairy Digester System Process Flow Diagram

D. Facility Map

Information Sheet

Standard Provisions

SJK: 1/25/08

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. R5-2008-0003  
FOR  
MADDOX DAIRY LTD, MADDOX DAIRY GENERAL, MADDOX FARMS,  
BURREL FARMS, INC., VININVEST, INC., AND MICROGY, INC.  
MADDOX DAIRY  
FRESNO COUNTY

This Monitoring and Reporting Program (MRP) is issued pursuant to California Water Code (CWC) §13267. The Discharger shall not implement any changes to this MRP unless and until the California Regional Water Quality Control Board, Central Valley Region, (hereafter "Regional Water Board") adopts or the Executive Officer issues a revised MRP.

This MRP includes Monitoring, Record-Keeping, and Reporting Requirements. Monitoring requirements include monitoring of discharges of manure and/or process wastewater, storm water, and tailwater from the production area and cropland, tile drain effluent, and groundwater in order to determine if the Discharger's facility is in compliance with the discharge specifications of Waste Discharge Requirements Order No. R5-2008-0003 (hereafter "Order").

Monitoring requirements also include monitoring of nutrients applied to, and removed from, cropland in order for the Discharger to demonstrate the facility's Nutrient Management Plan minimizes leaching of nutrients and salts to groundwater and the potential transport of these constituents to surface water.

In addition, monitoring requirements include periodic visual inspections of the dairy and digester to verify and document they are being operated and maintained to ensure continued compliance with the Order.

The Discharger shall keep and maintain records of the monitoring activities of the production and cropland for five years and to report the results of all monitoring. The Discharger shall conduct monitoring, record-keeping, and reporting as specified below.

If monitoring consistently shows no significant variation in the magnitude of a constituent concentration after at least two years of monitoring, the Discharger may request the MRP be revised to reduce monitoring frequency. The proposal must include adequate technical justification for reduction in monitoring frequency.



## Monitoring Requirements

### A. Visual Inspections

#### 1. Production Area

##### a. Daily

- (1) Inspect the digester equipment area (works) and note material conditions: plumbing, control equipment, feed-stock storage, etc., for evidence of leaks, corrosion, cracks, or other signs of equipment failure or malfunction.
- (2) Inspect the cattle carcass holding area for security and evidence of scavenging.

##### b. Annually, no earlier than 1 September and no later than 1 November:

- (1) Inspect all wastewater retention structures and note material conditions: berm integrity, cracking, slumping, erosion, excess vegetation, animal burrows, and/or seepage.
- (2) Inspect all the storm water conveyance structures and equipment and note material conditions: integrity, proper functioning, and evidence of blockage and/or leaks.
- (3) Inspect all dry waste storage and feed storage areas and note material conditions: appropriate drains, protection from rainfall and/or runoff, and measures to ensure leachate will drain to wastewater retention system.

##### c. Weekly during the wet season (December to March) and monthly between April and November:

- (1) Inspect the wastewater retention system for freeboard and insure adequate capacity to retain the anticipated amount of wastewater and runoff that will be generated prior to the next opportunity to apply wastewater to the cropland. Freeboard shall be the vertical distance from the pond surface to the lowest elevation of the surrounding berm or the bottom of the spillway and shall be measured to the nearest 0.25 foot (3 inches). Monthly, photograph each lagoon showing the current freeboard on that date. All photographs shall be dated and maintained as part of the facility records.
- (2) Inspect all dry waste and feed storage areas and note any conditions or changes that would result in discharges to surface water or off-site, and/or infiltration to underlying soil, and/or prevent drainage to the wastewater retention system.
- (3) Inspect all corrals and note any occurrence of standing water, mud/manure slurry, and/or saturated manure stockpiles that could result in infiltration of wastewater to underlying soil.

- d. During and after each significant storm event<sup>1</sup>:
  - (1) Visual inspect storm water conveyance and containment structures and wastewater retention system for discharge, freeboard, berm integrity, cracking, slumping, erosion, excess vegetation, animal burrows, and seepage or other evidence of uncontrolled discharge of wastewater.
- 2. Cropland
  - a. Daily when process wastewater is being applied:
    - (1) Inspect cropland area and note: the condition of cropland berms and surface water protection structures (banks, roadways, etc.). Observe for the occurrence of animal burrows, piping, and bank erosion.
    - (2) Inspect the cropland fields being irrigated for the presence (or lack) of field saturation, excessive deposition of manure solids, tailwater standing at field ends or in conveyance ditches, erosion, runoff (including tailwater discharges from the end of fields, pipes, or other conveyances), and nuisance conditions.
    - (3) Inspect all water supply wells within or adjacent to application cropland and note any application of wastewater within 100 feet of any well.
  - b. Annually, prior to the beginning of the rainy season, inspect all surface water protection features and structures. These structures shall be inspected for berm integrity, cracking, slumping, erosion, animal burrows, and other evidence of failure or impending failure.

## **B. Discharge Monitoring**

The discharge of manure/digester waste or wastewater and/or storm water runoff containing manure/digester waste or wastewater to surface water bodies is prohibited by the Order. In the event of such a discharged due to a failure of equipment, facilities, and/or management practices, the Discharger shall monitor discharges of manure and/or process wastewater, storm water, and tailwater from the production area and cropland for the constituents, and at the frequency specified below.

- 1. Unauthorized Discharges (Including Off-Property Discharges) of manure/digester waste or wastewater from the production area; irrigation water mixed with wastewater or tailwater from cropland; or storm water runoff from either area which has come in contact with waste:

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<sup>1</sup> A significant storm event is defined as a storm event that results in continuous runoff of storm water for a minimum of one hour, or intermittent runoff for a minimum of three hours in a 12-hour period.

- a. Daily during each discharge:
  - (1) Record date, time, approximate volume (gallons) or weight (tons), duration, location, source, and ultimate destination of the discharge.
  - (2) Field measurements of the discharge for electrical conductivity and pH.
  - (3) Laboratory analyses of the discharge for nitrate-nitrogen, total ammonia-nitrogen, ammonia-nitrogen, total Kjeldahl nitrogen, total phosphorus, potassium, total dissolved solids, five day biological oxygen demand (BOD<sub>5</sub>), total suspended solids, and total and fecal coliform.
- b. Daily during each discharge to surface water:
  - (1) For surface water upstream<sup>2</sup> and downstream<sup>3</sup> of the discharge.
    - i. Field measurements for electrical conductivity, dissolved oxygen, temperature, and pH.
    - ii. Laboratory analyses for nitrate-nitrogen, total ammonia-nitrogen, unionized ammonia-nitrogen, total Kjeldahl nitrogen, total phosphorus, potassium, total dissolved solids, BOD<sub>5</sub>, total suspended solids, and total and fecal coliform.

If conditions are not safe for sampling, the Discharger must provide documentation of why samples could not be collected and analyzed. For example, the Discharger may be unable to collect samples during dangerous weather conditions (such as local flooding, high winds, tornados, electrical storms, etc.). Once the dangerous conditions have passed, the Discharger shall collect a sample of the discharge or, if the discharge has ceased, from the waste management unit from which the discharge occurred.

Discharge and surface water sample analyses shall be conducted by a laboratory certified for such analyses by the California Department of Health Services (i.e., California certified Environmental Laboratory Accreditation Program [ELAP] laboratory). These laboratory analyses shall be conducted in accordance with the Title 40 Code of Federal Regulations Part 136 (Guidelines Establishing Test Procedures for the Analysis of Pollutants) or other test methods approved by the Executive Officer.

All discharges shall be reported as specified in the Non-compliance Reporting Requirements and Annual Reporting Requirements, as appropriate. The rationale for all discharge-sampling locations shall be included in the reports.

2. Nutrient Monitoring – by 1 October 2008, the Discharger shall begin monitoring wastewater, digester effluent, dry waste, and plant tissue produced at the facility, soil in the

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<sup>2</sup> Upstream samples shall be taken where the surface water body enters the facility.

<sup>3</sup> Downstream samples shall be taken beyond where the discharge has blended with the receiving waters but not influenced by dilution flow from other discharges.

cropland, and irrigation water used on each cropland field for the constituents and at the frequency specified below. This information is for use in conducting nutrient management on the individual cropland fields and the facility on the whole. The Discharger is encouraged to collect and use additional data, as appropriate, to refine nutrient management.

a. Wastewater

- (1) Each application: Record the volume (gallons or acre-feet) and date of process wastewater application to each cropland field.
- (2) Monthly, measure and record the electrical conductivity in each main wastewater retention pond.
- (3) Quarterly (during each quarter when wastewater is applied to cropland), prior to blending for application to cropland:
  - a. Analyze for nitrate-nitrogen, ammonium-nitrogen, total Kjeldahl nitrogen, boron, total phosphorus, potassium, pH, total dissolved solids, and electrical conductivity.
  - b. Analyze for general minerals (bicarbonate, calcium, carbonate, chloride, magnesium, sodium, and sulfate), iron, and manganese.

b. Digester Effluent (liquid from the screw press separator)

- (1) Daily, measure and record the volume discharged into the facility's wastewater retention system.
- (2) Daily, measure and record the electrical conductivity.
- (3) Quarterly
  - a. Analyze for nitrate-nitrogen, ammonium-nitrogen, total Kjeldahl nitrogen, boron, total phosphorus, potassium, pH, total dissolved solids, and electrical conductivity.
  - b. Analyze for general minerals (bicarbonate, calcium, carbonate, chloride, magnesium, sodium, and sulfate), iron, and manganese.

c. Dry Waste

- (1) Each offsite export of dry waste: record the total volume (cubic yards) or total weight (tons), and analyze for either density (pounds per cubic foot) or percent moisture.
- (2) Twice annually: analyze for ammonium-nitrogen, nitrate, total Kjeldahl nitrogen, chloride, total phosphorus, potassium, electrical conductivity (or total dissolved solids), and density (if volume manure applied is reported) or percent moisture (if weight manure applied is reported).

d. Plant Tissue

- (1) At harvest: record the total weight (tons) and percent wet weight or volume (cubic yards) and density (grams per liter) of harvested material removed from each cropland field.
- (2) At harvest: analyze for total nitrogen, phosphorus, and potassium (expressed on a dry weight basis), and percent wet weight (if weight of harvested material is reported) or density (if volume of harvested material is reported).

e. Soil

- (1) Annually, prior to spring planting for each cropland field:
  - a. In the root zone for the crop to be planted: analyze for nitrate-nitrogen, total Kjeldahl nitrogen, soluble phosphorous, and electrical conductivity.
  - b. Below the root zone: analyze for nitrate-nitrogen, and electrical conductivity.
- (2) Annually, prior to fall planting for each cropland field:
  - a. In the root zone of the crop to be planted: analyze for nitrate-nitrogen, phosphorus, potassium, total Kjeldahl nitrogen, soluble phosphorus, and electrical conductivity.
  - b. Below the root zone: analyzed for nitrate-nitrogen, total Kjeldahl nitrogen, and electrical conductivity.

f. Irrigation Water

- (1) Each irrigation event for each cropland field, record volume (gallons or acre-feet) and source (well or canal) of irrigation water applied and date(s) applied.
- (2) One irrigation event from each source of irrigation water during each irrigation season - analyze for: electrical conductivity and total nitrogen<sup>4</sup>.

### **C. Groundwater Monitoring**

The Discharger shall monitor groundwater conditions beneath the facility by sampling domestic wells, agricultural supply wells and monitoring wells present in the production and cropland. This monitoring shall be conducted at the frequency and for the parameters specified below.

#### **1. Domestic and Agricultural Supply Wells**

a. Annually:

- (1) Field measurements for pH, temperature, and electrical conductivity.

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<sup>4</sup> In lieu of sampling the irrigation water, the Discharger may provide equivalent data from the local irrigation district.

- (2) Analyze for nitrate-nitrogen, ammonium-nitrogen, total Kjeldahl nitrogen, calcium, potassium, sodium, magnesium, bicarbonate, carbonate, sulfate, chloride, boron, iron, manganese, total phosphorus, total dissolved solids, and total coliform organisms.
2. Monitoring Wells
  - a. Quarterly for two years and semi-annually thereafter:
    - (1) The depth to groundwater from a surveyed reference point to the nearest 0.01 foot in each monitoring well.
    - (2) Field measure pH, temperature, and electrical conductivity.
  - b. Quarterly for two years and semi-annually thereafter: analyze for nitrate-nitrogen, ammonium-nitrogen, total Kjeldahl nitrogen, calcium, potassium, sodium, magnesium, bicarbonate, carbonate, sulfate, chloride, boron, iron, manganese, total phosphorus, and total dissolved solids.
3. Sampling Procedures

Approved sampling procedures are listed on the Central Valley Water Board's web site at: [http://www.waterboards.ca.gov/centralvalley/available\\_documents/index.html#confined](http://www.waterboards.ca.gov/centralvalley/available_documents/index.html#confined)

When special procedures appear to be necessary, the Discharger may request approval of alternative sampling procedures. The Executive Officer will review such requests and if adequate justification is provided, may approve the requested alternative sampling procedures.

#### **D. General Monitoring Requirements**

1. The Discharger shall comply with all the provisions and specification of the Standard Provisions and Reporting Requirements.
2. All samples collected shall be representative of the volume and nature of the material being sampled.
3. Field activity reports should be created for each monitoring event, one record for each monitored location (monitoring well, water supply well, surface water body, cropland field). The field activity reports should identify the technician performing the fieldwork, the technician's affiliation, the entity commissioning the work (property owner, contractor, consultant, etc.), the location of the work, the identification of the sampled location, and the date(s) of the work. The field activity record should be prepared and signed by the field technician in the field when the work is performed.
4. All samples containers shall be labeled and records maintained to show the time and date of collection as well as the person collecting the sample and the sample location.

5. All samples collected for laboratory analyses shall be preserved and submitted to the laboratory within the required holding time appropriate for the analytical method used and the constituents analyzed.
6. All samples submitted to a laboratory for analyses shall be identified in a properly completed and signed Chain-of-Custody form.
7. Testing instruments used for pH, and electrical conductivity may be used in the field provided: the operator is trained in the proper use and maintenance of the instruments; the instruments are field calibrated prior to each monitoring event; and instruments are serviced and/or calibrated by the manufacturer at the recommended frequency.

#### **E. Record Keeping Requirements**

1. Dischargers shall maintain on-site, (for review by Regional Water Board inspectors) for a period of five years from the date they are created, all information as follows:
  - a. Records of the inspections including any and all subsequent corrective actions specified in **A. Inspections** above.
  - b. All records for the production area and digester including:
    - (1) Records documenting actions taken to correct deficiencies noted during the inspections. Deficiencies not corrected in 30 days must be accompanied by an explanation of the factors preventing immediate correction.
    - (2) Records of the date, time, and estimated volume of any digester bypass and/or overflow or leaks from any wastewater conveyance or storage structure.
    - (3) Records documenting the daily wastewater electrical conductivity measurements in each main wastewater retention pond.
    - (4) Records of all dry waste and/or wastewater exported from the facility which include information on the hauler, destination, dates hauled, and amount exported.
    - (5) Action taken and date(s) to correct unauthorized releases as reported in accordance with **F.1. Non-compliance Reporting Requirements** below.
    - (6) Records of monitoring activities, field activity records, and laboratory analyses conducted as required in **D. General Monitoring Requirements** above.
  - c. All records for the cropland including:
    - (1) All information necessary to document implementation and management of the elements of the nutrient management plan (NMP).
    - (2) Identification of crop, acreage, dates of planting and harvest, and actual crop yields for each field.

- (3) Dates, locations, and approximate weight and moisture content, or volume and density, of dry waste or artificial fertilizer applied to each field.
- (4) Dates, locations, and volume of wastewater applied to each field.
- (5) Weather conditions for 24 hours prior to and following application of dry waste and wastewater.
- (6) Results (analytical laboratory reports) from dry waste, wastewater, digester effluent, irrigation water, soil, plant tissue, storm water and/or tailwater discharges, surface water, tile drain effluent, and groundwater sampling.
- (7) Records documenting any corrective actions taken to correct deficiencies noted during the inspections required in the Monitoring Provisions above. Deficiencies not corrected in 30 days must be accompanied by an explanation of the factors preventing immediate correction.
- (8) Actions taken to correct unauthorized releases as reported in accordance with Section **F.1. Non-compliance Reporting** below.
- (9) Records of monitoring activities, field activity records, and laboratory analyses conducted as required in Section **D. General Monitoring Requirements** above.
  - d. A copy of the Discharger's current NMP.
  - e. The Manure/Process Wastewater Tracking Manifest forms documenting the export of waste from the facility. A copy of this form can be found on our web site in Attachment D of the Waste Discharge Requirement General Order R5-2007-0035 for Existing Milk Cow Dairies (Dairy General Order) at:  
[http://www.waterboards.ca.gov/centralvalley/adopted\\_orders/GeneralOrders/R5-2007-0035.pdf](http://www.waterboards.ca.gov/centralvalley/adopted_orders/GeneralOrders/R5-2007-0035.pdf)

## **F. Reporting Requirements**

### **1. Non-compliance Reporting Requirements**

- a. The Discharger shall report any non-compliance that endangers human health or the environment or any non-compliance with Prohibitions in the Order, within 24 hours of becoming aware of its occurrence. The incident shall be reported to the Regional Water Board office, Fresno County Environmental Health Services (559-445-3357), and to the California Office of Emergency Services (OES) (800-852-7550). During non-business hours, the Discharger shall leave a message on the Regional Water Board's voice mail. The message shall include the time, date, place, and nature of the non-compliance, the name and number of the reporting person, and shall be recorded in writing by the Discharger. The OES phone number is operational 24 hours a day.



- b. A written report shall be submitted to the Regional Water Board office within two weeks of the Discharger becoming aware of the non-compliance incident. The report shall contain a description of the non-compliance, its causes, duration, and the actual or anticipated time for achieving compliance. The report shall include complete details of the steps that the Discharger has taken or intends to take, in order to prevent recurrence. All intentional or accidental spills shall be reported as required by this provision. The written submission shall contain:
- (1) The approximate date, time, and location of the non-compliance including a description of the ultimate destination of any unauthorized discharge and the flow path of such discharge to a receiving water body;
  - (2) A description of the non-compliance and its cause;
  - (3) The flow rate, volume, and duration of any discharge involved in the non-compliance;
  - (4) The amount of precipitation (in inches) the day of any discharge and for each of the seven days preceding the discharge;
  - (5) A description (location; date and time collected; field measurements of pH, temperature, dissolved oxygen and electrical conductivity; sample identification; date submitted to laboratory; analyses requested) of non-compliance discharge samples and/or surface water samples taken to comply with the Monitoring Provisions above for Unauthorized Discharges (including off-property discharges) of manure /digester waste or process wastewater from the production area or land application area and storm water discharges to surface water from the production area;
  - (6) The period of non-compliance, including dates and times, and if the non-compliance has not been corrected, the anticipated time it is expected to continue;
  - (7) A time schedule and a plan to implement corrective actions necessary to prevent the recurrence of such non-compliance; and
  - (8) The laboratory analyses of the non-compliance discharge sample and/or upstream and downstream surface water samples shall be submitted to the Regional Water Board office within 45 days of the discharge.

## 2. **Annual Reporting Requirements**

- a. An annual Facility Report is due by **1 July** of each year for the previous year's monitoring, planting and harvesting.
- b. The annual report shall include all the information as specified below:
  - (1) Summary of the crops grown in the facility cropland to include: field identification, type, date planted and harvested, and amount harvested.

- (2) Number and type of animals, and number maintained in each type of confinement (free-stalls or open corrals). Statement reporting the type of manure removal practices in each type of confinement (i.e., flush lanes, dry scrape, vacuum pickup, etc.).
- (3) Summary of all dry waste and/or wastewater discharges from the facility to surface water or to land areas (cropland or otherwise) when not in accordance with the facility's Nutrient Management Plan that occurred during the annual reporting period, including date, time, location, approximate volume, a map showing discharge and sample locations, rationale for sample locations, and method of measuring discharge flows.
- (4) Summary of all storm water discharges from the production area to surface water during the annual reporting period, including the date, time, approximate volume, duration, location, and a map showing the discharge and sample locations, rationale for sample locations, and method of measuring discharge flows.
- (5) Summary of all discharges from the cropland to surface water that have occurred during the annual reporting period, including the date, time, approximate volume, location, source of discharge (i.e., tailwater, process wastewater, or blended process wastewater), a map showing the discharge and sample locations, rationale for sample locations, and method of measuring discharge flows.
- (6) Copies of records documenting the monthly wastewater electrical conductivity measurements in each main wastewater retention pond.
- (7) Copies of laboratory analyses of all discharges (tile drain effluent, dry waste, wastewater, digester effluent, or tailwater), surface water (upstream and downstream of a discharge), and storm water, including chain-of-custody forms and laboratory quality assurance/quality control results.
- (8) Tabulated field measurement and analytical data for samples of tile drain effluent, dry waste, wastewater, digester effluent, irrigation water, soil, and plant tissue. The data shall be tabulated to clearly show sample dates, constituents analyzed, constituent concentrations, and detection limits.
- (9) Tabulated irrigation and nutrient application data for each cropland field. The data shall be tabulated to show each field, area (acreage), crop(s) grown, amount and source of irrigation water, and the amount and source of nutrients and salt added (dry waste, wastewater, or fertilizer).
- (10) Calculations showing the total nitrogen, phosphorus, potassium, and non-nutrient salts applied to each field, including from sources other than dry waste or wastewater.

- (11) Calculations showing the nitrogen and salt balance for each field and the facility as a whole during the reporting period. The balance is determined by the amount of nitrogen and salt present in the cropland soil at the beginning of the reporting period, plus the amount added by dry waste, wastewater, and/or fertilizer, and minus the amount removed by harvest and/or export from the facility.
  - (12) If the amount of salt exceeded 2,000 pounds per acre for single crop fields or 3,000 pounds per acre for double crop fields; for any field, a statement indicating how the NMP will be modified based to bring the facility back into compliance with the Order.
  - (13) Copies of all records and reports prepared for paragraph **F.1. Non-Compliance Reporting** above.
  - (14) Copies of all facility corrective action reports which resulted from inspections for the past year.
3. **Groundwater Reporting Requirements**
- a. The Discharger shall report the results of all groundwater monitoring concurrently with the annual report.
  - b. Groundwater monitoring reports shall include:
    - (1) Copies of all field activity reports, chain-of-custody forms, and laboratory analyses (including laboratory quality assurance/quality control results) for each well sample (water supply wells and monitoring wells) collected.
    - (2) Tabulated groundwater elevation data showing date of measurement, depth to water, wellhead elevation and groundwater elevation in each on the monitoring wells.
    - (3) Tabulated analytical results for the well samples showing date of sampling, constituents analyzed, and detected concentrations.
    - (4) A potentiometric contour map showing the groundwater flow direction, gradient, and elevations for the most current groundwater sampling event.
    - (5) The tabulated data shall include both historical and current information.
4. **Hydrologic Report with Monitoring Well Installation and Sampling Plan (MWISP)** – by 30 March 2008, the Discharger shall submit a Hydrogeologic Report and MWISP. At a minimum the report must contain all of the information listed below:
- a. General Information:
    - (1) Topographic map depicting the facility boundaries, and the major waste management areas (wastewater retention ponds, corrals, dry waste and feed storage areas, digester works, and cropland). The map should also show any existing on-site or nearby (within 2,000 feet) domestic, irrigation, and municipal

supply wells and monitoring wells, utilities, surface water bodies, drainage courses and their tributaries/destinations, and other major physical and man-made features (roads, schools, parks, etc), as appropriate.

- (2) A description of the underlying geology and hydrogeology of the facility. Historical groundwater depth and water quality data should be included. Copies of Department of Water Resources Well Completion Records or other well construction description for all on-site water supply wells (active or otherwise) should be attached.
  - (3) Site plan showing proposed monitoring well locations, other existing wells, and major physical site features (corrals, freestall barns, milk parlors, feed storage areas, etc.) waste handling facilities (separator basins, retention ponds, manure storage areas, etc.), irrigated cropland and pasture, and on-site or adjacent water features.
  - (4) Rationale for the proposed number, construction, and location of the monitoring wells. Include anticipated depth to groundwater, groundwater flow direction (source of data), and identify the major waste management areas of the facility (corrals, wastewater retention ponds, digester work, and cropland). Provide for installation of a monitoring well up gradient from the influence of the facility (in as much as possible) and down gradient from each of the major waste management areas of the facility.
  - (5) Local permitting information, as required by the Fresno County Environmental Health Services Department.
- b. Drilling details; method, type of equipment, and logging practices/equipment.
  - c. Health and Safety Plan.
  - d. Proposed monitoring well design – a well construction schematic depicting: total depth, anticipated groundwater depth, borehole diameter, well construction materials, screen interval and perforations, seal intervals and materials, surface completion, and well protection.
  - e. Proposed well development – schedule (at least seven days after completion), method, equipment, measured parameters, and criteria used to determine that completion is complete.
  - f. Surveying – the method used to obtain horizontal and vertical positions, method accuracy, and the name and affiliation of the registered professional performing the survey.
  - g. Proposed monitoring event – schedule (at least twenty-four hours after development), depth to water measuring equipment and practices, well purging equipment, practices, and criteria for completion, sample collection equipment and practices, and analytical procedures.

5. **Monitoring Well Installation Completion Report (MWICR) Requirements** – within 60 days of installation of the monitoring wells, the Discharger shall submit MWICP. At a minimum the MWICP shall summarize the field activities as described below:
- a. General Information: same as required for the Hydrogeologic Report and MWISP in paragraph 4. above with the necessary revisions and/or updated data gathered during the field work to install the monitoring wells.
  - b. Monitoring Well Construction:
    - (1) Number and depths of the monitoring well installed.
    - (2) Monitoring well identification (i.e., numbers).
    - (3) Date(s) of drilling and well installation.
    - (4) Description of monitoring well locations including field-implemented changes (from proposed locations) due to physical obstacles or safety hazards.
    - (5) Description of drilling and construction, including equipment, methods, and difficulties encountered (such as hole collapse, lost circulation, need for fishing).
    - (6) Name and address of drilling company, driller, California License Number, and logger (name and affiliation of geologist).
    - (7) Driller's Well Completion Report and lithologic log of borehole.
  - c. As – built for each monitoring well depicting the details outlined above
  - d. All depth to water measurements made during the field program.
  - e. Field notes from drilling, installation, and surveying activities (i.e. sub-contractor dailies as appropriate).
  - f. Construction summary table of pertinent information such as date of installation, well depth, casing diameter, screen depth and interval, seal depth and interval, and well elevation.
  - g. Monitoring Well Development:
    - (1) Date and time of development.
    - (2) Name and affiliation of technician performing development.
    - (3) Method of development.
    - (4) Methods used to determine when development is complete.
    - (5) Development log: volume of water purged and measurements for temperature, pH, and electrical conductivity during and after development. Response notes – (bailing to dry, recovery time, number of development cycles).

- (6) Disposal of development water.
- h. Monitoring Well Survey:
  - (1) Identify coordinate system and/or reference points used.
  - (2) Description of reference points.
  - (3) Horizontal and vertical coordinates of north side of each well casing with cap removed.
  - (4) Name, license number, affiliation, and signature of California licensed professional responsible for survey.
  - (5) Surveyor's field notes.
  - (6) Tabulated survey data, certified by the surveyor.

#### 6. **Groundwater Limitations Analysis Report**

The Discharger shall submit to the Executive officer a Groundwater Limitations Analysis report consistent with the Order.

- a. This report shall contain an evaluation of the groundwater quality and flow data to assess trends.
- b. Data shall be presented and evaluated to address:
  - (1) The monitoring program's adequacy to assess compliance with the Order.
  - (2) Whether groundwater data provided is representative of conditions up gradient of the influence of the facility.
  - (3) Whether groundwater data provided is representative of conditions down gradient of the major waste management areas (wastewater retention system, corrals, digester works, and cropland) of the facility.
  - (4) Whether monitoring has been conducted in compliance with the Order and consistent with this MRP.
- c. The report shall propose specific numeric groundwater limitations for each waste constituent that reflects full implementation of best practicable treatment or control (BPTC) and reflecting applicable water quality objectives for that waste constituent. The report shall describe in detail how these were determined considering actual data from monitoring wells comprising the approved groundwater monitoring program, impact reductions through full implementation of BPTC, the factors in CWC § 13241, Resolution 68-16, the Basin Plan, etc. The Discharger may, submit results of a validated groundwater model or other hydrogeologic information to support its proposal.

**G. General Reporting Requirements**

- a. The results of any monitoring conducted more frequently than required at the locations specified herein shall be reported to the Regional Water Board.
- b. Laboratory analyses for manure, process wastewater, and soil shall be submitted to the Regional Water Board upon request by the Executive Officer.
- c. Each report shall be signed by the Discharger or a duly authorized representative as specified in the Standard Provisions and Reporting Requirements, Section C. 8.
- d. All technical reports required by this MRP that involve planning, investigation, evaluation, or design, or other work requiring interpretation and proper application of engineering or geologic sciences, shall be prepared as specified in the Standard Provisions and Reporting Requirements, Section C. 9.

e. **Submit Reports to:**

California Regional Water Quality Control Board  
Central Valley Region  
1685 E Street  
Fresno, CA 93706

Attention: Confined Animal Regulatory Unit

ORDERED BY: Original signature on file  
PAMELA C. CREEDON, Executive Officer

25 January 2008  
(Date)

## INFORMATION SHEET

WASTE DISCHARGE REQUIREMENTS ORDER NO. R5-2008-0003  
MADDOX DAIRY LTD, MADDOX DAIRY GENERAL, MADDOX FARMS,  
BURREL FARMS, INC., VININVEST, INC., AND MICROGY, INC.,  
MADDOX DAIRY, FRESNO COUNTY

### **Background**

Maddox Dairy LTD, a California limited partnership; Maddox Dairy General, a California general partnership; Maddox Farms, a California general partnership; Burrel Farms Inc., a California Corporation, Vininvest Inc., a California corporation, and Microgy, Inc., a New Hampshire Corporation (collectively hereafter “Discharger”) own and operate the Maddox Dairy (facility). The facility is about four miles east of the town of Helm, Fresno County. This dairy currently operates under Waste Discharge Requirements Order No. R5-2007-0035, General Order for Existing Milk Cow Dairies (hereafter “General Order”).

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 2005 RWD are: 3,470 milk cows, 399 dry cows, 2,408 heifers, and 2,627 calves. 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., which is also named as a discharger in the proposed Order. The digester will include a 200,000-gallon capacity steel above ground tank (AGT) to store the supplemental feedstock, a 325,000-gallon capacity steel AGT mix tank, and two 1.2 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.



WASTE DISCHARGE REQUIREMENTS ORDER NO. R5-2008-0003  
 MADDOX DAIRY LTD, MADDOX DAIRY GENERAL, MADDOX FARMS,  
 BURREL FARMS, INC., VININVEST, INC., AND MICROGY, INC.  
 MADDOX DAIRY, FRESNO COUNTY

<b>Table 1 Selected Constituents and Estimated Concentrations for Supplemental Feedstock</b>	
<b>Constituent</b>	<b>Estimated Concentration</b>
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 54,068 gallons of manure from the mix tank and 20,932 gallons of supplemental feedstock from the supplemental feedstock 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.

<b>Table 2 Wastewater Characteristics</b>		
<b>Constituent</b>	<b>Dairy Wastewater<sup>1</sup></b>	<b>Digester Effluent<sup>2</sup></b>
Bicarbonate	2,200 mg/L	Not reported
Calcium	175 mg/L	1,505 mg/L
Carbonate	ND	Not reported
Chloride	210 mg/L	1,185 mg/L
Electrical Conductivity	4,230 µmhos/cm	Not reported
Magnesium	85 mg/L	Not reported
Nitrogen (Total Kjeldahl)	320 mg/L	2,956 mg/L
pH	7.4	8.3

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 MADDOX DAIRY, FRESNO COUNTY

<b>Table 2 Wastewater Characteristics</b>		
<b>Constituent</b>	<b>Dairy Wastewater<sup>1</sup></b>	<b>Digester Effluent<sup>2</sup></b>
Potassium	360 mg/L	1,903 mg/L
Sodium	178 mg/L	1,092 mg/L
Sulfur	30 mg/L	362 mg/L
Total Dissolved Solids	2,280 mg/L	12,648 mg/L
1 - Based on average of 200 samples collected from 22 dairies in southern San Joaquin Valley 2 – Source: Larry Walker Associates email of 24 October 2007 from Robert Smith to David Sholes mg/L – milligram per liter µmhos/cm – micromhos per centimeter ND - not detected		

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. The owners and operators of the facility and Microgy, Inc. (collectively, “Discharger”) report 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 3,600 mg/L total dissolved solids (TDS) or 6,600 micromhos per centimeter µmhos/cm electrical conductivity (EC).

The anticipated dairy and digester operations are estimated to generate approximately 48.7 million gallons or 6.5 million cubic feet of wastewater during a typical rainy season. Using the standard assumption of 50-gallons/milk cow/day, the currently existing wastewater retention system appears to have insufficient capacity (approximately 6.4 million cubic feet) to meet the Title 27 CCR §22562 and §22563 requirements. However, estimates of water usage included in the 2007 RWD (27-gallons/milking cow/day) indicate sufficient capacity exists. 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 requirements of the Order.

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### Groundwater Conditions and Existing Land Use

The regional unconfined to semi-confined groundwater is approximately 170 feet below ground surface (bgs), according to information in *Lines of Equal Depth to Water in Wells, Unconfined Aquifer, San Joaquin Valley*, published by DWR in Spring 2005. According to Department of Water Resources hydrographs for wells within one mile of the facility, the shallowest groundwater depth recorded in water supply wells was 42 feet below ground surface (bgs) in 1957. Groundwater depth measurements made in March 2001 on four of the facility's supply wells within a mile of the production area ranged from 167 feet to 182 feet bgs.

The E-Clay layer of the Tulare Formation occurs about 575 feet bgs, and separates the upper aquifer from a lower, sometimes confined aquifer below the E-Clay. Although flow between the two aquifers was originally restricted, some agricultural wells within the vicinity may be screened within the upper and lower aquifers. The uppermost aquifer has the potential to have hydraulic continuity with the lower aquifer though wells that penetrate both, resulting in lower quality water from the uppermost aquifer to migrate into the higher quality waters just above and below the E-Clay.

Existing onsite production wells include three domestic wells and approximately 18 irrigation supply wells. Well construction information for one of the domestic wells and three irrigation supply wells indicate that they have 20 to 70 foot sanitary seals and were drilled to 480 to 520 feet bsg with screened intervals that begin at between 240 and 300 bgs. These wells appear to be completed above the E-Clay. There is currently no groundwater monitoring system installed at the facility other than the monitoring of existing production wells.

Samples collected on 16 January 2003 from one of the domestic supply wells and five irrigation supply wells were analyzed for general mineral constituents, the results of which are transcribed in Table 3.

<b>Table 3</b>							
<b>Selected Constituents From Domestic and Irrigation Supply Wells</b>							
	<b>Units</b>	<b>1D</b>	<b>21-3A</b>	<b>16-4 A</b>	<b>17-3 A</b>	<b>18-5A</b>	<b>19-3A</b>
Calcium	mg/L	17	25	16	32	43	78
Magnesium	mg/L	1.4	1.5	1.5	3.2	4.0	3.6
Potassium	mg/L	4.1	3.8	4.6	5.6	6.1	4.5
Sodium	mg/L	42	42	49	67	78	88
Chloride	mg/L	23	29	35	36	23	19
Sulfate	mg/L	14	21	9.6	46	45	160
Nitrate-N	mg/L	ND	1.2	ND	3.1	ND	ND
Ammonia	mg/L	1.2	ND	ND	ND	ND	ND
TKN	mg/L	1.8	1.1	1.2	ND	1.8	ND

WASTE DISCHARGE REQUIREMENTS ORDER NO. R5-2008-0003  
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 MADDOX DAIRY, FRESNO COUNTY

<b>Table 3 Selected Constituents From Domestic and Irrigation Supply Wells</b>							
	<b>Units</b>	<b>1D</b>	<b>21-3A</b>	<b>16-4 A</b>	<b>17-3 A</b>	<b>18-5A</b>	<b>19-3A</b>
PH	std. units	7.7	7.8	7.7	7.7	7.6	7.7
TDS	mg/L	230	720	240	330	390	520
EC	µmhos/cm	310	250	250	520	600	590

mg/L - milligrams per liter  
 µmhos/cm - micromhos per centimeter  
 ND - not detected

Land use in the facility vicinity is agricultural with scattered farmsteads, including other confined animal operations. Crops grown within five miles of the facility include: grain and hay crops; alfalfa; field crops including: cotton, safflower, sugar beets, corn, sudan, and beans; pasture; truck crops including: melons, squash and cucumbers, onions and garlic, tomatoes, flowers, nursery and Christmas tree farms; deciduous fruits and nuts; and vineyards according to land use maps published in 2000 by California Department of Water Resources.

The most prevalent soils on the facility are classified as Temple Series, a loam or clay loam; Rossi Series, a fine sandy loam; Chino Series, a fine sandy loam; and Merced Series, a clay, according to the USDA Natural Resources Conservation Service. Permeability of these soil series is slow to very slow.

**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 4 below are what the Basin Plan and referenced documents of recognized authorities indicate cannot be exceeded without causing some adverse impact on the

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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 4 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.

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

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, section 64431, Table 64431-A

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

WASTE DISCHARGE REQUIREMENTS ORDER NO. R5-2008-0003  
MADDOX DAIRY LTD, MADDOX DAIRY GENERAL, MADDOX FARMS,  
BURREL FARMS, INC., VININVEST, INC., AND MICROGY, INC.  
MADDOX DAIRY, FRESNO COUNTY

### **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.

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 except where specific circumstances require different or more stringent discharge specifications or provisions.

WASTE DISCHARGE REQUIREMENTS ORDER NO. R5-2008-0003  
MADDOX DAIRY LTD, MADDOX DAIRY GENERAL, MADDOX FARMS,  
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MADDOX DAIRY, FRESNO COUNTY

### **California Environmental Quality Act (CEQA)**

This Order rescinds 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 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 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.

### **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.

WASTE DISCHARGE REQUIREMENTS ORDER NO. R5-2008-0003  
MADDOX DAIRY LTD, MADDOX DAIRY GENERAL, MADDOX FARMS,  
BURREL FARMS, INC., VININVEST, INC., AND MICROGY, INC.  
MADDOX DAIRY, FRESNO COUNTY

- 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.
- 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.



WASTE DISCHARGE REQUIREMENTS ORDER NO. R5-2008-0003  
MADDOX DAIRY LTD, MADDOX DAIRY GENERAL, MADDOX FARMS,  
BURREL FARMS, INC., VININVEST, INC., AND MICROGY, INC.  
MADDOX DAIRY, FRESNO COUNTY

- 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, 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.

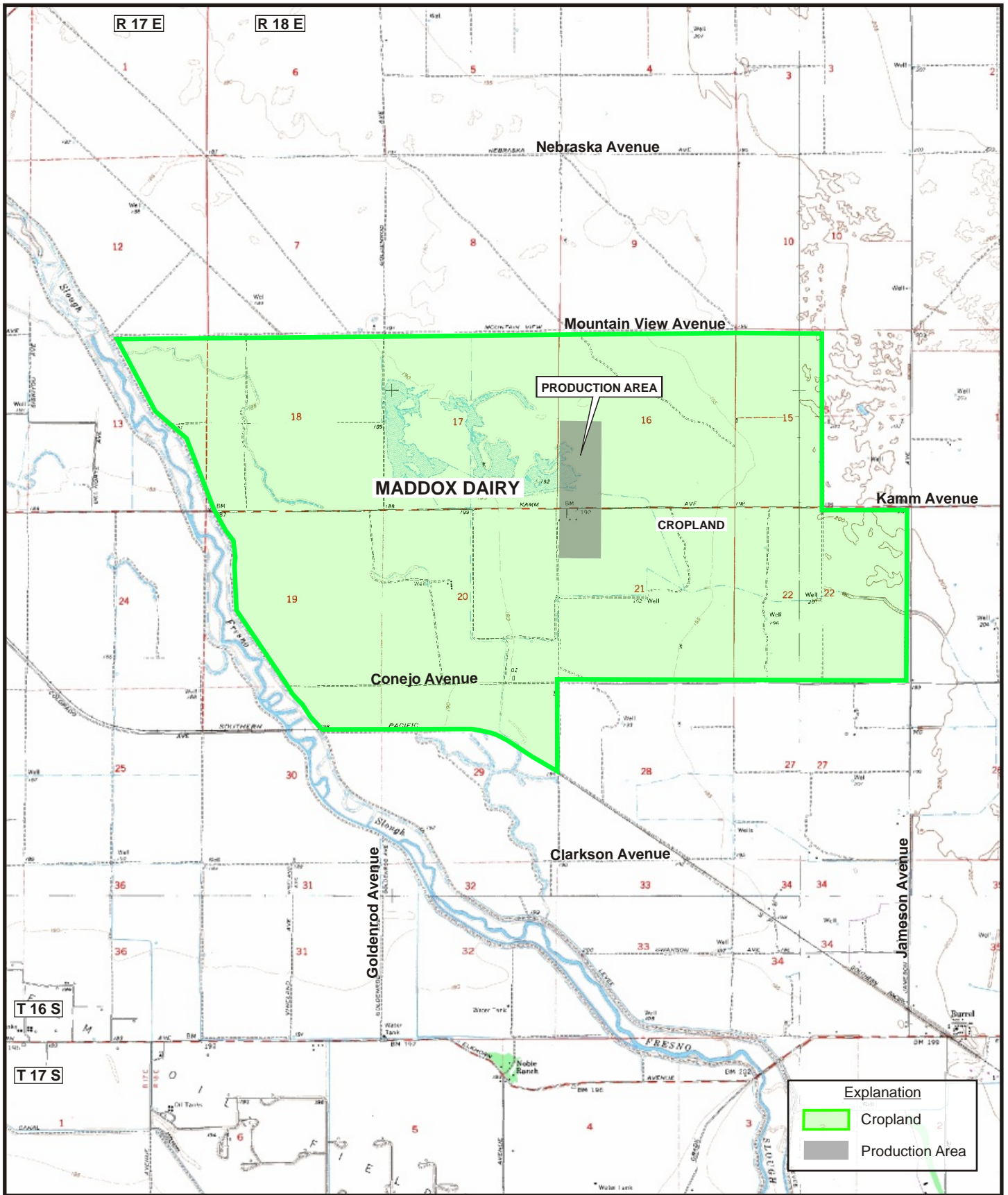
The Discharger must monitor groundwater for waste constituents expected to be present in the discharge, capable of reaching groundwater, and exceeding the groundwater limitations if treatment, control, and environmental attenuation, proves inadequate. For each constituent listed in Section D Interim 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.

WASTE DISCHARGE REQUIREMENTS ORDER NO. R5-2008-0003  
MADDOX DAIRY LTD, MADDOX DAIRY GENERAL, MADDOX FARMS,  
BURREL FARMS, INC., VININVEST, INC., AND MICROGY, INC.  
MADDOX DAIRY, FRESNO COUNTY

### **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.

SJK: 1/25/08



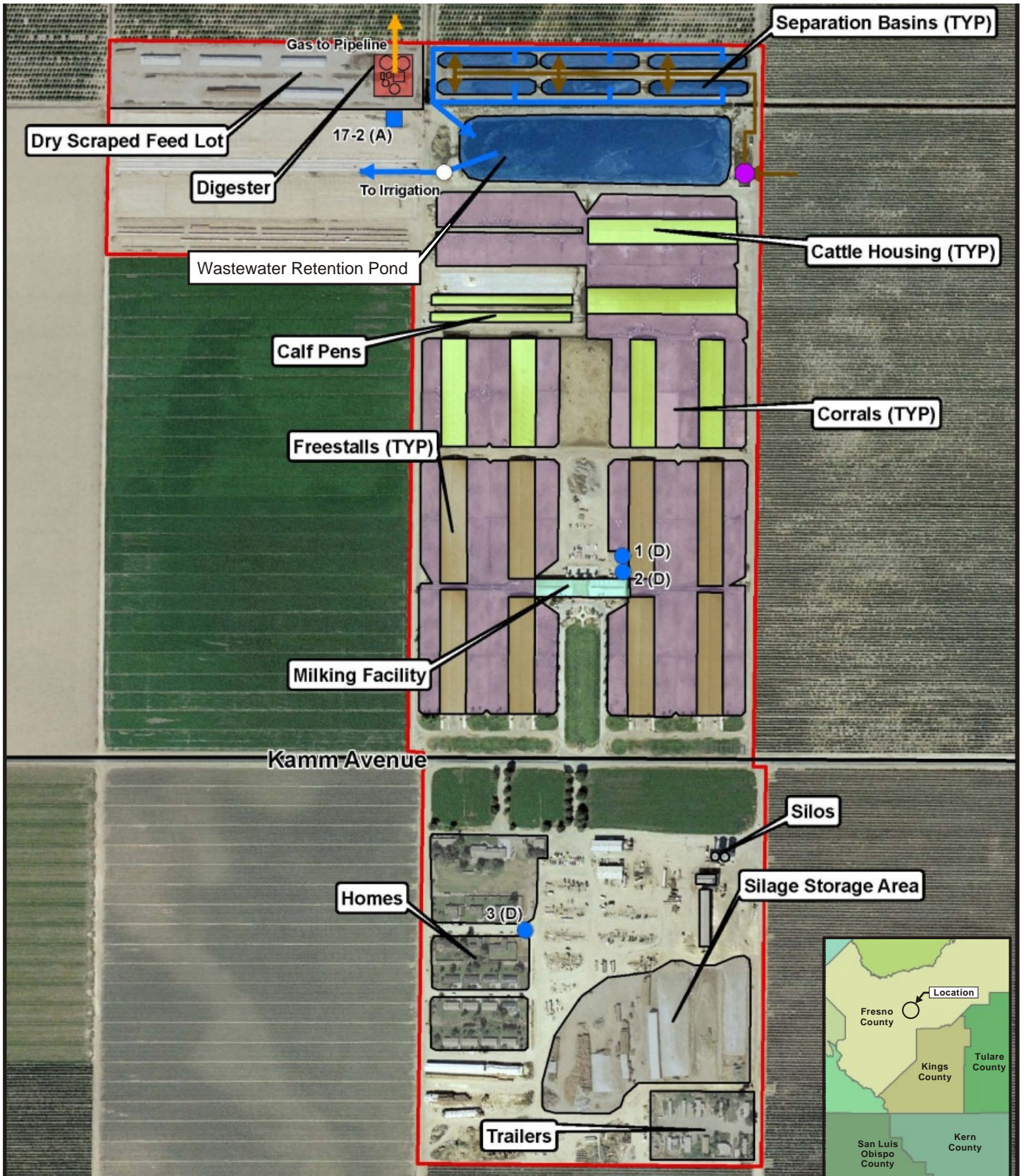
Explanation	
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Map Source:  
 HELM & RAISIN 7.5 Minute USGS Quadrangles  
 Section 13, T16S, R17E, MDB&M  
 Sections 15, 16, 17, 18, 19, 20, 21, 22, 29, & 30,  
 T16S, R18E, MDB&M

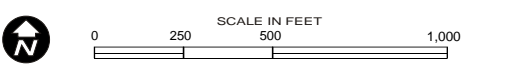
**N**  
 SCALE  
 1 INCH = 4,000 FEET

**LOCATION MAP**  
 ORDER NO. R5-2008-0003  
 INDIVIDUAL WASTE DISCHARGE REQUIREMENTS  
 FOR  
 MADDOX DAIRY LTD, MADDOX DAIRY GENERAL, MADDOX FARMS,  
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 MADDOX DAIRY  
 FRESNO COUNTY



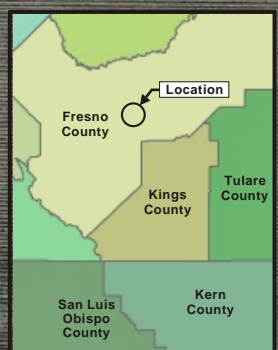


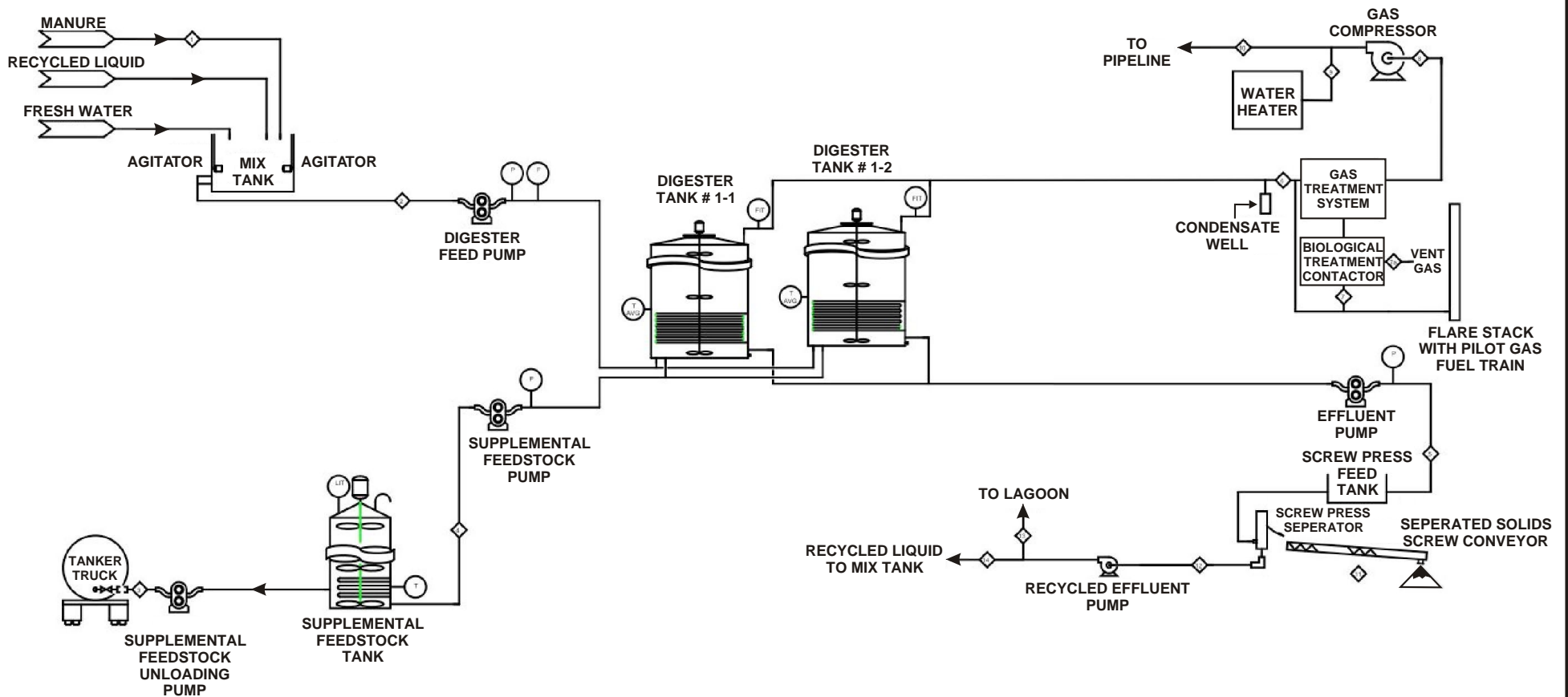
- Map Features:**
- Effluent
  - Digester Gas
  - Manure Flow line
  - Domestic Well
  - Ag Well
  - Lift Pump
  - Solids Separator



**PRODUCTION AREA MAP**  
 ORDER NO. R5-2008-0003  
 INDIVIDUAL WASTE DISCHARGE REQUIREMENTS  
 FOR  
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**ATTACHMENT B**





**DAIRY DIGESTER SYSTEM PROCESS FLOW DIAGRAM**

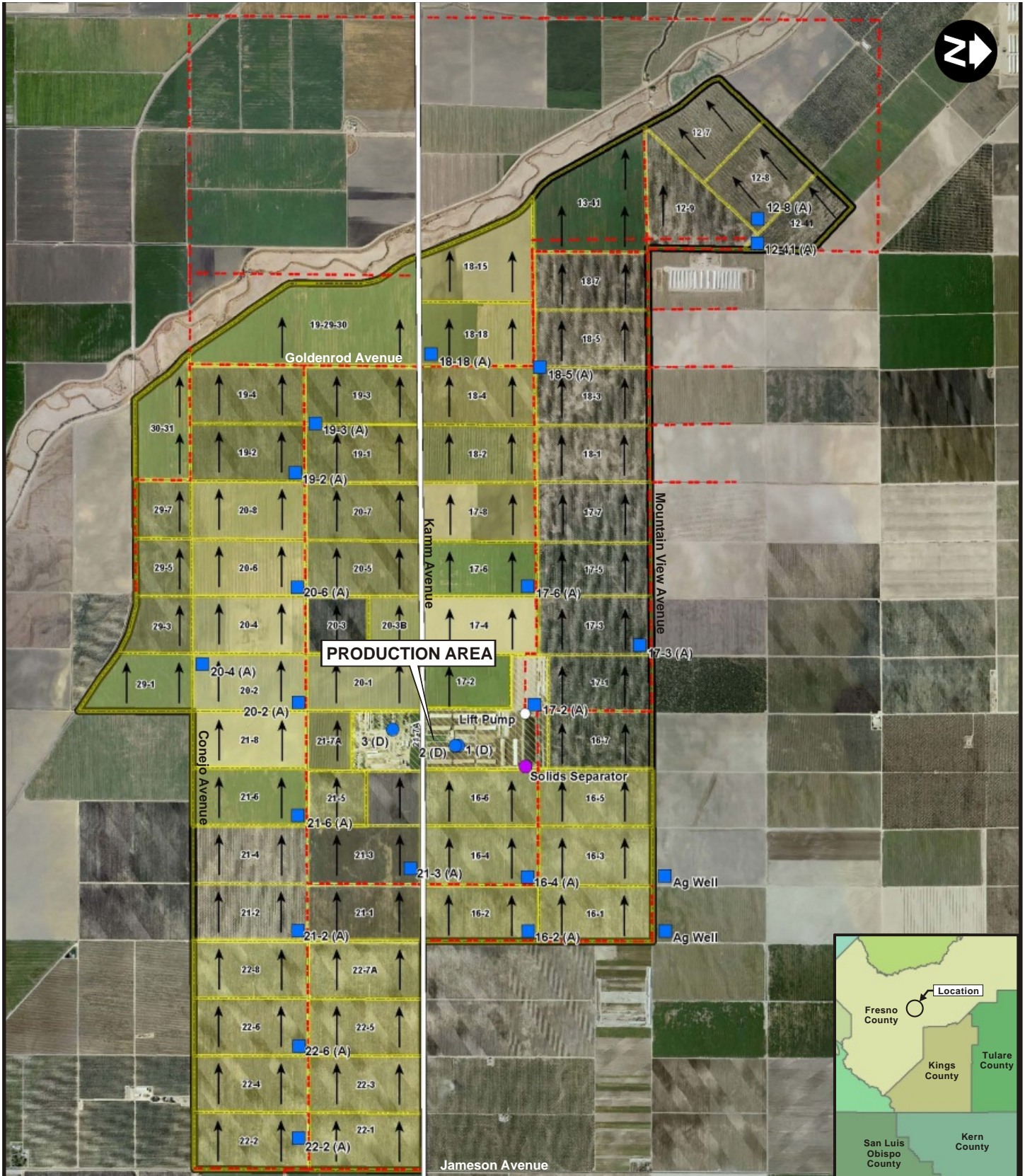
ORDER NO. R5-2008-0003

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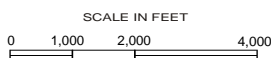
MADDOX DAIRY  
FRESNO COUNTY





Map Features:

- 8 Land Application System
- 8 Irrigation System
- Irrigation Direction
- Domestic Well
- Irrigation Well
- Pump



**FACILITY MAP**

ORDER NO. R5-2008-0003

INDIVIDUAL WASTE DISCHARGE REQUIREMENTS  
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