

June 7, 2023

Antonio Azevedo  
Antonio Azevedo Dairy #4  
2025 W El Nido Rd  
El Nido, CA 95317

**Re: Notice of Preliminary Decision - Authority to Construct**  
**Facility Number: N-8350**  
**Project Number: N-1203782**

Dear Mr. Azevedo:

Enclosed for your review and comment is the District's analysis of Antonio Azevedo Dairy #4's application for an Authority to Construct for the expansion of the existing dairy operation by constructing three new Saudi-style barns, increasing the permitted herd size, constructing two lagoons and a mechanical separator, and complying with District Rule 4570 requirements for large confined animal facility operations (CAFO), at 1261 W Roosevelt Rd, El Nido.

The notice of preliminary decision for this project has been posted on the District's website ([www.valleyair.org](http://www.valleyair.org)). After addressing all comments made during the 30-day public notice period, the District intends to issue the Authority to Construct. Please submit your written comments on this project within the 30-day public comment period, as specified in the enclosed public notice.

Thank you for your cooperation in this matter. If you have any questions regarding this matter, please contact Mr. John Yoshimura of Permit Services at (209) 557-6449.

Sincerely,



Brian Clements  
Director of Permit Services

BC:jy

Enclosures

cc: Courtney Graham, CARB (w/ enclosure) via email

**Samir Sheikh**  
Executive Director/Air Pollution Control Officer

**Northern Region**  
4800 Enterprise Way  
Modesto, CA 95358-8718  
Tel: (209) 557-6400 FAX: (209) 557-6475

**Central Region (Main Office)**  
1890 E. Gettysburg Avenue  
Fresno, CA 93726-0244  
Tel: (559) 230-8000 FAX: (559) 230-8061

**Southern Region**  
34946 Flyover Court  
Bakersfield, CA 93308-9725  
Tel: (661) 392-5500 FAX: (661) 392-5585

# San Joaquin Valley Air Pollution Control District Authority to Construct Application Review

## Expansion of an Existing Dairy Facility

Facility Name: Antonio Azevedo Dairy #4  
Mailing Address: 2025 W El Nido Rd  
El Nido, CA 95317  
Contact Person: Antonio Azevedo  
Telephone: (209) 230-8765  
E-Mail: [aazevedodairy@gmail.com](mailto:aazevedodairy@gmail.com)  
Application #s: N-8350-1-1, '-2-2, '-3-1, '-4-1, and '-5-1  
Project #: N-1203782  
Deemed Complete: August 25, 2020

---

### I. Proposal

Antonio Azevedo Dairy #4 has requested Authority to Construct (ATC) permits to expand its existing dairy operation by constructing three new Saudi-style barns, increase the permitted herd size, construct two lagoons and a mechanical separator, and comply with District Rule 4570 requirements for large confined animal facility operations (CAFO).

The dairy is currently permitted for the following herd size: 475 milk cows not to exceed a combined total of 575 mature cows (milk and dry cows) and 335 support stock. With this project, the applicant is proposing to increase the maximum number of cows to 2,700 milk cows not to exceed a combined total of 3,000 mature cows (milk and dry) and 1,000 support stock. The proposed modifications are summarized as follows:

#### Milking Parlor (N-8350-1-1)

- Increase the milk cow herd size from 475 to 2,700.

#### Cow Housing (N-8350-2-2)

- Increase the milk cow herd size from 475 to 2,700.
- Increase the mature cow (milk and dry combined) herd size from 575 to 3,000.
- Increase the support stock (heifers, bulls, and calves) herd size from 335 to 1,000.
- Construct 3 new Saudi-style barns.

#### Liquid Manure Handling (N-8350-3-1)

- Increase in liquid manure as a result of the increase in herd size.
- Construct two new lagoons.
- Construct a mechanical separator.

#### Solid Manure Handling (N-8350-4-1)

- Increase in solid manure as a result of the increase in herd size.

### Feed Storage and Handling (N-8350-5-1)

- Increase in feed and total mixed rations as a result of the increase in herd size.

A copy of the current permits can be seen in Appendix B.

## **II. Applicable Rules**

Rule 2201	New and Modified Stationary Source Review Rule (8/15/19)
Rule 2410	Prevention of Significant Deterioration (6/16/11)
Rule 2520	Federally Mandated Operating Permits (8/15/19)
Rule 4001	New Source Performance Standards (4/14/99)
Rule 4002	National Emissions Standards for Hazardous Air Pollutants (5/20/04)
Rule 4101	Visible Emissions (2/17/05)
Rule 4102	Nuisance (12/17/92)
Rule 4550	Conservation Management Practices (CMP) (8/19/2004)
Rule 4570	Confined Animal Facilities (CAF) (10/21/2010)
Rule 4801	Sulfur Compounds (12/17/92)
CH&SC 41700	Health Risk Assessment
CH&SC 42301.6	School Notice
Public Resources Code 21000-21177: California Environmental Quality Act (CEQA)	
California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000-15387: CEQA Guidelines	

## **III. Project Location**

The facility is located at 1261 W Roosevelt Rd in El Nido, CA. The equipment is not located within 1,000 feet of the outer boundary of a K-12 school. Therefore, the public notification requirement of California Health and Safety Code 42301.6 is not applicable to this project.

## **IV. Process Description**

The primary function of this facility is the production of milk, which is used to make products for human consumption. Production of milk requires a herd of mature dairy cows that are lactating. In order to produce milk, the cows must be bred and give birth. The gestation period for a cow is 9 months, and dairy cows are bred again 4 months after calving. Thus, a mature dairy cow produces a calf every 12 to 14 months, which is why there will be different ages and types of cows at the dairy, including calves, heifers, lactating milk cows, dry cows, and mature bulls.

The milk cows at a dairy usually generate anywhere from 130 to 150 pounds of manure per day. Manure accumulates in confinement areas such as barns, open corrals, and the milking center. Manure is primarily deposited in areas where the herd is fed and given water. How the manure is collected, stored, and treated depends directly on the manure management techniques used at a particular dairy

Dairy manure is collected and managed as a liquid, a semi-solid or slurry, and a solid. Manure with a total solids or dry matter content of 20% or higher usually can be handled as a solid while manure with a total solids content of 10% or less can be handled as a liquid.

### **Milking Parlor (Permit Unit N-8350-1)**

The milking parlor is a separate building, apart from the lactating cow confinement. The milking parlor is designed to facilitate changing the groups of cows milked and to allow workers access to the cows during milking. A holding area confines the cows that are ready for milking. The holding area is covered with open sides and is part of the milking parlor, which in turn, is located in the immediate vicinity of the cow housing.

Currently, the cows at this dairy are milked in a 16 stall herringbone milking parlor. With this project, the dairy will increase the quantity of milk cows milked in the existing milking parlor. No other changes are proposed for the existing milk parlor under this project. The lactating cows will be milked two times per day. The milking parlor have concrete floors sloped to a drain. Manure that is deposited in the milking parlor will be sprayed or flushed into the drain using fresh water continuously in the milking parlor and after each milking in the hospital barn. The effluent from the milking parlor will be carried through pipes to the lagoon system.

### **Cow Housing (Permit Unit N-8350-2)**

The facility currently utilizes three Saudi-style barns with flush lanes to house milk cows. In the Saudi-style barns, the cows are grouped in large pens with free access to feed bunks, water, and stalls for resting. The design of a Saudi style barn was originally crafted for hot weather conditions in desert climates. These structures feature very high ceilings, with a ventilation gap running the length of the barn. The sides of the structure are open, and the high peak (typically 14-18 feet) enhances air flow. Saudi style barns are very similar to freestall barns with the exception of the freestalls. In addition, loose dirt exercise pens adjoining the barns are typically provided, but are not essential. Manure from barn feed lanes is typically removed by flushing with water. Manure from the exercise pen surfaces, where present, is removed by scraping with a box-type scraper. The facility is proposing to install a three new Saudi-style barns under this project.

Additionally, the facility currently utilizes open corrals. Open corrals are large loose dirt open areas where cows are confined. The corrals will have paved feed lanes and shade structures. Manure from the feed lanes will be removed by flushing or scraping, whereas manure from the unpaved surfaces of the corrals will be removed by scraping weekly with a box-type scraper.

### **Liquid Manure Handling System (Permit Unit N-8350-3)**

The existing manure handling system consists of three storage ponds. The facility has proposed to install two additional ponds and a mechanical separator.

#### **Mechanical Separator(s)**

Flush water from the milk barn and housing areas are pumped over the screens in the mechanical separator(s). The liquid passes through the screens and flows into the liquid manure lagoon. The solids fall off the bottom of the screen onto a stacking pad, from where they are later removed by a front end loader and spread out to dry on the drying pads.

#### **Lagoon/Storage Pond**

The storage ponds and proposed lagoons are designed to have sufficient volume to hold all of the following: all manure and wastewater accumulated at the dairy for a period of 120 days; normal precipitation and any drainage to the lagoon system minus evaporation from the surface of the lagoon; and precipitation during a 25 year, 24 hour storm event. The liquid manure from the storage pond and lagoon will be used to irrigate crops.



Anaerobic Treatment Lagoon System

An anaerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of manure by microbes in the absence of oxygen. This process of anaerobic decomposition results in the preferential conversion of organic compounds in the manure into methane, carbon dioxide, and water rather than intermediate metabolites (VOCs). The National Resource Conservation Service (NRCS) California Field Office Technical Guide Code 359 - Waste Treatment Lagoon specifies the following criteria for anaerobic treatment lagoons:

- 1) Minimum treatment volume - The minimum design volume must account for all potential sludge, treatment, precipitation, and runoff volumes;
- 2) Minimum hydraulic retention time – The retention time of the material in the lagoon must be adequate to provide environmentally safe utilization of waste;
- 3) Maximum Volatile Solids (VS) loading rate – The VS loading rate shall be based on maximum daily loading considering all waste sources that will be treated by the lagoon. The suggested loading rate for the San Joaquin Valley is 6.5-11 lb-VS/1000 ft<sup>3</sup>/day depending on the type of system and solids separation; and
- 4) Minimum operating depth of at least 12 feet - Maximizing the depth of the lagoon has the following advantages: 1) The surface area in contact with the atmosphere is minimized, which will reduce volatilization of air pollutants; 2) The smaller surface area reduces the effects of the environment on the lagoon, which provides a more stable and favorable environment for anaerobic bacteria; 3) There is better mixing of lagoon due to rising gas bubbles; 4) and A deeper lagoon requires less land for the required treatment volume.

The facility currently has an anaerobic treatment lagoon system designed in accordance with the specifications set forth in NRCS practice standard 359. The proposed anaerobic treatment lagoon system consists of 2 lagoons and each have a volume of 1,341,125 ft<sup>3</sup>. The lagoon system is designed to maintain a constant liquid level to ensure a stable bacterial population, which will promote more efficient anaerobic digestion. The liquid level of the storage ponds fluctuate and can be emptied when necessary. Effluent from the lagoons are used for the irrigation of cropland. All the manure at the dairy will be pumped to the anaerobic treatment lagoons.

Anaerobic Lagoon Design Check

A detailed anaerobic lagoon design check is shown in Appendix I. The volume of the proposed anaerobic treatment lagoons (primary lagoons #1 and #2) are as follows:

<b>Total Lagoon Treatment Volume</b>		
Total Lagoon System Volume	=	2,702,250 ft <sup>3</sup>

And the minimum treatment volume is as follows:

<b>Minimum Treatment Volume</b>		
Minimum Treatment Volume	=	1,674,955 ft <sup>3</sup>

Therefore, the anaerobic treatment lagoons will provide sufficient anaerobic treatment lagoon volume to handle the total post-project manure flushed to the lagoon.

### Land Application

Liquid manure from the storage ponds and lagoon will be applied to cropland as fertilizer/irrigation water. The application is done through flood irrigation, at agronomic rates in conformance with a nutrient management plan that has been approved by the Regional Water Quality Control Board.

### **Solid Manure Handling (Permit Unit N-8350-4)**

#### Manure Stock Piles (Storage) and Land Application

The solid manure stockpiled at this dairy will include the separated solids from the mechanical separator(s). The separated solids will be immediately incorporated into cropland, be dried and used as fertilizer or as bedding in the freestall barns, or hauled offsite. The applicant proposes to cover the dry separated solids piles and animal waste piles with weatherproof coverings from October through May, so that the solids will remain dry until they are ready to be used.

### **Feed Storage and Handling (Permit Unit N-8350-5)**

The existing feed storage and handing operation consists of commodity barns and silage piles.

#### Commodity Barns and Silage Piles

The feed consists primarily of silage, which is made from corn, oats, and alfalfa, or a variety of other feed crops. The silage is made by placing the harvested crops, chopped to desired pieces if necessary, into piles, which are then compacted with heavy equipment to remove air. The piles are then tightly covered to avoid reintroduction of air. This allows anaerobic microbes present in the crops to multiply, resulting in fermentation of the organic material in the feed. When the silage is ready, one end of the pile can be opened and the required amount of silage can be removed from that end on a daily basis.

In order to provide the right nutritional balance, silage is usually blended with other feed additives, such as oils, whey, seeds and grains, nut hulls, and various salts and minerals before it is fed to the cattle. These additives are usually stored in commodity barns to avoid exposure to weather.

#### Total Mixed Rations (TMR)

TMR refers to a blended mixture of silage and additives that is ready to be fed to the cattle. Most cattle facilities prepare their TMRs in small batches using a feed wagon equipped with a mixer. The silage and additives are placed in the feed wagon in the proportions prescribed by the dietary requirements of the group of cows to be fed. These ingredients are then thoroughly mixed in the wagon and delivered to the feed bunks.

## **V. Equipment Listing**

### Pre-Project Equipment Description

- N-8350-1-0: 475 COW MILKING OPERATION WITH ONE 16 STALL HERRINGBONE MILKING PARLOR
- N-8350-2-1: COW HOUSING - 475 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 575 MATURE COWS (MILK AND DRY COWS); 335 TOTAL SUPPORT STOCK (HEIFERS, CALVES AND BULLS); AND LOAFING BARN WITH SCRAPE SYSTEM

APR 1010 – 2021-4

---

- N-8350-3-0: LIQUID MANURE HANDLING SYSTEM CONSISTING OF THREE STORAGE PONDS; MANURE LAND APPLIED THROUGH FLOOD IRRIGATION
- N-8350-4-0: SOLID MANURE HANDLING CONSISTING OF SOLID MANURE HAULED OFFSITE
- N-8350-5-0: FEED STORAGE AND HANDLING CONSISTING OF COVERED FEED STORAGE OR COMMODITY BARN(S), SILAGE PILES, DRY GRAIN TANKS AND BINS

Proposed Modification

- N-8350-1-1: MODIFICATION OF 475 COW MILKING OPERATION WITH ONE 16 STALL HERRINGBONE MILKING PARLOR: INCREASE MAXIMUM NUMBER OF MILK COWS TO 2,700 AND ADD RULE 4570 MITIGATION MEASURES
- N-8350-2-2: MODIFICATION OF COW HOUSING - 475 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 575 MATURE COWS (MILK AND DRY COWS); 335 TOTAL SUPPORT STOCK (HEIFERS, CALVES AND BULLS); AND LOAFING BARN WITH SCRAPE SYSTEM: CONSTRUCT THREE SAUDI-STYLE BARNS, INCREASE HERD SIZE TO 2,700 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 3,000 MATURE COWS (MILK AND DRY) COWS AND 1,000 SUPPORT STOCK, AND ADD RULE 4570 MITIGATION MEASURES
- N-8350-3-1: MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF THREE STORAGE PONDS; MANURE LAND APPLIED THROUGH FLOOD IRRIGATION: ALLOW FOR INCREASE IN EMISSIONS DUE TO HERD INCREASE AUTHORIZED BY ATC N-8350-2-2, CONSTRUCT TWO LAGOONS (PRIMARY LAGOONS #1 AND #2) AND A MECHANICAL SEPARATOR
- N-8350-4-1: MODIFICATION OF SOLID MANURE HANDLING CONSISTING OF SOLID MANURE HAULED OFFSITE: ALLOW FOR INCREASE IN EMISSIONS DUE TO HERD INCREASE AUTHORIZED BY ATC N-8350-2-2
- N-8350-5-1: MODIFICATION OF FEED STORAGE AND HANDLING CONSISTING OF COVERED FEED STORAGE OR COMMODITY BARN, SILAGE PILES, DRY GRAIN TANKS AND BINS: ALLOW FOR INCREASE IN EMISSIONS DUE TO HERD INCREASE AUTHORIZED BY ATC N-8350-2-2

Post Project Equipment Description:

- N-8350-1-1: 2,700 COW MILKING OPERATION WITH ONE 16 STALL HERRINGBONE MILKING PARLOR
- N-8350-2-2: COW HOUSING – 2,700 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 3,000 MATURE COWS (MILK AND DRY COWS); 1,000 TOTAL SUPPORT STOCK (HEIFERS, CALVES AND BULLS); AND 6 SAUDI-STYLE BARNS WITH FLUSH/SCRAPE SYSTEM

Pursuant to District practice for liquid manure handling systems, the first catchment unit after the solids separation system is generally designated as a lagoon. Therefore, the equipment description will be administratively corrected to replace one of the 'storage ponds' with 'lagoon'.

The facility is also proposing to add a mechanical separator to the liquid manure handling system. The installation of subsequent mechanical separators will not require an ATC as long as the permit authorizes the use of at least one mechanical separator. Thus, the ATC and post-project equipment descriptions will refer to “mechanical separator(s)” (no specific number) to allow for future installations.

N-8350-3-1: LIQUID MANURE HANDLING SYSTEM CONSISTING OF MECHANICAL SEPRATOR(S); TWO ANAEROBIC TREATMENT LAGOONS (PRIMARY LAGOONS #1 AND #2); THREE STORAGE PONDS; MANURE LAND APPLIED THROUGH FLOOD IRRIGATION

N-8350-4-1: SOLID MANURE HANDLING CONSISTING OF SOLID MANURE HAULED OFFSITE

N-8350-5-1: FEED STORAGE AND HANDLING CONSISTING OF COVERED FEED STORAGE OR COMMODITY BARN, SILAGE PILES, DRY GRAIN TANKS AND BINS

## **VI. Emission Control Technology Evaluation**

Particulate matter (PM<sub>10</sub>), volatile organic compounds (VOC), ammonia (NH<sub>3</sub>), and hydrogen sulfide (H<sub>2</sub>S) are the major pollutants of concern from dairy operations. Gaseous pollutant emissions at a dairy result from the ruminant digestive processes (enteric emissions), from the decomposition and fermentation of feed, and also from decomposition of organic material in dairy manure. Volatile Organic Compounds (VOCs) are formed as intermediate metabolites when organic matter in manure degrades. Ammonia volatilization is the result of the microbial decomposition of nitrogenous compounds in manure. The quantity of enteric emissions depends directly on the number and types of cows. The quantity of emissions from manure decomposition depends on the amount of manure generated, which also depends on the number and types of cows. Therefore, the total herd size and composition is the critical factor in quantifying emissions from a dairy. Various management practices are used to control emissions at this dairy. Examples of some of these practices are discussed below:

### **Milking Parlor (N-8350-1-1)**

This dairy uses a flush/spray system to wash out the manure from the milking parlor after each group of cows is milked. Since the milking parlor is constantly flushed, there will be no particulate matter emissions from the milking parlor. Manure, which is a source of VOC emissions, is removed from the milking parlor many times a day by flushing after each milking. Because of ammonia’s high affinity for and solubility in water, volatilization of ammonia from the milking parlors will also be reduced by flushing after each milking.

### **Cow Housing (N-8350-2-2)**

The cows at the facility will be housed in Saudi-style barns and open corrals. Some of the practices that will be utilized to reduce emissions at the dairy are described below:

#### **Saudi-Style Barns**

Particulate matter emissions from Saudi-style barns are greatly reduced because the cows will be on a paved surface rather than on dry dirt. Additionally, flushing of the lanes creates a moist environment, which further decreases particulate matter emissions.

### Frequent Flushing

Frequent flushing is also used for the removal of manure from the lanes and walkways in the housing barns. Frequent flushing creates a moist environment that greatly reduces or eliminates PM<sub>10</sub> emissions. In addition, flush water dissolves NH<sub>3</sub> as well as various water-soluble VOC in the manure, thereby stopping or decelerating the emission of these pollutants directly into the atmosphere. Both manure and dissolved pollutants are subsequently carried by the flush water into the liquid manure handling system for further treatment.

### **Liquid Manure Handling (N-8350-3-1)**

#### Solids Separation (Mechanical Separator(s))

The purpose of solids separation is to remove fibrous materials prior to the liquid manure entering the lagoon. By removing the most fibrous material from the liquid stream prior to entering the lagoon, it is anticipated that the amount of intermediate metabolites released during digestion in the lagoon may be reduced. Removal of the fibrous material allows for more complete digestion in the lagoon and lower emissions. Solids remaining are left to dry and then are removed. The separated solids can be immediately incorporated into cropland or spread in thin layers, harrowed, and dried.

#### Anaerobic Treatment Lagoon

As previously discussed, an anaerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of manure by microbes in the absence of oxygen. This process of anaerobic decomposition results in the preferential conversion of organic compounds in the manure into methane, carbon dioxide, and water rather than intermediate metabolites (VOCs). An anaerobic treatment lagoon system is assumed to conservatively control VOC emissions by at least 40%.

#### Liquid Manure Land Application

Liquid manure will be applied to cropland at agronomic rates, in compliance with the dairy's comprehensive nutrient management plan and the requirements of the Regional Water Quality Control Board. These practices are expected to reduce odors and result in faster uptake of nutrients by crops. When applied nutrients are optimally matched with the nutrient needs of developing crops, the excess nutrients that are associated with increased emissions and/or groundwater pollution are minimized.

### **Solid Manure Handling (N-8350-4-1)**

Based on the information currently available, emissions from solid manure applied to cropland are expected to be low. However, to ensure that any possible emissions are minimized, the manure will be promptly incorporated into the soil after application. This will reduce any volatilization of gaseous pollutants, as the soil provides cover from wind and other weather elements that enhance volatilization. In addition, incorporation reduces emissions by biofilter effect, whereby the adsorption of NH<sub>3</sub>, VOC, and other compounds onto soil particles provides an opportunity for oxidation by the action of various microorganisms the soil.<sup>1</sup>

---

<sup>1</sup> Page 9-38 of U.S. EPA's draft document entitled "Emissions From Animal Feeding Operations" (<http://www.epa.gov/ttn/chief/ap42/ch09/draft/draftanimalfeed.pdf>)

### **Feed Storage and Handling (N-8350-5-1)**

All cows will be fed in accordance with National Research Council (NRC) guidelines using routine nutritional analysis for rations. NRC guidelines are intended to optimize nutrient uptake by the cow, which not only increases feed efficiency but also minimizes the excretion of undigested protein and other nutrients in the manure. Since excess manure nutrients are the feedstock for the processes that result in NH<sub>3</sub>, H<sub>2</sub>S, and VOC emissions as manure decomposes, the reduction of nutrients in the manure is expected to reduce the emission of these pollutants.

In addition, any refused feed will be removed from the feed lanes on a regular basis to minimize gaseous emissions from decomposition. Silage piles will be covered with plastic tarps to minimize volatilization of pollutants from the pile surfaces.

### **Rule 4570 Mitigation Measures**

All mitigation measures are expected to result in VOC emissions reductions for each permit unit at the dairy; reductions in ammonia emissions are also expected. A complete list of the mitigation measures practiced at the facility, and the expected control efficiency for each, is included with the emissions calculations shown in Appendix H.

## **VII. General Calculations**

### **A. Assumptions**

- Potential to Emit for the dairy will be based on the permitted capacity of the number and types of cows at the dairy;
- All PM<sub>10</sub> emissions from the dairy will be allocated to the cow housing permit unit (N-8350-2) and IC engine (N-8350-6-0);
- For this dairy, only emissions from the lagoon (N-8350-3) will be used in determining if this facility will be a major source since the lagoons are considered to be the only non-fugitive source of emissions at this dairy;
- The PM<sub>10</sub> emission factors for the dairy animals are based on a District document entitled "Dairy and Feedlot PM<sub>10</sub> Emissions Factors," which compiled data from studies performed by Texas A&M ASAE and a USDA/UC Davis report quantifying dairy and feedlot emissions;
- The NH<sub>3</sub> emission factors for milk cows are based on an internal document entitled "*Breakdown of Dairy VOC Emission Factor into Permit Units.*" The NH<sub>3</sub> emission factors for the other cows were developed by taking the ratio of manure generated by the different types of cows to the milk cow and multiplying it by the milk cow emission factor;
- The VOC emission factors for the dairy animals are based on the District document entitled "Air Pollution Control Officer's Revision of the Dairy VOC Emissions Factor";
- All H<sub>2</sub>S emissions will be allocated to the liquid manure permit unit (N-8350-3).

### **B. Emission Factors**

#### **PM<sub>10</sub>, VOC, NH<sub>3</sub>, and H<sub>2</sub>S**

The emissions calculations shown in Appendix H lists the PM<sub>10</sub>, VOC, NH<sub>3</sub>, and H<sub>2</sub>S emission factors from the animals and feed at this dairy. These emission factors will be used to calculate the pre-project and post-project PM<sub>10</sub>, VOC, NH<sub>3</sub>, and H<sub>2</sub>S emissions from the entire dairy.

## C. Calculations

### 1. Pre-Project Potential to Emit (PE1)

A summary of the pre-project potential to emit from each modified permit unit is shown in the following table and are included in Appendix H:

Daily PE1 (lb/day)							
Permit #	NOx	SOx	PM <sub>10</sub>	CO	VOC	NH <sub>3</sub>	H <sub>2</sub> S
N-8350-1-0 (milking parlor)	0.0	0.0	0.0	0.0	0.6	0.2	0.0
N-8350-2-1 (cow housing)	0.0	0.0	12.0	0.0	29.2	89.7	0.0
N-8350-3-0 (liquid manure handling)	0.0	0.0	0.0	0.0	5.8	28.8	0.8
N-8350-4-0 (solid manure handling)	0.0	0.0	0.0	0.0	1.1	5.8	0.0
N-8350-5-0 (feed storage and handling)	0.0	0.0	0.0	0.0	107.2	0.0	0.0

Annual PE1 (lb/year)							
Permit #	NOx	SOx	PM <sub>10</sub>	CO	VOC	NH <sub>3</sub>	H <sub>2</sub> S
N-8350-1-0 (milking parlor)	0	0	0	0	223	90	0
N-8350-2-1 (cow housing)	0	0	4,323	0	10,653	32,707	0
N-8350-3-0 (liquid manure handling)	0	0	0	0	2,118	10,500	301
N-8350-4-0 (solid manure handling)	0	0	0	0	410	2,099	0
N-8350-5-0 (feed storage and handling)	0	0	0	0	39,111	0	0

### 2. Post-Project Potential to Emit (PE2)

A summary of the post-project potential to emit from each modified permit unit is shown in the following table and are included in Appendix H:

Daily PE2 (lb/day)							
Permit #	NOx	SOx	PM <sub>10</sub>	CO	VOC	NH <sub>3</sub>	H <sub>2</sub> S
N-8350-1-1 (milking parlor)	0.0	0.0	0.0	0.0	3.0	1.0	0.0
N-8350-2-2 (cow housing)	0.0	0.0	20.8	0.0	89.2	180.2	0.0
N-8350-3-1 (liquid manure handling)	0.0	0.0	0.0	0.0	13.1	41.7	0.8
N-8350-4-1 (solid manure handling)	0.0	0.0	0.0	0.0	4.2	24.2	0.0
N-8350-5-1 (feed storage and handling)	0.0	0.0	0.0	0.0	138.5	0.0	0.0

Annual PE2 (lb/year)							
Permit #	NOx	SOx	PM <sub>10</sub>	CO	VOC	NH <sub>3</sub>	H <sub>2</sub> S
N-8350-1-1 (milking parlor)	0	0	0	0	1,080	369	0
N-8350-2-2 (cow housing)	0	0	7,581	0	32,564	65,795	0
N-8350-3-1 (liquid manure handling)	0	0	0	0	4,789	15,254	301
N-8350-4-1 (solid manure handling)	0	0	0	0	1,547	8,820	0
N-8350-5-1 (feed storage and handling)	0	0	0	0	50,529	0	0

### 3. Pre-Project Stationary Source Potential to Emit (SSPE1)

Pursuant to District Rule 2201, the SSPE1 is the Potential to Emit (PE) from all units with valid Authorities to Construct (ATC) or Permits to Operate (PTO) at the Stationary Source and the quantity of Emission Reduction Credits (ERC) which have been banked since September 19, 1991 for Actual Emissions Reductions (AER) that have occurred at the source, and which have not been used on-site. The annual emissions for permit unit N-8350-6-0 is referenced from project N-1152805.

<b>Pre-Project Stationary Source Potential to Emit [SSPE1] (lb/year)</b>							
	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>	CO	VOC	NH <sub>3</sub>	H <sub>2</sub> S
N-8350-1-0	0	0	0	0	223	90	0
N-8350-2-1	0	0	4,323	0	10,653	32,707	0
N-8350-3-0	0	0	0	0	2,118	10,500	301
N-8350-4-0	0	0	0	0	410	2,099	0
N-8350-5-0	0	0	0	0	39,111	0	0
N-8350-6-0	154	0	8	140	8	0	0
<b>SSPE1</b>	<b>154</b>	<b>0</b>	<b>4,331</b>	<b>140</b>	<b>52,523</b>	<b>45,396</b>	<b>301</b>

### 4. Post-Project Stationary Source Potential to Emit (SSPE2)

Pursuant to District Rule 2201, the SSPE2 is the PE from all units with valid ATCs or PTOs at the Stationary Source and the quantity of ERCs which have been banked since September 19, 1991 for AER that have occurred at the source, and which have not been used on-site.

<b>Post-Project Stationary Source Potential to Emit [SSPE2] (lb/year)</b>							
	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>	CO	VOC	NH <sub>3</sub>	H <sub>2</sub> S
N-8350-1-1	0	0	0	0	1,080	369	0
N-8350-2-1	0	0	7,581	0	32,564	65,795	0
N-8350-3-1	0	0	0	0	4,789	15,254	301
N-8350-4-1	0	0	0	0	1,547	8,820	0
N-8350-5-1	0	0	0	0	50,529	0	0
N-8350-6-0	154	0	8	140	8	0	0
<b>SSPE2</b>	<b>154</b>	<b>0</b>	<b>7,589</b>	<b>140</b>	<b>90,517</b>	<b>90,238</b>	<b>301</b>

### 5. Major Source Determination

#### Rule 2201 Major Source Determination

Pursuant to District Rule 2201, a Major Source is a stationary source with a SSPE2 equal to or exceeding one or more of the following threshold values. For the purposes of determining major source status the following shall not be included:

- any ERCs associated with the stationary source
- Emissions from non-road IC engines (i.e. IC engines at a particular site at the facility for less than 12 months), pursuant to the Clean Air Act, Title 3, Section 302, US Codes 7602(j) and (z)
- Fugitive emissions, except for the specific source categories specified in 40 CFR 70.2



Agricultural operations do not belong to any of the source categories specified in 40 CFR 51.165. Since this facility is an agricultural operation, fugitive emissions shall not be included in determining whether it is a major stationary source.

40 CFR 71.2 defines fugitive emissions as “those emissions which could not reasonably pass through a stack, chimney, vent, or other functionally-equivalent opening.” In 2005, the California Air Pollution Control Officers Association (CAPCOA) issued guidance for estimating VOC emissions from dairy farms. This guidance determined that VOC emissions from the milking centers, cow housing areas, corrals, common manure storage areas, and land application of manure are considered fugitive since they are not physically contained and could not reasonably pass through a stack, chimney, vent, or other functionally-equivalent opening. The guidance also determined that VOC emissions from liquid manure lagoons and storage ponds are not considered fugitive because emission collection technologies for liquid manure systems exist. The District has researched this issue and concurs with the CAPCOA determinations, as discussed in more detail below:

#### Milking Parlor

The mechanical ventilation system could arguably be utilized to capture emissions from the milking parlor. In order to achieve and maintain the negative pressure required for this purpose, the adjoining holding area would also need to be completely enclosed. However, enclosing the holding area is not practical due to the continuous movement of cows in and out of the barn throughout the day. In addition, the capital outlay required to enclose this large area would be prohibitive. The District therefore determines that emissions from the milking parlor cannot reasonably be captured, and are to be considered fugitive.

#### Cow Housing

Although there are smaller dairy farms that have enclosed housing barns, such barns are usually not fully enclosed and do not include any systems for the collection of emissions. In addition, the airflow requirements for dairy cows are extremely high, primarily for herd health reasons. Airflow requirements are expected to be even higher in places such as the San Joaquin Valley, where daytime temperatures can exceed 110 degrees for prolonged periods during the summer months. Given the high air flow rates that will be involved, collection and control of the exhaust from housing barns is not only impractical but also cost prohibitive. The District therefore determines that emissions from housing barns cannot reasonably be captured, and are to be considered fugitive.

#### Manure Storage Areas

Solid manure is typically stored in the housing areas, as mounds or piles in individual corrals or pens. Some manure may also be stored in piles outside the housing areas while awaiting land application, shipment offsite, or other uses. Thus, manure storage areas are widely distributed over the dairy site, making it impractical to capture emissions from any significant proportion of the solid manure. The District therefore determines that emissions from manure storage areas cannot reasonably be captured, and are to be considered fugitive.

Land Application

Since manure has to be applied over large expanses of cropland (hundreds or even thousands of acres), there is no practical method that can be used to capture the associated emissions. The District therefore determines that emissions from land application of manure cannot reasonably be captured, and are to be considered fugitive.

Feed Handling and Storage

Silage and total mixed rations (TMR) are the primary sources of emissions from feed storage and handling. Silage is stored in several tarped/covered piles and/or plastic bags. One end/face of the pile/bag that is actively being used to prepare feed rations must remain open to allow extraction of the silage. A front-end loader is used to extract silage from the open face of the pile throughout the day as the feed rations for the various groups or categories of cows are prepared. A significant proportion of silage pile emissions are associated with this open face, which is exposed to the atmosphere and frequently disturbed during silage extraction. Due to the need to access the pile’s open face throughout the day, it is not practical to enclose it or equip it with any kind of device or system that could be used to capture of emissions.

TMR is prepared by mixing silage with various additives such as seeds, grains, and molasses. Because the quality of silage degrades fairly rapidly upon exposure to air, TMR is prepared only when needed and promptly distributed to the feed lanes for consumption. Most of the TMR emissions are thus emitted from the feed lanes, which are located inside the housing barns, where the TMR will remain exposed to the air for at least several hours as the cows feed. As previously discussed, collection and control of emissions from housing barns is not only impractical but also cost prohibitive.

The District therefore determines that emissions from feed handling and storage cannot reasonably be captured, and are to be considered fugitive.

As previously stated, emissions from liquid manure lagoons and IC engine have already been determined to be non-fugitive. The facility’s non-fugitive stationary source potential emissions are summarized in the following tables (see Appendix H for non-fugitive totals):

<b>Non-Fugitive SSPE1 (lb/year)</b>						
<b>Category</b>	<b>NO<sub>x</sub></b>	<b>SO<sub>x</sub></b>	<b>PM<sub>10</sub></b>	<b>PM<sub>2.5</sub></b>	<b>CO</b>	<b>VOC</b>
N-8350-3-0 - Lagoons	0	0	0	0	0	1,018
N-8350-6-0 - Engine	154	0	8	8	140	8
<b>Non-Fugitive SSPE1</b>	<b>154</b>	<b>0</b>	<b>8</b>	<b>8</b>	<b>140</b>	<b>1,026</b>

<b>Non-Fugitive SSPE2 (lb/year)</b>						
<b>Category</b>	<b>NO<sub>x</sub></b>	<b>SO<sub>x</sub></b>	<b>PM<sub>10</sub></b>	<b>PM<sub>2.5</sub></b>	<b>CO</b>	<b>VOC</b>
N-8350-3-0 - Lagoons	0	0	0	0	0	2,294
N-8350-6-0 – Engine	154	0	8	8	140	8
<b>Non-Fugitive SSPE2</b>	<b>154</b>	<b>0</b>	<b>8</b>	<b>8</b>	<b>140</b>	<b>2,302</b>

The Rule 2201 major source determination is summarized in the following table:

<b>Rule 2201 Major Source Determination (lb/year)</b>						
	<b>NO<sub>x</sub></b>	<b>SO<sub>x</sub></b>	<b>PM<sub>10</sub></b>	<b>PM<sub>2.5</sub></b>	<b>CO</b>	<b>VOC</b>
SSPE1	154	0	8	8	140	1,026
SSPE2	154	0	8	8	140	2,302
Major Source Threshold	20,000	140,000	140,000	140,000	200,000	20,000
Major Source?	No	No	No	No	No	No

Note: PM2.5 assumed to be equal to PM10

As seen in the table above, the facility is not an existing Major Source and is not becoming a Major Source as a result of this project.

**Rule 2410 Major Source Determination**

The facility or the equipment evaluated under this project is not listed as one of the categories specified in 40 CFR 52.21 (b)(1)(iii). Therefore the PSD Major Source threshold is 250 tpy for any regulated NSR pollutant.

<b>PSD Major Source Determination (tons/year)</b>						
	<b>NO<sub>2</sub></b>	<b>VOC</b>	<b>SO<sub>2</sub></b>	<b>CO</b>	<b>PM</b>	<b>PM<sub>10</sub></b>
Estimated Facility PE before Project Increase	0.1	0.5	0.0	0.1	0.0	0.0
PSD Major Source Thresholds	250	250	250	250	250	250
PSD Major Source ? (Y/N)	N	N	N	N	N	N

As shown above, the facility is not an existing PSD major source for any regulated NSR pollutant expected to be emitted at this facility.

**6. Baseline Emissions (BE)**

The BE calculation (in lb/year) is performed pollutant-by-pollutant for each unit within the project to calculate the QNEC, and if applicable, to determine the amount of offsets required.

Pursuant to District Rule 2201, BE = PE1 for:

- Any unit located at a non-Major Source,
- Any Highly-Utilized Emissions Unit, located at a Major Source,
- Any Fully-Offset Emissions Unit, located at a Major Source, or
- Any Clean Emissions Unit, located at a Major Source.

Otherwise,

BE = Historic Actual Emissions (HAE), calculated pursuant to District Rule 2201.

As shown in Section VII.C.5 above, the facility is not a Major Source for any pollutant.

Therefore BE = PE1.

As calculated in Section VII.C.1 above, PE1 is summarized in the following table:

BE (lb/year)						
	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO	VOC
N-8350-1-1	0	0	0	0	0	223
N-8350-2-2	0	0	4,323	4,323	0	10,653
N-8350-3-1	0	0	0	0	0	2,118
N-8350-4-1	0	0	0	0	0	410
N-8350-5-1	0	0	0	0	0	39,111

## 7. SB 288 Major Modification

40 CFR Part 51.165 defines a SB 288 Major Modification as any physical change in or change in the method of operation of a major stationary source that would result in a significant net emissions increase of any pollutant subject to regulation under the Act.

Since this facility is not a major source for any of the pollutants addressed in this project, this project does not constitute an SB 288 major modification and no further discussion is required.

## 8. Federal Major Modification / New Major Source

### Federal Major Modification

District Rule 2201 states that a Federal Major Modification is the same as a “Major Modification” as defined in 40 CFR 51.165 and part D of Title I of the CAA.

As defined in 40 CFR 51.165, Section (a)(1)(v) and part D of Title I of the CAA, a Federal Major Modification is any physical change in or change in the method of operation of a major stationary source that would result in a significant net emissions increase of any pollutant subject to regulation under the Act. The significant net emission increase threshold for each criteria pollutant is included in Rule 2201.

Since this facility is not a Major Source for any pollutants, this project does not constitute a Federal Major Modification and no further discussion is required.

### New Major Source

As demonstrated above, this facility is not becoming a Major Source as a result of this project, therefore, this facility is not a New Major Source pursuant to 40 CFR 51.165 a(1)(iv)(A)(3).

## 9. Rule 2410 – Prevention of Significant Deterioration (PSD) Applicability Determination

Rule 2410 applies to any pollutant regulated under the Clean Air Act, except those for which the District has been classified nonattainment. The pollutants which must be addressed in the PSD applicability determination for sources located in the SJV and which are emitted in this project are: (See 52.21 (b) (23) definition of significant)

- PM
- PM<sub>10</sub>

- Hydrogen sulfide (H<sub>2</sub>S)
- Total reduced sulfur (including H<sub>2</sub>S)
- VOC

**I. Project Emissions Increase – New Major Source Determination**

The post-project potentials to emit from all new and modified units are compared to the PSD major source thresholds to determine if the project constitutes a new major source subject to PSD requirements.

The facility or the equipment evaluated under this project is not listed as one of the categories specified in 40 CFR 52.21 (b)(1)(i). The PSD Major Source threshold is 250 tpy for any regulated NSR pollutant.

<b>PSD Major Source Determination: Potential to Emit (tons/year)</b>						
	<b>NO<sub>2</sub></b>	<b>VOC</b>	<b>SO<sub>2</sub></b>	<b>CO</b>	<b>PM</b>	<b>PM<sub>10</sub></b>
Total PE from New and Modified Units	0.0	1.1	0.0	0.0	0.0	0.0
PSD Major Source threshold	250	250	250	250	250	250
New PSD Major Source?	No	No	No	No	No	No

As shown in the table above, the potential to emit for the project, by itself, does not exceed any PSD major source threshold. Therefore Rule 2410 is not applicable and no further analysis is required.

**10. Quarterly Net Emissions Change (QNEC)**

The QNEC is calculated solely to establish emissions that are used to complete the District’s PAS emissions profile screen. Detailed QNEC calculations are included in Appendix F.

**VIII. Compliance Determination**

**Rule 1070 Inspections**

This rule allows the District to perform inspections for the purpose of obtaining information necessary to determine whether air pollution sources are in compliance with applicable rules and regulations. The rule also allows the District to require record keeping, to make inspections and to conduct tests of air pollution sources. The following conditions will be listed on the ATC as a mechanism to ensure compliance:

- {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee’s premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
- {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]

## **Rule 2010 Permits Required**

The provisions of this rule apply to any person who plans to or does operate, construct, alter, or replace any source operation, which may emit air contaminants or may reduce the emission of air contaminants.

Pursuant to Section 4.0, a written permit shall be obtained from the APCO. No Permit to Operate shall be granted either by the APCO or the Hearing Board for any source operation described in Section 3.0 constructed or installed without authorization as required by Section 3.0 until the information required is presented to the APCO and such source operation is altered, if necessary, and made to conform to the standards set forth in Rule 2070 (Standards for Granting Applications) and elsewhere in these rules and regulations.

The facility has obtained all required Air District permits and complies with the requirements of this rule.

## **Rule 2201 New and Modified Stationary Source Review Rule**

### **A. Best Available Control Technology (BACT)**

#### **1. BACT Applicability**

Pursuant to District Rule 2201, Section 4.1, BACT requirements are triggered on a pollutant-by-pollutant basis and on an emissions unit-by-emissions unit basis. Unless specifically exempted by Rule 2201, BACT shall be required for the following actions\*:

- a. Any new emissions unit with a potential to emit exceeding two pounds per day,
- b. The relocation from one Stationary Source to another of an existing emissions unit with a potential to emit exceeding two pounds per day,
- c. Modifications to an existing emissions unit with a valid Permit to Operate resulting in an Adjusted Increase in Permitted Emissions (AIPE) exceeding two pounds per day, and/or
- d. Any new or modified emissions unit, in a stationary source project, which results in an SB 288 Major Modification or a Federal Major Modification, as defined by the rule.

\*Except for CO emissions from a new or modified emissions unit at a Stationary Source with an SSPE2 of less than 200,000 pounds per year of CO.

#### **a. New emissions units – PE > 2 lb/day**

The facility has proposed to construct three new freestall barns (Shade Barns #4, 5, and 6). As shown in Appendix H, BACT is required for the three new freestall barns for VOC, PM<sub>10</sub>, and NH<sub>3</sub> emissions.

#### **b. Relocation of emissions units – PE > 2 lb/day**

As discussed in Section I above, there are no emissions units being relocated from one stationary source to another; therefore BACT is not triggered.

**c. Modification of emissions units – AIPE > 2 lb/day**

$$AIPE = PE2 - HAPE$$

Where,

AIPE = Adjusted Increase in Permitted Emissions, (lb/day)

PE2 = Post-Project Potential to Emit, (lb/day)

HAPE = Historically Adjusted Potential to Emit, (lb/day)

$$HAPE = PE1 \times (EF2/EF1)$$

Where,

PE1 = The emissions unit's PE prior to modification or relocation, (lb/day)

EF2 = The emissions unit's permitted emission factor for the pollutant after modification or relocation. If EF2 is greater than EF1 then EF2/EF1 shall be set to 1

EF1 = The emissions unit's permitted emission factor for the pollutant before the modification or relocation

$$AIPE = PE2 - (PE1 * (EF2 / EF1))$$

The milk parlor permit (N-8350-1), cow housing permit (S-5836-2), liquid manure handling permit (S-5836-3), solid manure handling permit (S-5836-4), and feed storage and handling permit (S-5836-5) are being modified. Therefore, the Adjusted Increase in Permitted Emissions (AIPE) must be calculated.

Based on the AIPE values in Appendix H, BACT is triggered for the following emissions units and pollutants, as shown in the table below.

Permit Unit	Emissions Unit Requiring BACT	BACT Pollutants
Milking Parlor (N-8350-1-1)	Milking Parlor	VOC
Cow Housing (N-8350-2-2)	Shade (Saudi-Style) Barns #1, 2, 3, 4, 5, & 6	VOC, NH <sub>3</sub> , and PM <sub>10</sub>
Liquid Manure Handling (N-8350-3-1)	Lagoons/Storage Pond	VOC and NH <sub>3</sub>
Liquid Manure Handling (N-8350-3-1)	Land Application	VOC and NH <sub>3</sub>
Solid Manure Handling (N-8350-4-1)	Solid Manure Storage/Separated Solids Piles	NH <sub>3</sub>
Solid Manure Handling (N-8350-4-1)	Land Application	NH <sub>3</sub>
Feed Storage and Handling (N-8350-5-1)	TMR	VOC

**d. SB 288/Federal Major Modification**

As discussed in Sections VII.C.7 and VII.C.8 above, this project does not constitute an SB 288 and/or Federal Major Modification for any pollutant. Therefore BACT is not triggered for any pollutant.

## 2. BACT Guideline

BACT Guideline 5.8.1, applies to the milking parlor in the milking parlor operation. [Milking Parlor] (See Appendix C)

BACT Guideline 5.8.2, applies to the freestall and Saudi style barns in the cow housing operation. [Cow Housing – Freestall and Saudi Style Barns] (See Appendix C)

BACT Guideline 5.8.6, applies to the lagoons in the liquid manure handling system. [Liquid Manure Handling – Lagoon/Storage Pond] (See Appendix C)

BACT Guideline 5.8.7, applies to the liquid/slurry land application in the liquid manure handling system. [Liquid Manure Handling – Liquid/Slurry Land Application] (See Appendix C)

BACT Guideline 5.8.8, applies to storage/separated solids piles in the solid manure handling system. [Solid Manure Handling – Storage/Separated Solids Piles] (See Appendix C)

BACT Guideline 5.8.9, applies to the land application in the solid manure handling system. [Solid Manure Handling – Land Application] (See Appendix C)

BACT Guideline 5.8.11, applies to the feed/TMR in the feed storage and handling operation. [Feed Storage and Handling – Feed/TMR] (See Appendix C)

## 3. Top-Down BACT Analysis

Per Top-Down BACT Analysis (see Appendix D), BACT is satisfied with the following requirements:

### **Milking Parlor (N-8350-1-1)**

#### 16 stall herringbone milking parlor (VOC and NH<sub>3</sub>)

VOC: 1) Flush/Spray before, after, or during milking each group of cows

The following conditions will be included on the proposed milking parlor ATC to assure compliance with the BACT requirements of this rule:

- 1) Flush/Spray immediately prior to, immediately after, or during each batch of milking (VOC)
  - Permittee shall flush or hose milk parlor immediately prior to, immediately after, or during each milking. [District Rules 2201 and 4570]
  - Permittee shall provide verification that milk parlors are flushed or hosed prior to, immediately after, or during each milking. [District Rules 2201 and 4570]



## **Cow Housing (N-8350-2-2)**

### **Shade (Saudi-style) Barns #1, 2, 3, 4, 5, and 6 (VOC, NH<sub>3</sub>, and PM<sub>10</sub>)**

- VOC: 1) Concrete feed lanes and walkways;
- 2) Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning lanes and walkways for support stock (heifers) at least once per day);
  - 3) Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
  - 4) Properly sloping exercise pens (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing corrals to maintain a dry surface;
  - 5) Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions; and
  - 6) Rule 4570 Measures

- NH<sub>3</sub>: 1) Concrete feed lanes and walkways;
- 2) Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning lanes and walkways for support stock (heifers) at least once per day);
  - 3) Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
  - 4) Properly sloping exercise pens (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing corrals to maintain a dry surface; and
  - 5) Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions;

- PM<sub>10</sub>: 1) Concrete feed lanes and walkways; and
- 2) Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions.

The following conditions will be included on the proposed cow housing ATC to assure compliance with the BACT requirements of this rule:

- 1) Concrete Feedlanes and Walkways (VOC and NH<sub>3</sub>)
  - Permittee shall pave feedlanes, where present, for a width of at least 8 feet along the feedlane fence for mature cows and at least 6 feet along the feedlane fence for support stock. [District Rules 2201 and 4570]

- 2) Frequent Flushing of Feed Lanes and Walkways (VOC and NH<sub>3</sub>)
  - For Shade Barns #1, 2, 3, 4, 5, and 6, the permittee shall flush or scrape the feed lanes and walkways at least four times per day for mature cows and at least once per day for support stock. [District Rules 2201 and 4570]
  - For Shade Barns #1, 2, 3, 4, 5, and 6, the permittee shall keep records or maintain an operating plan that requires the feed lanes and walkways for mature cows to be flushed or scraped at least four times per day and the feed lanes and walkways for support stock to be flushed or scraped at least once per day. [District Rules 2201 and 4570]
- 3) Cows Fed in Accordance with NRC Guidelines (VOC and NH<sub>3</sub>)
  - The permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
  - The permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
- 4) Properly sloping exercise pens (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing corrals to maintain a dry surface (VOC and NH<sub>3</sub>)
  - Permittee shall implement at least one of the following exercise pen/corral mitigation measures: 1) slope the surface of the exercise pens and corrals at least 3% where the available space for each animal is 400 square feet or less and shall slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 square feet per animal; 2) maintain exercise pens and corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape exercise pens and corrals sufficiently to maintain a dry surface except during periods of rainy weather. [District Rules 2201 and 4570]
  - Permittee shall either 1) maintain sufficient records to demonstrate that exercise pens and corrals are maintained to ensure proper drainage preventing water from standing for more than forty-eight hours or 2) maintain records of dates exercise pens and corrals are groomed (i.e. harrowed, raked, or scraped, etc.). [District Rules 2201 and 4570]
- 5) Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions (VOC and NH<sub>3</sub> and PM<sub>10</sub>)
  - For Shade Barns #1, 2, 3, 4, 5, and 6, the permittee shall scrape the exercise pens and the open corral at least once every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions. [District Rule 2201]
  - For Shade Barns #1, 2, 3, 4, 5, and 6, the permittee shall maintain sufficient records to demonstrate that the exercise pens and open corral are scraped at least once every two weeks, except when prevented by wet conditions. [District Rule 2201]

6) District Rule 4570 Mitigation Measures (VOC)

- Permittee shall flush or scrape freestall lanes immediately prior to, immediately after or during each milking. [District Rules 2201 and 4570]
- Permittee shall maintain records sufficient to demonstrate that freestall lanes are flushed or scraped immediately prior to, immediately after or during each milking. [District Rules 2201 and 4570]
- Permittee shall remove manure that is not dry from individual cow freestall beds or shall rake, harrow, scrape, or grade freestall bedding at least once every seven (7) days. [District Rules 2201 and 4570]
- Permittee shall record either of the following: 1) the dates when manure that is not dry is removed from individual cow freestall beds or 2) the dates when the freestall bedding is raked, harrowed, scraped, or graded. [District Rules 2201 and 4570]

**Liquid Manure Handling System (N-8350-3-1)**

Lagoon (VOC)

VOC: 1) Anaerobic treatment lagoon designed according to NRCS Guideline, and solids removal/separation system (mechanical separator(s) or settling basin(s)/weeping wall(s))

The following condition will be included on the proposed liquid manure handling ATC to assure compliance with the BACT requirements of this rule:

1) Anaerobic Treatment Lagoon (VOC)

- {4538} Permittee shall remove solids with a solid separator system prior to the manure entering the lagoons. [District Rules 2201 and 4570]
- Permittee shall use an anaerobic treatment lagoon designed according to NRCS Guideline No. 359. [District Rules 2201 and 4570]
- Permittee shall maintain records, such as design specifications, calculations, including Minimum Treatment Volume (MTV), Hydraulic Retention Time (HRT) demonstrating that the anaerobic treatment lagoon meets the requirements listed in the NRCS Field Office Technical Guide Code 359. [District Rule 2201]
- Permittee shall test any other parameters determined necessary by the APCO, ARB, and EPA to demonstrate compliance with rule requirements as frequently as determined necessary by the APCO, ARB, and EPA. [District Rules 2201 and 4570]

Lagoon (NH<sub>3</sub>)

NH<sub>3</sub>: 1) All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines.

The following condition will be included on the proposed liquid manure handling ATC to assure compliance with the BACT requirements of this rule:

1) Cows Fed in Accordance with NRC Guidelines (NH<sub>3</sub>)

- Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]

- Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]

Land Application (VOC)

VOC:1) Irrigation of crops using liquid manure from a holding/storage pond after being treated in a covered lagoon/digester (VOC)

The following condition will be included on the proposed liquid manure handling ATC to assure compliance with the BACT requirements of this rule:

- 1) Irrigation of crops using treated liquid manure from a covered lagoon/digester (VOC)
  - {4548} Permittee shall only apply liquid manure that has been treated with an anaerobic treatment lagoon, an aerobic lagoon or a digester system. [District Rules 2201 and 4570]
  - {4549} Permittee shall maintain records that only liquid manure treated with an anaerobic treatment lagoon or aerobic lagoon or digester system is applied to fields. [District Rules 2201 and 4570]

Land Application (NH<sub>3</sub>)

NH<sub>3</sub>: 1) All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines.

The following condition will be included on the proposed liquid manure handling ATC to assure compliance with the BACT requirements of this rule:

- 1) Cows Fed in Accordance with NRC Guidelines (NH<sub>3</sub>)
  - Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
  - Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]

**Solid Manure Handling System (N-8350-4-1)**

Solid Manure – Solid Manure Storage/Separated Solids Piles (NH<sub>3</sub>)

NH<sub>3</sub>: 1) All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines.

The following condition will be included on the proposed solid manure handling ATC to assure compliance with the BACT requirements of this rule:

1) Cows Fed in Accordance with NRC Guidelines (NH<sub>3</sub>)

- Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
- Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]

Land Application (NH<sub>3</sub>)

NH<sub>3</sub>: 1) Rapid incorporation of solid manure into the soil after land application, and all animals fed in accordance with NRCS or other District-approved guidelines.

The following conditions will be included on the proposed solid manure handling ATC to assure compliance with the BACT requirements of this rule:

- 1) Rapid incorporation of solid manure into the soil after land application, and all animals fed in accordance with NRCS or other District approved guidelines (NH<sub>3</sub>)
  - Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
  - Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
  - Solid manure applied to fields shall be incorporated into the soil within two hours after application. [District Rules 2201 and 4570]
  - Permittee shall maintain records to demonstrate that all solid manure has been incorporated within two hours of land application. [District Rules 2201 and 4570]

**Feed Storage and Handling (N-8350-5-1)**

TMR (VOC)

VOC: 1) Implement District Rule 4570 management practices for feed.

The following conditions will be included on the proposed feed storage and handling ATC to assure compliance with the BACT requirements of this rule:

- 1) District Rule 4570 measures (VOC)
  - Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
  - Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]

- Permittee shall push feed so that it is within three feet of feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]
- Permittee shall maintain an operating plan or record that requires feed to be pushed within three feet of feedlane fence within two hours of putting out the feed, or use of a feed trough or other structure designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]
- Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
- Permittee shall maintain an operating plan or record of when feeding of total mixed rations began within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
- Permittee shall store grain in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]
- Permittee shall feed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. [District Rules 2201 and 4570]
- Permittee shall maintain records demonstrating grain is/was stored in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]
- Permittee shall maintain records to demonstrate animals are fed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]

**B. Offsets**

**1. Offset Applicability**

Pursuant to District Rule 2201, Section 4.5, offset requirements shall be triggered on a pollutant by pollutant basis and shall be required if the SSPE2 equals or exceeds the offset threshold levels in Table 4-1 of Rule 2201.

The SSPE2 is compared to the offset thresholds in the following table.

Offset Determination (lb/year)					
	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>	CO	VOC
SSPE2	154	0	7,589	140	90,238
Offset Thresholds	20,000	54,750	29,200	200,000	20,000
Offsets Triggered?	No	No	No	No	Yes

## **2. Quantity of District Offsets Required**

Offset requirements shall be triggered on a pollutant by pollutant basis and shall be required if the SSPE2 equals to or exceeds the offset threshold levels in Table 4-1 of Rule 2201. As shown in the table above, VOC emissions exceed the offset threshold; however, per Section 4.6.9, offsets are not required for agricultural sources unless they are a major source. As determined in Section VII.C.5 above, this facility is not a major source for any pollutant. Therefore, offsets are not required.

## **C. Public Notification**

### **1. Applicability**

Pursuant to District Rule 2201, Section 5.4, public noticing is required for:

- a. New Major Sources, Federal Major Modifications, and SB 288 Major Modifications,
- b. Any new emissions unit with a Potential to Emit greater than 100 pounds during any one day for any one pollutant,
- c. Any project which results in the offset thresholds being surpassed,
- d. Any project with an SSIPE of greater than 20,000 lb/year for any pollutant, and/or
- e. Any project which results in a Title V significant permit modification

#### **a. New Major Sources, Federal Major Modifications, and SB 288 Major Modifications**

As shown in Section VII.C.5 above, this existing minor source facility is not becoming a Major Source as a result of this project. Therefore, this facility is not a New Major Source and this project does not constitute an SB 288 or a Federal Major Modification. Consequently, public noticing for this project for New Major Source, Federal Major Modification, or SB 288 Major Modification purposes is not required.

#### **b. PE > 100 lb/day**

Applications which include a new emissions unit with a PE greater than 100 pounds during any one day for any pollutant will trigger public noticing requirements. As seen in Section VII.C.2 above, this project does not include a new emissions unit which has daily emissions greater than 100 lb/day for any pollutant, therefore public noticing for PE > 100 lb/day purposes is not required.

#### **c. Offset Threshold**

Public notification is required if the pre-project Stationary Source Potential to Emit (SSPE1) is increased to a level exceeding the offset threshold levels. The following table compares the SSPE1 with the SSPE2 in order to determine if any offset thresholds have been surpassed with this project.

Offset Thresholds				
Pollutant	SSPE1 (lb/year)	SSPE2 (lb/year)	Offset Threshold	Public Notice Required?
NO <sub>x</sub>	154	154	20,000 lb/year	No
SO <sub>x</sub>	0	0	54,750 lb/year	No
PM <sub>10</sub>	4,331	7,589	29,200 lb/year	No
CO	140	140	200,000 lb/year	No
VOC	52,523	90,517	20,000 lb/year	No

As demonstrated above, there were no thresholds surpassed with this project; therefore public noticing is not required for offset purposes.

**d. SSIPE > 20,000 lb/year**

Public notification is required for any permitting action that results in a SSIPE of more than 20,000 lb/year of any affected pollutant. According to District policy, the SSIPE = SSPE2 – SSPE1. The SSIPE is compared to the SSIPE Public Notice thresholds in the following table.

SSIPE Public Notice Thresholds					
Pollutant	SSPE2 (lb/year)	SSPE1 (lb/year)	SSIPE (lb/year)	SSIPE Public Notice Threshold	Public Notice Required?
NO <sub>x</sub>	154	154	0	20,000 lb/year	No
SO <sub>x</sub>	0	0	0	20,000 lb/year	No
PM <sub>10</sub>	7,589	4,331	3,258	20,000 lb/year	No
CO	140	140	0	20,000 lb/year	No
VOC	90,517	52,523	37,994	20,000 lb/year	Yes
NH <sub>3</sub>	90,238	45,396	44,842	20,000 lb/year	Yes
H <sub>2</sub> S	301	301	0	20,000 lb/year	No

As demonstrated above, the SSIPEs for VOC and NH<sub>3</sub> pollutants were greater than 20,000 lb/year; therefore public noticing for SSIPE purposes is required.

**e. Title V Significant Permit Modification**

Since this facility does not have a Title V operating permit, this change is not a Title V significant modification, and therefore public noticing is not required.

**2. Public Notice Action**

As discussed above, public noticing is required for this project for VOC and NH<sub>3</sub> emissions increase over 20,000 lb/year. Therefore, public notice documents will be submitted to the California Air Resources Board (CARB) and a public notice will be electronically published on the District’s website prior to the issuance of the ATC for this equipment.



## D. Daily Emission Limits (DELs)

DELs and other enforceable conditions are required by Rule 2201 to restrict a unit's maximum daily emissions, to a level at or below the emissions associated with the maximum design capacity. The DEL must be contained in the latest ATC and contained in or enforced by the latest PTO and enforceable, in a practicable manner, on a daily basis. DELs are also required to enforce the applicability of BACT.

### N-8350-1-1 (Milking Parlor)

- Permittee shall flush or hose milk parlor immediately prior to, immediately after, or during each milking. [District Rules 2201 and 4570]
- The permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]

### N-8350-2-2 (Cow Housing)

- The permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
- Permittee shall pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers. [District Rules 2201 and 4570]
- Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rules 2201 and 4570]
- Permittee shall clean manure from corrals at least four (4) times per year with at least sixty (60) days between each cleaning, or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]
- Permittee shall scrape, vacuum or flush concrete lanes in corrals at least once every day for mature cows and every seven (7) days for support stock. [District Rules 2201 and 4570]
- Shade structures shall be installed in any of the following ways: 1) constructed with a light permeable roofing material; 2) uphill of any slope in the corral; 3) installed so that the structure has a North/South orientation. OR Permittee shall clean manure from under corral shades at least once every fourteen (14) days, when weather permits access into the corral. [District Rules 2201 and 4570]
- Permittee shall manage corrals such that the manure depth in the corral does not exceed twelve (12) inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rules 2201 and 4570]
- Permittee shall implement at least one of the following exercise pen/corral mitigation measures: 1) slope the surface of the exercise pens and corrals at least 3% where the available space for each animal is 400 square feet or less and shall slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 square feet per animal; 2) maintain exercise pens and corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape exercise pens and corrals sufficiently to maintain a dry surface except during periods of rainy weather. [District Rules 2201 and 4570]

- Permittee shall flush or scrape freestall lanes immediately prior to, immediately after or during each milking. [District Rules 2201 and 4570]
- Permittee shall remove manure that is not dry from individual cow freestall beds or shall rake, harrow, scrape, or grade freestall bedding at least once every seven (7) days. [District Rules 2201 and 4570]
- For Shade Barns #1, 2, 3, 4, 5, and 6, the permittee shall flush or scrape the feed lanes and walkways at least four times per day for mature cows and at least once per day for support stock. [District Rule 2201]
- For Shade Barns #1, 2, 3, 4, 5, and 6, the permittee shall scrape the exercise pens and the open corral at least once every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions. [District Rule 2201]

#### N-8350-3-1 (Liquid Manure Handling)

- Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
- Permittee shall remove solids with a solid separator system, prior to the manure entering the lagoon. [District Rules 2201 and 4570]
- Permittee shall use an anaerobic treatment lagoon designed according to NRCS Guideline No. 359. [District Rules 2201 and 4570]
- Permittee shall only apply liquid manure that has been treated with an anaerobic treatment lagoon, an aerobic lagoon or a digester system. [District Rules 2201 and 4570]

#### N-8350-4-1 (Solid Manure Handling)

- Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
- Permittee shall incorporate all solid manure within seventy-two (72) hours of land application. [District Rules 2201 and 4570]
- Within seventy two (72) hours of removal of solid manure from housing, permittee shall either 1) remove dry manure from the facility, or 2) cover dry manure outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed twenty-four (24) hours per event. [District Rules 2201 and 4570]
- Solid manure applied to fields shall be incorporated into the soil within two hours after application. [District Rules 2201 and 4570]

#### N-8350-5-1 (Feed Storage and Handling)

- Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
- Permittee shall push feed so that it is within three feet of feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]
- Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
- Permittee shall store grain in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]
- Permittee shall feed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. [District Rules 2201 and 4570]

- Permittee shall cover all silage piles, except for the area where feed is being removed from the pile, with a plastic tarp that is at least five (5) mils (0.005 inches) thick, multiple plastic tarps with a cumulative thickness of at least 5 mils (0.005 inches), or an oxygen barrier film covered with a UV resistant material. Silage piles shall be covered within seventy-two (72) hours of last delivery of material to the pile. Sheets of material used to cover silage shall overlap so that silage is not exposed where the sheets meet. [District Rules 2201 and 4570]
- Permittee shall select and implement one of the following mitigation measures for building each silage pile at the facility: Option 1) build the silage pile such that the average bulk density is at least 44 lb/cu ft for corn silage and 40 lb/cu ft for other silage types, as measured in accordance with Section 7.11 of District Rule 4570; Option 2) Adjust filling parameters when creating the silage pile to achieve an average bulk density of at least 44 lb/cu ft for corn silage and at least 40 lb/cu ft for other silage types as determined using a District-approved spreadsheet; or Option 3) build silage piles using crops harvested with the applicable minimum moisture content, maximum Theoretical Length of Chop (TLC), and roller opening identified in District Rule 4570, Table 4.1, 1.d and manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. Records of the option chosen as a mitigation measure for building each silage pile shall be maintained. [District Rules 2201 and 4570]
- For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall harvest corn used for the pile at an average moisture content of at least 65% and harvest other silage crops for the pile at an average moisture content of at least 60%. [District Rules 2201 and 4570]
- For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall adjust setting of equipment used to harvest crops for the pile to incorporate the following parameters for Theoretical Length of Chop (TLC) and roller opening, as applicable: 1) Corn with no processing: TLC not exceeding 1/2 inch, 2) Processed Corn: TLC not exceeding 3/4 inch and roller opening of 1-4 mm, 3) Alfalfa/Grass: TLC not exceeding 1.0 inch, 4) Other silage crops: TLC not exceeding 1/2 inch. [District Rules 2201 and 4570]
- For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rules 2201 and 4570]
- Permittee shall select and implement at least two of the following mitigation measures for management of silage piles at the facility: Option 1) manage silage piles such that only one silage pile has an uncovered face and the total exposed surface area is less than 2,150 square feet, or manage multiple uncovered silage piles such that the total exposed surface area of all uncovered silage piles is less than 4,300 square feet; Option 2) use a shaver/facer to remove silage from the silage pile, or shall use another method to maintain a smooth vertical surface on the working face of the silage pile; or Option 3) inoculate silage with homolactic lactic acid bacteria in accordance with manufacturer recommendations to achieve a concentration of at least 100,000 colony forming units per gram of wet forage, apply propionic acid, benzoic acid, sorbic acid, sodium benzoate, or potassium sorbate at the rate specified by the manufacturer to reduce yeast counts when forming silage piles, or apply other additives at rates that have been demonstrated to

reduce alcohol concentrations in silage and/or VOC emissions from silage and have been approved by the District and EPA. Records of the options chosen for managing each silage pile shall be maintained. [District Rules 2201 and 4570]

## **E. Compliance Assurance**

### **1. Source Testing**

Pursuant to District Policy APR 1705, source testing is not required to demonstrate compliance with Rule 2201.

### **2. Monitoring**

No monitoring is required to demonstrate compliance with Rule 2201.

### **3. Recordkeeping**

Recordkeeping is required to demonstrate compliance with the offset, public notification and daily emission limit requirements of Rule 2201. The following condition(s) are listed on the permit to operate:

#### N-8350-1-1 (Cow Milking)

- Permittee shall provide verification that milk parlors are flushed or hosed prior to, immediately after, or during each milking. [District Rules 2201 and 4570]
- {4455} Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
- Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

#### N-8350-2-2 (Cow Housing)

- The permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
- Permittee shall maintain records demonstrating that water pipes and troughs are inspected and leaks are repaired at least once every seven (7) days. [District Rules 2201 and 4570]
- Permittee shall demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning or demonstrate that corrals are cleaned at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]
- Permittee shall maintain records demonstrating that concrete lanes in corrals are scraped, vacuumed, or flushed at least once every day for mature cows and at least once every seven (7) days for support stock. [District Rules 2201 and 4570]

- If permittee has selected to comply using shades constructed with a light permeable roofing material, then permittee shall maintain records, such as design specifications, demonstrating that the shade structures are equipped with such roofing material or if permittee has selected to comply by cleaning the manure from under the corral shades, then permittee shall maintain records demonstrating that manure is cleaned from under the shades at least once every fourteen (14) days, as long as weather permits access to corrals. [District Rules 2201 and 4570]
- Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rules 2201 and 4570]
- Permittee shall either 1) maintain sufficient records to demonstrate that corrals are maintained to ensure proper drainage preventing water from standing for more than forty-eight hours or 2) maintain records of dates pens are groomed (i.e., harrowed, raked, or scraped, etc.). [District Rules 2201 and 4570]
- Permittee shall maintain records sufficient to demonstrate that freestall lanes are flushed or scraped immediately prior to, immediately after or during each milking. [District Rules 2201 and 4570]
- Permittee shall record either of the following: 1) the dates when manure that is not dry is removed from individual cow freestall beds or 2) the dates when the freestall bedding is raked, harrowed, scraped, or graded. [District Rules 2201 and 4570]
- For Shade Barns #1, 2, 3, 4, 5, and 6, the permittee shall keep records or maintain an operating plan that requires the feed lanes and walkways for mature cows to be flushed or scraped at least four times per day and the feed lanes and walkways for support stock to be flushed or scraped at least once per day. [District Rules 2201 and 4570]
- For Shade Barns #1, 2, 3, 4, 5, and 6, the permittee shall maintain sufficient records to demonstrate that the exercise pens and open corral are scraped at least once every two weeks, except when prevented by wet conditions. [District Rule 2201]
- Permittee shall maintain a record of the number of animals of each species and production group at the facility and shall maintain quarterly records of any changes to this information. [District Rules 2201 and 4570]
- Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

#### N-8350-3-1 (Liquid Manure Handling)

- Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
- Permittee shall maintain records, such as design specifications, calculations, including Minimum Treatment Volume (MTV), Hydraulic Retention Time (HRT) demonstrating that the anaerobic treatment lagoon meets the requirements listed in the NRCS Field Office Technical Guide Code 359. [District Rules 2201 and 4570]
- Permittee shall test any other parameters determined necessary by the APCO, ARB, and EPA to demonstrate compliance with rule requirements as frequently as determined necessary by the APCO, ARB, and EPA. [District Rules 2201 and 4570]

- Permittee shall maintain records that only liquid manure treated with an anaerobic treatment lagoon or aerobic lagoon or digester system is applied to fields. [District Rules 2201 and 4570]
- Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

N-8350-4-1 (Solid Manure Handling)

- Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
- Permittee shall maintain records to demonstrate that all solid manure has been incorporated within seventy-two (72) hours of land application. [District Rules 2201 and 4570]
- Permittee shall keep records of dates when manure is removed from the facility or permittee shall maintain records to demonstrate that dry manure piles outside the pens are covered with a weatherproof covering from October through May. [District Rules 2201 and 4570]
- If weatherproof coverings are used, permittee shall maintain records, such as manufacturer warranties or other documentation, demonstrating that the weatherproof covering over dry manure are installed, used, and maintained in accordance with manufacturer recommendations and applicable standards listed in NRCS Field Office Technical Guide Code 313 or 367, or any other applicable standard approved by the APCO, ARB, and EPA. [District Rules 2201 and 4570]
- Permittee shall maintain records to demonstrate that all solid manure has been incorporated within two hours of land application. [District Rules 2201 and 4570]
- Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

N-8350-5-1 (Feed Storage and Handling)

- Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
- Permittee shall maintain an operating plan or record that requires feed to be pushed within three feet of feedlane fence within two hours of putting out the feed, or use of a feed trough or other structure designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]
- Permittee shall maintain an operating plan or record of when feeding of total mixed rations began within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
- Permittee shall maintain records demonstrating grain is/was stored in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]

- Permittee shall maintain records of the thickness and type of cover used to cover each silage pile. Permittee shall also maintain records of the date of the last delivery of material to each silage pile and the date each pile is covered. [District Rules 2201 and 4570]
- For each silage pile that Option 1 (Measured Bulk Density) is chosen as a mitigation measure for building the pile, records of the measured bulk density shall be maintained. [District Rules 2201 and 4570]
- For each silage pile that Option 2 (Bulk Density Determined by Spreadsheet) is chosen as a mitigation measure for building the pile, records of the filling parameters entered into the District-approved spreadsheet to determine the bulk density shall be maintained. [District Rules 2201 and 4570]
- For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records of the average percent moisture of crops harvested for silage shall be maintained. [District Rules 2201 and 4570]
- For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records that equipment used to harvest crops for the pile was set to the required TLC and roller opening for the type of crop harvested shall be maintained. [District Rules 2201 and 4570]
- For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall maintain a plan that requires that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rules 2201 and 4570]
- If Option 1 (Limiting Exposed Area of Silage) is chosen as a mitigation measure for managing silage piles, the permittee shall calculate and record the maximum (largest part of pile) total exposed area of each silage pile. Records of the maximum calculated area shall be maintained. [District Rules 2201 and 4570]
- For each silage pile that Option 2 (Shaver/Facer or Smooth Face) is chosen as a mitigation measure for managing the pile, the permittee shall maintain records that a shaver/facer was used to remove silage from the pile or shall visually inspect the pile at least daily to verify that the working face was smooth and maintain records of the visual inspections. [District Rules 2201 and 4570]
- For each silage pile that Option 3 (Silage Additives) is chosen as a mitigation measure for managing the pile, records shall be maintained of the type additive (e.g. inoculants, preservative, other District & EPA-approved additive), the quantity of the additive applied to the pile, and a copy of the manufacturer's instructions for application of the additive. [District Rules 2201 and 4570]
- Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

#### **4. Reporting**

No reporting is required to demonstrate compliance with Rule 2201.

### **Rule 2410 Prevention of Significant Deterioration**

As shown in Section VII.C.9 above, this project does not result in a new PSD major source or PSD major modification. No further discussion is required.

### **Rule 2520 Federally Mandated Operating Permits**

Since this facility's potential emissions do not exceed any major source thresholds of Rule 2201, this facility is not a major source, and Rule 2520 does not apply.

### **Rule 4001 New Source Performance Standards (NSPS)**

This rule incorporates NSPS from Part 60, Chapter 1, Title 40, Code of Federal Regulations (CFR); and applies to all new sources of air pollution and modifications of existing sources of air pollution listed in 40 CFR Part 60. However, no subparts of 40 CFR Part 60 apply to confined animal facilities.

### **Rule 4002 National Emission Standards for Hazardous Air Pollutants (NESHAPs)**

This rule incorporates NESHAPs from Part 61, Chapter I, Subchapter C, Title 40, CFR and the NESHAPs from Part 63, Chapter I, Subchapter C, Title 40, CFR; and applies to all sources of hazardous air pollution listed in 40 CFR Part 61 or 40 CFR Part 63. However, no subparts of 40 CFR Part 61 or 40 CFR Part 63 apply to confined animal facilities.

### **Rule 4101 Visible Emissions**

Rule 4101 states that no air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity.

Pursuant to section 4.12, emissions subject to or specifically exempt from Regulation VIII (Fugitive PM<sub>10</sub> Prohibitions) are exempt from Rule 4101.

Pursuant to District Rule 8011, section 4.12, on-field agricultural sources are exempt from the requirements of Regulation VIII.

On-field agricultural sources are defined in Rule 8011, section 3.35 as the following:

- Activities conducted solely for the purpose of preparing land for the growing of crops or ***the raising of fowl or animals***, such as brush or timber clearing, grubbing, scraping, ground excavation, land leveling, grading, turning under stalks, disking, or tilling;

Therefore, activities conducted solely for the purpose of raising fowl or animals are exempt from the requirements of Regulation VIII and Rule 4101.



## Rule 4102 Nuisance

Rule 4102 prohibits discharge of air contaminants which could cause injury, detriment, nuisance or annoyance to the public. Public nuisance conditions are not expected as a result of these operations, provided the equipment is well maintained. Therefore, compliance with this rule is expected.

### California Health & Safety Code 41700 (Health Risk Assessment)

District Policy APR 1905 – *Risk Management Policy for Permitting New and Modified Sources* specifies that for an increase in emissions associated with a proposed new source or modification, the District perform an analysis to determine the possible impact to the nearest resident or worksite.

District policy APR 1905 also specifies that the increase in emissions associated with a proposed new source or modification of an existing source shall not result in an increase in cancer risk greater than the District’s significance level (20 in a million) and shall not result in acute and/or chronic risk indices greater than 1.

According to the Technical Services Memo for this project, the total facility prioritization score including this project was greater than one. Therefore, an HRA was required to determine the short-term acute and long-term chronic exposure from this project.

The resulting prioritization score, acute hazard index, chronic hazard index, and cancer risk for this project is shown below.

Units	Prioritization Score	Acute Hazard Index	Chronic Hazard Index	Maximum Individual Cancer Risk	T-BACT Required	Special Permit Requirements
1-1	1.91	0.00	0.00	4.65E-07	No	No
2-2	57.10	0.22	0.18	1.16E-05	Yes <sup>1</sup>	No
3-1	336.00	0.77 <sup>2</sup>	0.01	7.74E-06	Yes <sup>1</sup>	Yes
4-1	0.28	0.01	0.00	N/A <sup>3</sup>	No	No
5-1	N/A <sup>4</sup>	N/A <sup>4</sup>	N/A <sup>4</sup>	N/A <sup>4</sup>	No	No
Project Totals	>1	1.00	0.19	1.98E-05		
Facility Totals	>1	1.00 <sup>5</sup>	0.19	2.00E-05 <sup>5</sup>		

Notes:

1. T-BACT is determined on an emission unit by emission unit basis. T-BACT will be addressed in the Conclusions section of this report.
2. Acute Hazard Index for Unit 3-1 was calculated using the District’s H<sub>2</sub>S Calculator.
3. Cancer Risk was not calculated for Unit 4-1 since there is no risk factor or the risk factor is so low that it has been determined to be insignificant for this type of unit.
4. There is no risk associated with Unit 5 as the District does not have an approved toxic speciation profile for dairy feed and storage handling operations.

The facility has reached District threshold for the Acute Hazard Index and the Maximum Individual Cancer Risk. Future projects shall not be approved without re-evaluating previous projects.

## Discussion of T-BACT

BACT for toxic emission control (T-BACT) is required if the cancer risk exceeds one in one million. As demonstrated above, T-BACT is required for this project because the HRA indicates that the risk is above the District's thresholds for triggering T-BACT requirements.

For this project T-BACT is triggered for VOC for Shade Barns #1, 2, and 5 in the cow housing permit; T-BACT is triggered for VOC for the lagoons in the liquid manure handling permit. T-BACT is satisfied with BACT for VOC for both units (see Appendix D, as described in the BACT section above; therefore, compliance with the District's Risk Management Policy is expected.

District policy APR 1905 also specifies that the increase in emissions associated with a proposed new source or modification not have acute or chronic indices, or a cancer risk greater than the District's significance levels (i.e. acute and/or chronic indices greater than 1 and a cancer risk greater than 20 in a million). As outlined by the HRA Summary in Appendix E of this report, the emissions increases for this project was determined to be less than significant.

The following conditions will be placed on the liquid manure handling permit to ensure compliance:

- The pH value shall not be any lower than 7.5. [District Rules 2201 and 4102]
- The concentration of undissociated hydrogen sulfide (H<sub>2</sub>S) at the surface of the two primary lagoons shall not exceed 3.00 mg/l. [District Rules 2201 and 4102]
- The concentration of undissociated H<sub>2</sub>S at the surface of each primary lagoon shall either be calculated using the monitored values for the total sulfide concentration, pH, and temperature, or procedures outlined in Standard Methods 4500-S<sub>2</sub>-H, or other procedures approved by the District. If using monitored values, the fraction of total sulfide that is undissociated H<sub>2</sub>S shall be calculated using the formula  $(10^{-\text{pH}})/(10^{-\text{pH}} + K_{a1})$ , where  $K_{a1}$  is the temperature-adjusted dissociation constant for H<sub>2</sub>S. [District Rules 2201 and 4102]
- The total sulfide concentration, pH, and temperature at the surface of each primary lagoon shall be monitored and recorded at least once every calendar quarter and at other times requested by the District. If the average calculated undissociated H<sub>2</sub>S concentration from monitoring the primary lagoons exceeds the maximum allowed concentration, the permittee shall monitor and record the total sulfide concentration, pH, and temperature at the surface of at least two other locations in each primary lagoon as soon as possible, but no longer than 24 hours after results were available from the initial monitoring indicating a potential exceedance. The undissociated H<sub>2</sub>S concentration calculated from the initial monitoring locations and the secondary monitoring locations for the primary lagoons shall be averaged. If the calculated average concentration of undissociated H<sub>2</sub>S continues exceed the maximum allowed limit, then the total sulfide concentration, pH, and temperature at the surface of each primary lagoon shall be monitored and recorded monthly until three consecutive months of monitoring show compliance, after which the monitoring frequency may return to quarterly. For each secondary storage pond that has a liquid depth of no greater than 5 feet during the monitoring period, the concentration of undissociated H<sub>2</sub>S may be considered negligible and monitoring shall not be required. Records of the results of monitoring of the sulfide concentration, pH, and temperature at

the surface of each primary lagoon, and the maximum depth of the primary lagoons during periods the lagoons are not monitored shall be maintained. The District may also approve alternative monitoring frequencies and/or parameters. [District Rules 2201 and 4102]

- Monitoring of the total sulfide concentration of the primary lagoons shall be performed using a sulfide test kit, a sulfide meter, procedures of an accredited lab, Standard Methods 4500-S2; ASTM D4658; USGS Method I-3840; EPA Method 376.2; Marine Pollution Studies Laboratory (MPSL) Standard Operating Procedure for measurement of sulfide; or an alternative method approved by the District. [District Rules 2201 and 4102]

### **Rule 4550 Conservation Management Practices (CMP)**

This rule applies to agricultural operation sites located within the San Joaquin Valley Air Basin. The purpose of this rule is to limit fugitive dust emissions from agricultural operation sites.

Pursuant to Section 5.1, effective on and after July 1, 2004, an owner/operator with 500 or more milk and dry cows combined shall implement the applicable CMPs selected pursuant to Section 6.2.

The applicant will need to submit a separate CMP plan application to comply with the requirements of this rule.

### **Rule 4570 Confined Animal Facilities (CAF)**

The purpose of this rule is to limit emissions of volatile organic compounds (VOC) from Confined Animal Facilities (CAF). The provisions of this rule shall apply to any Confined Animal Facility.

Pursuant to section 4.0 – Exemptions, the requirements of this rule, except for the requirements of section 7.0 shall not apply to a CAF which remains at all times below all of the regulatory thresholds in Table 2. The CAF at this site exceeds the regulatory threshold for a dairy in Table 2; therefore, the CAF in this project is not exempt from the requirements of this rule.

Section 5.1 outlines the permit requirements for a CAF subject to the requirements of this rule. Section 5.1.1 requires owners/operators to obtain a Permit-to-Operate for the facility. With the submittal of this application, the facility is in compliance with this requirement.

Section 5.1.2 requires a thirty-day public noticing and commenting period shall be required for all large CAF's receiving their initial Permit-to-Operate or Authority-to-Construct.

The applicant has submitted an application containing all the requirements above. Since public noticing is required for this project, a public notice will be published in a local newspaper of general circulation prior to the issuance of these ATCs.

Section 5.1.3 requires that owners/operators submit a facility emissions mitigation plan of the Permit-to-Operate application or Authority-to-Construct application. The mitigation plan shall contain the following information:

- The name, business address, and phone number of the owners/operators responsible for the preparation and the implementation of the mitigation measures listed in the permit.
- The signature of the owners/operators attesting to the accuracy of the information provided and adherence to implementing the activities specified in the mitigation plan at all times and the date that the application was signed.
- A list of all mitigation measures shall be chosen from the application portions of Sections 5.5 or 5.6.

With the submittal of this application, the facility is in compliance with this requirement.

Section 5.1.4 requires the Permit-to-Operate or Authority-to-Construct application to include the following information, which is in addition to the facility emission mitigation plan:

- The maximum number of animals at the facility in each production stage (facility capacity).
- Any other information necessary for the District to prepare an emission inventory of all regulated air pollutants emitted from the facility as determined by the APCO.
- The approved mitigation measures from the facility's mitigation plan will be listed on the Permit to Operate or Authority-to-Construct as permit conditions.
- The District shall act upon the Authority to Construct application or Permit to Operate application within six (6) months of receiving a complete application.

Section 5.1.6 states that the District shall act upon the Authority to Construct application or Permit to Operate application within six (6) months of receiving a complete application.

Section 5.3 requires owners/operators of any CAF to implement all VOC emission mitigation measures, as contained in the permit application, on and after 365 days from the date of issuance of either the Authority-to-Construct or the Permit-to Operate whichever is sooner.

Section 5.4 states that an owner/operator may temporarily suspend use of mitigation measure(s) provided all of the following requirements are met:

- It is determined by a licensed veterinarian, certified nutritionist, CDFA, or USDA that any mitigation measure being suspended is detrimental to animal health or necessary for the animal to molt, and a signed written copy of this determination shall be retained on-site and made available for inspection upon request.
- The owner/operator notifies the District, within forty-eight (48) hours of the determination that the mitigation measure is being temporarily suspended; the specific health condition requiring the mitigation measure to be suspended; and the duration that the measure must be suspended for animal health reasons,
- The emission mitigation measure is not suspended for longer than recommended by the licensed veterinarian or certified nutritionist for animal health reasons,
- If such a situation exists, or is expected to exist for longer than thirty (30) days, the owners/operators shall, within that thirty (30) day period, submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the mitigation measure that was suspended, and
- The APCO, ARB, and EPA approve the temporary suspension of the mitigation measure for the time period requested by the owner/operator and a signed written copy of this determination shall be retained on site.

The following condition will be included on each permit.

- {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the permittee shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]

Section 7.2 outlines the general records requirements for CAFs subject to section 5.0 requirements. Owner/operators shall maintain records of the following:

- Copies of all of the facility's permits;
- The number of animals of each species and production group at the facility on a quarterly basis. Examples of records that may be used include Dairy Herd Improvement Association records and animal inventories done for financial purposes; and
- Records sufficient to demonstrate compliance with all applicable mitigation measures.

The following condition will be included on the cow housing permit.

- {4449} Permittee shall maintain a record of the number of animals of each species and production group at the facility and shall maintain quarterly records of any changes to this information. [District Rules 2201 and 4570]

Section 7.3 outlines the record requirements for feed and silage mitigation measures.

Section 7.4 outlines the record requirements for milking parlor mitigation measures. Owner/operators shall maintain records verifying that the milking parlor was flushed or hosed immediately prior to, immediately after, or during each milking.

Section 7.5 outlines the record requirements for freestall/corral/animal housing.

Section 7.6 outlines the record requirements for solid manure/separated solids outside of animal housing.

Section 7.7 outlines the record requirements for liquid manure.

Section 7.8 outlines the record requirements for land application of manure. Specific recordkeeping and monitoring conditions from sections 7.3 through 7.8 are shown below under the appropriate mitigation measures.

Section 7.9 requires owner/operators of a CAF subject to the requirements of Section 5.0 to keep and maintain the required records in Sections 7.1 through 7.8.4, as applicable, for a minimum of five (5) years and the records shall be made available to the APCO and EPA upon request. The following condition will be included on each permit.

- {4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

Section 7.10 requires specific monitoring or source testing conditions for each mitigation measure. These conditions are shown below with each mitigation measure.

The Dairy has chosen the following Mitigation Measures. All conditions required for compliance with Rule 4570 for the mitigation measures selected by the applicant are shown below. These conditions will be included on the appropriate permits.

### **General Conditions**

- {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the permittee shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
- {4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

### **Feed Storage and Handling Mitigation Measures**

Feed according to National Research Council (NRC) guidelines.

- {4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
- {4455} Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]

Push feed so that it is within three (3) feet of feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals.

- {4456} Permittee shall push feed so that it is within three feet of feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]
- {modified 4457} Permittee shall maintain an operating plan or record that requires feed to be pushed within three feet of feedlane fence within two hours of putting out the feed, or use of a feed trough or other structure designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]

Begin feeding total mixed rations within two (2) hours of grinding and mixing rations.

- {4458} Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rules 2201 and 4570]

- {modified 4459} Permittee shall maintain an operating plan or record of when feeding of total mixed rations began within two hours of grinding and mixing rations. [District Rules 2201 and 4570]

Store grain in a weatherproof storage structure or under a weatherproof covering from October through May.

- {4460} Permittee shall store grain in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]
- {4461} Permittee shall maintain records demonstrating grain is/was stored in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]

Feed steam-flaked, dry rolled, cracked or ground corn or other ground cereal grains.

- {4462} Permittee shall feed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. [District Rules 2201 and 4570]
- {4463} Permittee shall maintain records to demonstrate animals are fed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]

## Silage

Cover the surface of silage piles, except for the area where feed is being removed from the pile, with a plastic tarp that is at least 5 mils thick (0.005 inches), multiple plastic tarps with a cumulative thickness of at least 5 mils (0.005 inches), or an oxygen barrier film covered with a UV resistant material within 72 hours of last delivery of material to the pile.

- {4469} Permittee shall cover all silage piles, except for the area where feed is being removed from the pile, with a plastic tarp that is at least five (5) mils (0.005 inches) thick, multiple plastic tarps with a cumulative thickness of at least 5 mils (0.005 inches), or an oxygen barrier film covered with a UV resistant material. Silage piles shall be covered within seventy-two (72) hours of last delivery of material to the pile. Sheets of material used to cover silage shall overlap so that silage is not exposed where the sheets meet. [District Rules 2201 and 4570]
- {4470} Permittee shall maintain records of the thickness and type of cover used to cover each silage pile. Permittee shall also maintain records of the date of the last delivery of material to each silage pile and the date each pile is covered. [District Rules 2201 and 4570]

Build silage piles such that the average bulk density of silage piles is at least 44 lb/cu ft for corn silage and 40 lb/cu ft for other silage types, as measured in accordance with Section 7.10 of Rule 4570, or when creating a silage pile, adjust filling parameters to assure a calculated average bulk density of at least 44 lb/cu ft for corn silage and at least 40 lb/cu ft for other silage types, using a spreadsheet approved by the District, or incorporate the following practices when creating silage piles:

- Harvest silage crop at  $\geq 65\%$  moisture for corn; and  $\geq 60\%$  moisture for alfalfa/grass and other silage crops; and

- Manage silage material delivery such that no more than six (6) inches of materials are un-compacted on top of the pile.
- Incorporate the following parameters for Theoretical Length of Chop (TLC) and roller opening, as applicable, for the crop being harvested:

Crop Harvested	TLC (inches)	Roller Opening(mm)
Corn with no processing	≤ 1/2 in	N/A
Processed Corn <35% dry matter	≤ 3/4 in	1 – 4 mm
Alfalfa/Grass	≤ 1.0 in	N/A
Wheat/Cereal Grains/Other	≤ 1/2 in	N/A

- {4471} Permittee shall select and implement one of the following mitigation measures for building each silage pile at the facility: Option 1) build the silage pile such that the average bulk density is at least 44 lb/cu ft for corn silage and 40 lb/cu ft for other silage types, as measured in accordance with Section 7.11 of District Rule 4570; Option 2) Adjust filling parameters when creating the silage pile to achieve an average bulk density of at least 44 lb/cu ft for corn silage and at least 40 lb/cu ft for other silage types as determined using a District-approved spreadsheet; or Option 3) build silage piles using crops harvested with the applicable minimum moisture content, maximum Theoretical Length of Chop (TLC), and roller opening identified in District Rule 4570, Table 4.1, 1.d and manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. Records of the option chosen as a mitigation measure for building each silage pile shall be maintained. [District Rules 2201 and 4570]
- {4472} For each silage pile that Option 1 (Measured Bulk Density) is chosen as a mitigation measure for building the pile, records of the measured bulk density shall be maintained. [District Rules 2201 and 4570]
- {4473} For each silage pile that Option 2 (Bulk Density Determined by Spreadsheet) is chosen as a mitigation measure for building the pile, records of the filling parameters entered into the District-approved spreadsheet to determine the bulk density shall be maintained. [District Rules 2201 and 4570]
- {4474} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall harvest corn used for the pile at an average moisture content of at least 65% and harvest other silage crops for the pile at an average moisture content of at least 60%. [District Rules 2201 and 4570]
- {4475} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records of the average percent moisture of crops harvested for silage shall be maintained. [District Rules 2201 and 4570]
- {4476} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall adjust setting of equipment used to harvest crops for the pile to incorporate the following parameters for Theoretical Length of Chop (TLC) and roller opening, as applicable: 1) Corn with no processing: TLC not exceeding 1/2 inch, 2) Processed Corn: TLC not exceeding 3/4 inch and roller opening of 1-4 mm, 3) Alfalfa/Grass: TLC not exceeding 1.0 inch, 4) Other silage crops: TLC not exceeding 1/2 inch. [District Rules 2201 and 4570]
- {4477} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records that equipment used to harvest crops for the pile was set to the required TLC and roller opening for the type of crop harvested shall be maintained. [District Rules 2201 and 4570]



- {4478} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rules 2201 and 4570]
- {4479} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall maintain a plan or record that requires that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rules 2201 and 4570]

Manage silage piles such that only one silage pile has an uncovered face and the uncovered face has a total exposed surface area of less than 2,150 square feet.

Manage multiple uncovered silage piles such that the total exposed surface area of all silage piles is less than 4,300 square feet.

Maintain silage working face use a shaver/facer to remove silage from the silage pile.

Maintain silage working face; maintain a smooth vertical surface on the working face of the silage pile.

Silage Additives: Inoculate silage with homolactic acid bacteria in accordance with manufacturer recommendations to achieve a concentration of at least 100,000 colony forming units per gram of wet forage.

Silage Additives: Apply propionic acid, benzoic acid, sorbic acid, sodium benzoate, or potassium sorbate at a rate specified by the manufacturer to reduce yeast counts when forming silage pile.

Apply other additives at specified rates that have been demonstrated to reduce alcohol concentrations in silage and/or VOC emissions from silage and have been approved by the District and EPA.

- {4480} Permittee shall select and implement at least two of the following mitigation measures for management of silage piles at the facility: Option 1) manage silage piles such that only one silage pile has an uncovered face and the total exposed surface area is less than 2,150 square feet, or manage multiple uncovered silage piles such that the total exposed surface area of all uncovered silage piles is less than 4,300 square feet; Option 2) use a shaver/facer to remove silage from the silage pile, or shall use another method to maintain a smooth vertical surface on the working face of the silage pile; or Option 3) inoculate silage with homolactic lactic acid bacteria in accordance with manufacturer recommendations to achieve a concentration of at least 100,000 colony forming units per gram of wet forage, apply propionic acid, benzoic acid, sorbic acid, sodium benzoate, or potassium sorbate at the rate specified by the manufacturer to reduce yeast counts when forming silage piles, or apply other additives at rates that have been demonstrated to reduce alcohol concentrations in silage and/or VOC emissions from silage and have been approved by the District and EPA. Records of the options chosen for managing each silage pile shall be maintained. [District Rules 2201 and 4570]
- {4481} If Option 1 (Limiting Exposed Area of Silage) is chosen as a mitigation measure for managing silage piles, the permittee shall calculate and record the maximum (largest part of

pile) total exposed area of each silage pile. Records of the maximum calculated area shall be maintained. [District Rules 2201 and 4570]

- {4482} For each silage pile that Option 2 (Shaver/Facer or Smooth Face) is chosen as a mitigation measure for building the pile, the permittee shall maintain records that a shaver/facer was used to remove silage from the pile or shall visually inspect the pile at least daily to verify that the working face was smooth and maintain records of the visual inspections. [District Rules 2201 and 4570]
- {4483} For each silage pile that Option 3 (Silage Additives) is chosen as a mitigation measure for building the pile, records shall be maintained of the type additive (e.g. inoculants, preservative, other District & EPA-approved additive), the quantity of the additive applied to the pile, and a copy of the manufacturer's instructions for application of the additive. [District Rules 2201 and 4570]

### **Milking Parlor Mitigation Measures**

Flush or hose milk parlor immediately prior to, immediately after, or during each milking.

- {4484} Permittee shall flush or hose milk parlor immediately prior to, immediately prior to, immediately after or during each milking. [District Rules 2201 and 4570]
- {4485} Permittee shall provide verification that milk parlors are flushed or hosed prior to, immediately after, or during each milking. [District Rules 2201 and 4570]

### **Freestall Barns Mitigation Measures**

Pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers.

- {4486} Permittee shall pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers. [District Rules 2201 and 4570]

Flush, scrape, or vacuum freestall flush lanes immediately prior, after, or during each milking.

- {4487} Permittee shall flush, scrape or vacuum freestall lanes immediately prior to, immediately after or during each milking. [District Rule 4570]
- {4488} Permittee shall maintain records sufficient to demonstrate that freestall lanes are flushed, scraped or vacuumed immediately prior to, immediately after or during each milking. [District Rule 4570]

For a LARGE dairy only (1,000 milk cows or larger) – Remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall beddings at least once every seven (7) days.

- {4492} Permittee shall remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every seven (7) days. [District Rules 2201 and 4570]

### **Corral Mitigation Measures**

Pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers.

- {4486} Permittee shall pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers. [District Rules 2201 and 4570]

Inspect water pipes and troughs and repair leaks at least once every seven (7) days.

- {4499} Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rules 2201 and 4570]
- {4500} Permittee shall maintain records demonstrating that water pipes and troughs are inspected and leaks are repaired at least once every seven (7) days. [District Rules 2201 and 4570]

Clean manure from corrals at least four (4) times per year with at least sixty (60) days between cleaning, or clean corrals at least once between April and July and at least once between September and December.

- {4501} Permittee shall clean manure from corrals at least four (4) times per year with at least sixty (60) days between each cleaning, or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]
- {4502} Permittee shall record the date that animal waste is cleaned from corrals or demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning. [District Rules 2201 and 4570]

Scrape, vacuum or flush concrete lanes in corrals at least once every day for mature cows and every seven (7) days for support stock.

- {4508} Permittee shall scrape, vacuum or flush concrete lanes in corrals at least once every day for mature cows and every seven (7) days for support stock. [District Rules 2201 and 4570]
- {4556} Permittee shall maintain records demonstrating that concrete lanes in corrals are scraped, vacuumed, or flushed at least once every day for mature cows and at least once every seven (7) days for support stock. [District Rules 2201 and 4570]

Implement one of the following three mitigation measures: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 square feet or less, and slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 square feet per animal; 2) maintain corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface.

- {4554} Permittee shall implement at least one of the following corral mitigation measures: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 square feet or less and shall slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 square feet per animal; 2) maintain corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface except during periods of rainy weather. [District Rules 2201 and 4570]

- {4555} Permittee shall either 1) maintain sufficient records to demonstrate that corrals are maintained to ensure proper drainage preventing water from standing for more than forty-eight hours or 2) maintain records of dates pens are groomed (i.e., harrowed, raked, or scraped, etc.). [District Rules 2201 and 4570]

The facility has proposed to install shade structures. Therefore, the following conditions will be included to demonstrate compliance.

- {4511} Shade structures shall be installed in any of the following ways: 1) constructed with a light permeable roofing material; 2) uphill of any slope in the corral; 3) installed so that the structure has a North/South orientation. OR Permittee shall clean manure from under corral shades at least once every fourteen (14) days, when weather permits access into the corral. [District Rules 2201 and 4570]
- {4512} If permittee has selected to comply using shades constructed with a light permeable roofing material, then permittee shall maintain records, such as design specifications, demonstrating that the shade structures are equipped with such roofing material or if permittee has selected to comply by cleaning the manure from under the corral shades, then permittee shall maintain records demonstrating that manure is cleaned from under the shades at least once every fourteen (14) days, as long as weather permits access to corrals. [District Rules 2201 and 4570]

Manage corrals such that the manure depth in the corral does not exceed twelve (12) inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. The facility must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible.

- {4518} Permittee shall manage corrals such that the manure depth in the corral does not exceed twelve (12) inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rules 2201 and 4570]
- {4519} Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rules 2201 and 4570]

### **Land Application Mitigation Measures**

#### **Solid Manure**

Incorporate all solid manure within seventy-two (72) hours of land application.

- {4541} Permittee shall incorporate all solid manure within seventy-two (72) hours of land application. [District Rules 2201 and 4570]
- {4542} Permittee shall maintain records to demonstrate that all solid manure has been incorporated within seventy-two (72) hours of land application. [District Rules 2201 and 4570]

#### **Liquid Manure**

Only apply liquid manure that has been treated with an anaerobic or aerobic treatment lagoon, aerobic lagoon, or digester system.

- {4548} Permittee shall only apply liquid manure that has been treated with an anaerobic treatment lagoon, an aerobic lagoon or a digester system. [District Rules 2201 and 45700]
- {4549} Permittee shall maintain records that only liquid manure treated with an anaerobic treatment lagoon or aerobic lagoon or digester system is applied to fields. [District Rules 2201 and 4570]

### **Liquid Manure Handling Mitigation Measures**

Use an anaerobic treatment lagoon designed according to NRCS Guideline NO. 359.

- {4535} Permittee shall use an anaerobic treatment lagoon designed according to NRCS Guideline No. 359. [District Rules 2201 and 4570]
- {4536} Permittee shall maintain records, such as design specifications, calculations, including Minimum Treatment Volume (MTV), Hydraulic Retention Time (HRT) demonstrating that the anaerobic treatment lagoon meets the requirements listed in the NRCS Field Office Technical Guide Code 359. [District Rules 2201 and 4570]
- {4537} Permittee shall test any other parameters determined necessary by the APCO, ARB, and EPA to demonstrate compliance with rule requirements as frequently as determined necessary by the APCO, ARB, and EPA. [District Rules 2201 and 4570]

Remove solids from the waste system with a solid separator system, prior to the waste entering the lagoon.

- {4538} Permittee shall remove solids with a solid separator system, prior to the manure entering the lagoon. [District Rules 2201 and 4570]

### **Solid Manure Handling Mitigation Measures (LARGE Dairies Only)**

#### **Solid Manure**

Within seventy-two (72) hours of removal from housing, the owner shall remove dry manure from the facility.

- {4526} Within seventy two (72) hours of removal of solid manure from housing, permittee shall either 1) remove dry manure from the facility, or 2) cover dry manure outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed twenty-four (24) hours per event. [District Rules 2201 and 4570]
- {4527} Permittee shall keep records of dates when manure is removed from the facility or permittee shall maintain records to demonstrate that dry manure piles outside the pens are covered with a weatherproof covering from October through May. [District Rules 2201 and 4570]

Within seventy-two (72) hours of removal from housing, the owner shall cover dry manure outside the housing with a weatherproof covering from October through may, except for times when wind events remove the covering, not to exceed twenty-four (24) hours per event.

- {4528} If weatherproof coverings are used, permittee shall maintain records, such as manufacturer warranties or other documentation, demonstrating that the weatherproof

covering over dry manure are installed, used, and maintained in accordance with manufacturer recommendations and applicable standards listed in NRCS Field Office Technical Guide Code 313 or 367, or any other applicable standard approved by the APCO, ARB, and EPA. [District Rules 2201 and 4570]

### **California Health & Safety Code 42301.6 (School Notice)**

The District has verified that this site is not located within 1,000 feet of a school. Therefore, pursuant to California Health and Safety Code 42301.6, a school notice is not required.

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

CEQA requires each public agency to adopt objectives, criteria, and specific procedures consistent with CEQA Statutes and the CEQA Guidelines for administering its responsibilities under CEQA, including the orderly evaluation of projects and preparation of environmental documents. The District adopted its *Environmental Review Guidelines* (ERG) in 2001. The basic purposes of CEQA are to:

- Inform governmental decision-makers and the public about the potential, significant environmental effects of proposed activities;
- Identify the ways that environmental damage can be avoided or significantly reduced;
- Prevent significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures when the governmental agency finds the changes to be feasible; and
- Disclose to the public the reasons why a governmental agency approved the project in the manner the agency chose if significant environmental effects are involved.

### **Greenhouse Gas (GHG) Significance Determination**

#### District is a Responsible Agency

It is determined that another agency has prepared an environmental review document for the project. The District is a Responsible Agency for the project because of its discretionary approval power over the project via its Permits Rule (Rule 2010) and New Source Review Rule (Rule 2201), (CEQA Guidelines §15381). As a Responsible Agency, the District is limited to mitigating or avoiding impacts for which it has statutory authority. The District does not have statutory authority for regulating greenhouse gas emissions. The District has determined that the applicant is responsible for implementing greenhouse gas mitigation measures, if any, imposed by the Lead Agency.

### **District CEQA Findings**

The District is a Responsible Agency for the project because of its discretionary approval power over the project via its Permits Rule (Rule 2010) and New Source Review Rule (Rule 2201), (CEQA Guidelines §15381). The District's engineering evaluation of the project (this document) demonstrates that compliance with District rules and permit conditions would reduce Stationary Source emissions from the project to levels below the District's significance thresholds for criteria pollutants. The District has determined that

no additional findings are required (CEQA Guidelines §15096(h)). The following condition will be included on each permit:

- {3658} This permit does not authorize the violation of any conditions established for this facility (e.g. maximum number of animals or animal units, construction requirements, etc.) in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

**Indemnification Agreement/Letter of Credit Determination**

According to District Policy APR 2010 (CEQA Implementation Policy), when the District is the Lead or Responsible Agency for CEQA purposes, an indemnification agreement and/or a letter of credit may be required. The decision to require an indemnity agreement and/or a letter of credit is based on a case-by-case analysis of a particular project’s potential for litigation risk, which in turn may be based on a project’s potential to generate public concern, its potential for significant impacts, and the project proponent’s ability to pay for the costs of litigation without a letter of credit, among other factors.

The criteria pollutant emissions and toxic air contaminant emissions associated with the proposed project are not significant, and there is minimal potential for public concern for this particular type of facility/operation. Therefore, an Indemnification Agreement and/or a Letter of Credit will not be required for this project in the absence of expressed public concern.

**IX. Recommendation**

Compliance with all applicable rules and regulations is expected. Issue ATCs N-8350-1-1, ‘-2-2, ‘-3-1, ‘-4-1, and ‘-5-1 subject to the permit conditions on the attached draft ATC in Appendix A.

**X. Billing Information**

Annual Permit Fees			
Permit Number	Fee Schedule	Fee Description	Annual Fee
N-8350-1-1	3020-06	Milking Parlor	\$128
N-8350-2-2	3020-06	Cow Housing Areas	\$128
N-8350-3-1	3020-06	Lagoon/Storage Ponds	\$128
N-8350-4-1	3020-06	Solid Manure	\$128
N-8350-5-1	3020-06	Feed Storage	\$128

## **Appendixes**

- A: Draft ATCs
- B: Current PTOs
- C: BACT Guideline
- D: BACT Analysis
- E: HRA/AAQA Summary
- F: Quarterly Net Emissions Change (QNEC)
- G: Emission Profiles
- H: Dairy Emissions Calculator
- I: Anaerobic Lagoon Design Check



## **APPENDIX A**

### **Draft ATCs**

San Joaquin Valley  
Air Pollution Control District

**AUTHORITY TO CONSTRUCT**

ISSUANCE DATE: DRAFT  
**DRAFT**

**PERMIT NO:** N-8350-1-1

**LEGAL OWNER OR OPERATOR:** ANTONIO AZEVEDO DAIRY #4

**MAILING ADDRESS:** 2025 W EL NIDO RD  
EL NIDO, CA 95317

**LOCATION:** 1261 W ROOSEVELT RD  
EL NIDO, CA 95317

**EQUIPMENT DESCRIPTION:**

MODIFICATION OF 475 COW MILKING OPERATION WITH ONE 16 STALL HERRINGBONE MILKING PARLOR:  
INCREASE MAXIMUM NUMBER OF MILK COWS TO 2,700 AND ADD RULE 4570 MITIGATION MEASURES

**CONDITIONS**

1. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]
4. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

**YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (209) 557-6400 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT.** This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Samir Sheikh, Executive Director / APCO

**Brian Clements, Director of Permit Services**

N-8350-1-1 : May 3 2023 11:41AM -- YOSHIMUJ : Joint Inspection NOT Required

5. Permittee shall flush or hose milk parlor immediately prior to, immediately after, or during each milking. [District Rules 2201 and 4570]
6. Permittee shall provide verification that milk parlors are flushed or hosed prior to, immediately after, or during each milking. [District Rules 2201 and 4570]
7. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
8. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
9. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

DRAFT

San Joaquin Valley  
Air Pollution Control District

**AUTHORITY TO CONSTRUCT**

**ISSUANCE DATE:** DRAFT

**PERMIT NO:** N-8350-2-2

**LEGAL OWNER OR OPERATOR:** ANTONIO AZEVEDO DAIRY #4

**MAILING ADDRESS:** 2025 W EL NIDO RD  
EL NIDO, CA 95317

**LOCATION:** 1261 W ROOSEVELT RD  
EL NIDO, CA 95317

**EQUIPMENT DESCRIPTION:**

MODIFICATION OF COW HOUSING - 475 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 575 MATURE COWS (MILK AND DRY COWS); 335 TOTAL SUPPORT STOCK (HEIFERS, CALVES AND BULLS); AND LOAFING BARN WITH SCRAPE SYSTEM: CONSTRUCT THREE SAUDI-STYLE BARNS, INCREASE HERD SIZE TO 2,700 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 3,000 MATURE COWS (MILK AND DRY) COWS AND 1,000 SUPPORT STOCK, AND ADD RULE 4570 MITIGATION MEASURES

**CONDITIONS**

1. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

CONDITIONS CONTINUE ON NEXT PAGE

**YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (209) 557-6400 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT.** This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Samir Sheikh, Executive Director / APCO

Brian Clements, Director of Permit Services

N-8350-2-2 : May 8 2023 8:31AM -- YOSHIMUJ : Joint Inspection NOT Required

4. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
5. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
6. The permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
7. Permittee shall pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers. [District Rules 2201 and 4570]
8. Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rules 2201 and 4570]
9. Permittee shall maintain records demonstrating that water pipes and troughs are inspected and leaks are repaired at least once every seven (7) days. [District Rules 2201 and 4570]
10. Permittee shall clean manure from corrals at least four (4) times per year with at least sixty (60) days between each cleaning, or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]
11. Permittee shall demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning or demonstrate that corrals are cleaned at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]
12. Permittee shall scrape, vacuum or flush concrete lanes in corrals at least once every day for mature cows and every seven (7) days for support stock. [District Rules 2201 and 4570]
13. Permittee shall maintain records demonstrating that concrete lanes in corrals are scraped, vacuumed, or flushed at least once every day for mature cows and at least once every seven (7) days for support stock. [District Rules 2201 and 4570]
14. Shade structures shall be installed in any of the following ways: 1) constructed with a light permeable roofing material; 2) uphill of any slope in the corral; 3) installed so that the structure has a North/South orientation. OR Permittee shall clean manure from under corral shades at least once every fourteen (14) days, when weather permits access into the corral. [District Rules 2201 and 4570]
15. If permittee has selected to comply using shades constructed with a light permeable roofing material, then permittee shall maintain records, such as design specifications, demonstrating that the shade structures are equipped with such roofing material or if permittee has selected to comply by cleaning the manure from under the corral shades, then permittee shall maintain records demonstrating that manure is cleaned from under the shades at least once every fourteen (14) days, as long as weather permits access to corrals. [District Rules 2201 and 4570]
16. Permittee shall manage corrals such that the manure depth in the corral does not exceed twelve (12) inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rules 2201 and 4570]
17. Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rules 2201 and 4570]
18. Permittee shall keep records of dates when separated solids are removed from the facility or permittee shall maintain records to demonstrate that separated solids piles outside the pens are covered with a weatherproof covering from October through May. [District Rules 2201 and 4570]

DRAFT  
CONDITIONS CONTINUE ON NEXT PAGE

19. Permittee shall implement at least one of the following corral mitigation measures: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 square feet or less and shall slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 square feet per animal; 2) maintain corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface except during periods of rainy weather. [District Rules 2201 and 4570]
20. Permittee shall either 1) maintain sufficient records to demonstrate that corrals are maintained to ensure proper drainage preventing water from standing for more than forty-eight hours or 2) maintain records of dates pens are groomed (i.e., harrowed, raked, or scraped, etc.). [District Rules 2201 and 4570]
21. Permittee shall flush, scrape or vacuum freestall lanes immediately prior to, immediately after or during each milking. [District Rules 2201 and 4570]
22. Permittee shall maintain records sufficient to demonstrate that freestall lanes are flushed, scraped or vacuumed immediately prior to, immediately after or during each milking. [District Rules 2201 and 4570]
23. Permittee shall remove manure that is not dry from individual cow freestall beds or shall rake, harrow, scrape, or grade freestall bedding at least once every seven (7) days. [District Rules 2201 and 4570]
24. Permittee shall record either of the following: 1) the dates when manure that is not dry is removed from individual cow freestall beds or 2) the dates when the freestall bedding is raked, harrowed, scraped, or graded. [District Rules 2201 and 4570]
25. For Shade Barns #1, 2, 3, 4, 5, and 6, the permittee shall flush or scrape the feed lanes and walkways at least four times per day for mature cows and at least once per day for support stock. [District Rules 2201 and 4570]
26. For Shade Barns #1, 2, 3, 4, 5, and 6, the permittee shall keep records or maintain an operating plan that requires the feed lanes and walkways for mature cows to be flushed or scraped at least four times per day and the feed lanes and walkways for support stock to be flushed or scraped at least once per day. [District Rules 2201 and 4570]
27. For Shade Barns #1, 2, 3, 4, 5, and 6, the permittee shall scrape the exercise pens and the open corral at least once every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions. [District Rule 2201]
28. For Shade Barns #1, 2, 3, 4, 5, and 6, the permittee shall maintain sufficient records to demonstrate that the exercise pens and open corral are scraped at least once every two weeks, except when prevented by wet conditions [District Rule 2201]
29. Permittee shall maintain a record of the number of animals of each species and production group at the facility and shall maintain quarterly records of any changes to this information. [District Rules 2201 and 4570]
30. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

DRAFT

San Joaquin Valley  
Air Pollution Control District

# AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT  
**DRAFT**

**PERMIT NO:** N-8350-3-1

**LEGAL OWNER OR OPERATOR:** ANTONIO AZEVEDO DAIRY #4

**MAILING ADDRESS:** 2025 W EL NIDO RD  
EL NIDO, CA 95317

**LOCATION:** 1261 W ROOSEVELT RD  
EL NIDO, CA 95317

**EQUIPMENT DESCRIPTION:**

MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF THREE STORAGE PONDS; MANURE LAND APPLIED THROUGH FLOOD IRRIGATION: ALLOW FOR INCREASE IN EMISSIONS DUE TO HERD INCREASE AUTHORIZED BY ATC N-8350-2-2, CONSTRUCT TWO LAGOONS AND A MECHANICAL SEPARATOR

## CONDITIONS

1. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]
4. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

**YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (209) 557-6400 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT.** This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Samir Sheikh, Executive Director / APCO

**Brian Clements, Director of Permit Services**

N-8350-3-1 : May 3 2023 11:42AM -- YOSHIMUJ : Joint Inspection NOT Required

5. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
6. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
7. Permittee shall remove solids with a solid separator system, prior to the manure entering the lagoon. [District Rules 2201 and 4570]
8. Permittee shall use an anaerobic treatment lagoon designed according to NRCS Guideline No. 359. [District Rules 2201 and 4570]
9. Permittee shall maintain records, such as design specifications, calculations, including Minimum Treatment Volume (MTV), Hydraulic Retention Time (HRT) demonstrating that the anaerobic treatment lagoon meets the requirements listed in the NRCS Field Office Technical Guide Code 359. [District Rules 2201 and 4570]
10. Permittee shall test any other parameters determined necessary by the APCO, ARB, and EPA to demonstrate compliance with rule requirements as frequently as determined necessary by the APCO, ARB, and EPA. [District Rules 2201 and 4570]
11. Permittee shall only apply liquid manure that has been treated with an anaerobic treatment lagoon, an aerobic lagoon or a digester system. [District Rules 2201 and 4570]
12. Permittee shall maintain records that only liquid manure treated with an anaerobic treatment lagoon or aerobic lagoon or digester system is applied to fields. [District Rules 2201 and 4570]
13. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

DRAFT



San Joaquin Valley  
Air Pollution Control District

**AUTHORITY TO CONSTRUCT**

**ISSUANCE DATE: DRAFT**  
**DRAFT**

**PERMIT NO:** N-8350-4-1

**LEGAL OWNER OR OPERATOR:** ANTONIO AZEVEDO DAIRY #4

**MAILING ADDRESS:** 2025 W EL NIDO RD  
EL NIDO, CA 95317

**LOCATION:** 1261 W ROOSEVELT RD  
EL NIDO, CA 95317

**EQUIPMENT DESCRIPTION:**

MODIFICATION OF SOLID MANURE HANDLING CONSISTING OF SOLID MANURE HAULED OFFSITE: ALLOW FOR INCREASE IN EMISSIONS DUE TO HERD INCREASE AUTHORIZED BY ATC N-8350-2-2

**CONDITIONS**

1. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]
4. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

**YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (209) 557-6400 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT.** This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Samir Sheikh, Executive Director / APCO

**Brian Clements, Director of Permit Services**

N-8350-4-1 : May 3 2023 11:42AM -- YOSHIMUJ : Joint Inspection NOT Required

5. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
6. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
7. Permittee shall incorporate all solid manure within seventy-two (72) hours of land application. [District Rules 2201 and 4570]
8. Permittee shall maintain records to demonstrate that all solid manure has been incorporated within seventy-two (72) hours of land application. [District Rules 2201 and 4570]
9. Within seventy two (72) hours of removal of solid manure from housing, permittee shall either 1) remove dry manure from the facility, or 2) cover dry manure outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed twenty-four (24) hours per event. [District Rules 2201 and 4570]
10. Permittee shall keep records of dates when manure is removed from the facility or permittee shall maintain records to demonstrate that dry manure piles outside the pens are covered with a weatherproof covering from October through May. [District Rules 2201 and 4570]
11. If weatherproof coverings are used, permittee shall maintain records, such as manufacturer warranties or other documentation, demonstrating that the weatherproof covering over dry manure are installed, used, and maintained in accordance with manufacturer recommendations and applicable standards listed in NRCS Field Office Technical Guide Code 313 or 367, or any other applicable standard approved by the APCO, ARB, and EPA. [District Rules 2201 and 4570]
12. Solid manure applied to fields shall be incorporated into the soil within two hours after application. [District Rules 2201 and 4570]
13. Permittee shall maintain records to demonstrate that all solid manure has been incorporated within two hours of land application. [District Rules 2201 and 4570]
14. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

DRAFT

San Joaquin Valley  
Air Pollution Control District

**AUTHORITY TO CONSTRUCT**

ISSUANCE DATE: DRAFT  
**DRAFT**

**PERMIT NO:** N-8350-5-1

**LEGAL OWNER OR OPERATOR:** ANTONIO AZEVEDO DAIRY #4

**MAILING ADDRESS:** 2025 W EL NIDO RD  
EL NIDO, CA 95317

**LOCATION:** 1261 W ROOSEVELT RD  
EL NIDO, CA 95317

**EQUIPMENT DESCRIPTION:**

MODIFICATION OF FEED STORAGE AND HANDLING CONSISTING OF COVERED FEED STORAGE OR COMMODITY BARN, SILAGE PILES, DRY GRAIN TANKS AND BINS: ALLOW FOR INCREASE IN EMISSIONS DUE TO HERD INCREASE AUTHORIZED BY ATC N-8350-2-2

**CONDITIONS**

1. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]
4. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

**YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (209) 557-6400 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT.** This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Samir Sheikh, Executive Director / APCO

**Brian Clements, Director of Permit Services**

N-8350-5-1 : May 3 2023 11:42AM -- YOSHIMUJ : Joint Inspection NOT Required

5. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
6. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
7. Permittee shall push feed so that it is within three feet of feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]
8. Permittee shall maintain an operating plan or record that requires feed to be pushed within three feet of feedlane fence within two hours of putting out the feed, or use of a feed trough or other structure designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]
9. Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
10. Permittee shall maintain an operating plan or record of when feeding of total mixed rations began within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
11. Permittee shall store grain in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]
12. Permittee shall maintain records demonstrating grain is/was stored in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]
13. Permittee shall feed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. [District Rules 2201 and 4570]
14. Permittee shall maintain records to demonstrate animals are fed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
15. Permittee shall cover all silage piles, except for the area where feed is being removed from the pile, with a plastic tarp that is at least five (5) mils (0.005 inches) thick, multiple plastic tarps with a cumulative thickness of at least 5 mils (0.005 inches), or an oxygen barrier film covered with a UV resistant material. Silage piles shall be covered within seventy-two (72) hours of last delivery of material to the pile. Sheets of material used to cover silage shall overlap so that silage is not exposed where the sheets meet. [District Rules 2201 and 4570]
16. Permittee shall maintain records of the thickness and type of cover used to cover each silage pile. Permittee shall also maintain records of the date of the last delivery of material to each silage pile and the date each pile is covered. [District Rules 2201 and 4570]
17. Permittee shall select and implement one of the following mitigation measures for building each silage pile at the facility: Option 1) build the silage pile such that the average bulk density is at least 44 lb/cu ft for corn silage and 40 lb/cu ft for other silage types, as measured in accordance with Section 7.11 of District Rule 4570; Option 2) Adjust filling parameters when creating the silage pile to achieve an average bulk density of at least 44 lb/cu ft for corn silage and at least 40 lb/cu ft for other silage types as determined using a District-approved spreadsheet; or Option 3) build silage piles using crops harvested with the applicable minimum moisture content, maximum Theoretical Length of Chop (TLC), and roller opening identified in District Rule 4570, Table 4.1, 1.d and manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. Records of the option chosen as a mitigation measure for building each silage pile shall be maintained. [District Rules 2201 and 4570]
18. For each silage pile that Option 1 (Measured Bulk Density) is chosen as a mitigation measure for building the pile, records of the measured bulk density shall be maintained. [District Rules 2201 and 4570]

19. For each silage pile that Option 2 (Bulk Density Determined by Spreadsheet) is chosen as a mitigation measure for building the pile, records of the filling parameters entered into the District-approved spreadsheet to determine the bulk density shall be maintained. [District Rules 2201 and 4570]
20. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall harvest corn used for the pile at an average moisture content of at least 65% and harvest other silage crops for the pile at an average moisture content of at least 60%. [District Rules 2201 and 4570]
21. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records of the average percent moisture of crops harvested for silage shall be maintained. [District Rules 2201 and 4570]
22. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall adjust setting of equipment used to harvest crops for the pile to incorporate the following parameters for Theoretical Length of Chop (TLC) and roller opening, as applicable: 1) Corn with no processing: TLC not exceeding 1/2 inch, 2) Processed Corn: TLC not exceeding 3/4 inch and roller opening of 1-4 mm, 3) Alfalfa/Grass: TLC not exceeding 1.0 inch, 4) Other silage crops: TLC not exceeding 1/2 inch. [District Rules 2201 and 4570]
23. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records that equipment used to harvest crops for the pile was set to the required TLC and roller opening for the type of crop harvested shall be maintained. [District Rules 2201 and 4570]
24. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rules 2201 and 4570]
25. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall maintain a plan that requires that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rules 2201 and 4570]
26. Permittee shall select and implement at least two of the following mitigation measures for management of silage piles at the facility: Option 1) manage silage piles such that only one silage pile has an uncovered face and the total exposed surface area is less than 2,150 square feet, or manage multiple uncovered silage piles such that the total exposed surface area of all uncovered silage piles is less than 4,300 square feet; Option 2) use a shaver/facer to remove silage from the silage pile, or shall use another method to maintain a smooth vertical surface on the working face of the silage pile; or Option 3) inoculate silage with homolactic lactic acid bacteria in accordance with manufacturer recommendations to achieve a concentration of at least 100,000 colony forming units per gram of wet forage, apply propionic acid, benzoic acid, sorbic acid, sodium benzoate, or potassium sorbate at the rate specified by the manufacturer to reduce yeast counts when forming silage piles, or apply other additives at rates that have been demonstrated to reduce alcohol concentrations in silage and/or VOC emissions from silage and have been approved by the District and EPA. Records of the options chosen for managing each silage pile shall be maintained. [District Rules 2201 and 4570]
27. If Option 1 (Limiting Exposed Area of Silage) is chosen as a mitigation measure for managing silage piles, the permittee shall calculate and record the maximum (largest part of pile) total exposed area of each silage pile. Records of the maximum calculated area shall be maintained. [District Rules 2201 and 4570]
28. For each silage pile that Option 2 (Shaver/Facer or Smooth Face) is chosen as a mitigation measure for managing the pile, the permittee shall maintain records that a shaver/facer was used to remove silage from the pile or shall visually inspect the pile at least daily to verify that the working face was smooth and maintain records of the visual inspections. [District Rules 2201 and 4570]
29. For each silage pile that Option 3 (Silage Additives) is chosen as a mitigation measure for managing the pile, records shall be maintained of the type additive (e.g. inoculants, preservative, other District & EPA-approved additive), the quantity of the additive applied to the pile, and a copy of the manufacturer's instructions for application of the additive. [District Rules 2201 and 4570]
30. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

## **APPENDIX B**

### **Current PTOs**

# San Joaquin Valley Air Pollution Control District

**PERMIT UNIT:** N-8350-1-0

**EXPIRATION DATE:** 12/31/2025

**EQUIPMENT DESCRIPTION:**

475 COW MILKING OPERATION WITH ONE 16 STALL HERRINGBONE MILKING PARLOR

## PERMIT UNIT REQUIREMENTS

---

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

These terms and conditions are part of the Facility-wide Permit to Operate.

# San Joaquin Valley Air Pollution Control District

**PERMIT UNIT:** N-8350-2-1

**EXPIRATION DATE:** 12/31/2025

**EQUIPMENT DESCRIPTION:**

COW HOUSING - 475 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 575 MATURE COWS (MILK AND DRY COWS); 335 TOTAL SUPPORT STOCK (HEIFERS, CALVES AND BULLS); AND LOAFING BARN WITH SCRAPE SYSTEM

## PERMIT UNIT REQUIREMENTS

---

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]
4. The operator shall submit an application to comply with District Rule 4550 (Conservation Management Practices) for the dairy prior to the actual number of mature cows (milk and dry) equal 500 or more mature cows. [District Rule 4550]
5. The operator shall submit an application to comply with District Rule 4570 (Confined Animal Facilities) prior to the actual number of milk cows equal 500 or more milk cows. [District Rule 4570]

These terms and conditions are part of the Facility-wide Permit to Operate.



# San Joaquin Valley Air Pollution Control District

**PERMIT UNIT:** N-8350-3-0

**EXPIRATION DATE:** 12/31/2025

**EQUIPMENT DESCRIPTION:**

LIQUID MANURE HANDLING SYSTEM CONSISTING OF THREE STORAGE PONDS; MANURE LAND APPLIED THROUGH FLOOD IRRIGATION

## PERMIT UNIT REQUIREMENTS

---

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

These terms and conditions are part of the Facility-wide Permit to Operate.

# San Joaquin Valley Air Pollution Control District

**PERMIT UNIT:** N-8350-4-0

**EXPIRATION DATE:** 12/31/2025

**EQUIPMENT DESCRIPTION:**

SOLID MANURE HANDLING CONSISTING OF SOLID MANURE HAULED OFFSITE

## PERMIT UNIT REQUIREMENTS

---

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

These terms and conditions are part of the Facility-wide Permit to Operate.

# San Joaquin Valley Air Pollution Control District

**PERMIT UNIT:** N-8350-5-0

**EXPIRATION DATE:** 12/31/2025

**EQUIPMENT DESCRIPTION:**

FEED STORAGE AND HANDLING CONSISTING OF COVERED FEED STORAGE OR COMMODITY BARN(S), SILAGE PILES, DRY GRAIN TANKS AND BINS

## PERMIT UNIT REQUIREMENTS

---

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

These terms and conditions are part of the Facility-wide Permit to Operate.

## **APPENDIX C**

### **BACT Guideline**

San Joaquin Valley  
 Unified Air Pollution Control District

**Best Available Control Technology (BACT) Guideline 5.8.1\***

Last Update: 12/18/2013

**Milking Parlor**

<b>Pollutant</b>	<b>Achieved in Practice or contained in the SIP</b>	<b>Technologically Feasible</b>	<b>Alternate Basic Equipment</b>
VOC	Flush/Spray before, after, or during milking each group of cows	1) Enclosure of milk parlor with biogas vented to incinerator with 95% control  2) Enclosure of milk parlor with biogas vented to biofilter with minimum 80% control	
NH3	Flush/Spray before, after, or during milking each group of cows		

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

**\*This is a Summary Page for this Class of Source**

San Joaquin Valley  
 Unified Air Pollution Control District

**Best Available Control Technology (BACT) Guideline 5.8.2\***

Last Update: 12/18/2013

**Cow Housing - Freestall and Saudi-Style Barns**

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC	<p>1) Concrete feed lanes and walkways;</p> <p>2) Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system. Scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning lanes and walkways for support stock (heifers) at least once per day);</p> <p>3) Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;</p> <p>4) Properly sloping exercise pens (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing corrals to maintain a dry surface;</p> <p>5) Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions; and</p> <p>6) Rule 4570 Measures</p>		
PM10	<p>1) Concrete feed lanes and walkways;</p> <p>2) Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions</p>		

## San Joaquin Valley Unified Air Pollution Control District

- NH3
- 1) Concrete feed lanes and walkways;
  - 2) Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, Scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning lanes and walkways for support stock (heifers) at least once per day);
  - 3) Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
  - 4) Properly sloping exercise pens (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing corrals to maintain a dry surface; and
  - 5) Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions;

---

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

**\*This is a Summary Page for this Class of Source**

San Joaquin Valley  
 Unified Air Pollution Control District

**Best Available Control Technology (BACT) Guideline 5.8.6\***

Last Update: 12/18/2013

**Liquid Manure Handling - Lagoon/Storage Pond**

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC	Anaerobic treatment lagoon designed according to NRCS Guideline, and solids removal/separation system (mechanical separator(s) or settling basin(s)/weeping wall(s))	1) Aerobic treatment lagoon or mechanically aerated lagoon;  2) Covered lagoon digester vented to a control device with minimum 95% control	
NH3	All animals fed in accordance with NRCS or other District-approved guidelines		

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

**\*This is a Summary Page for this Class of Source**



San Joaquin Valley  
 Unified Air Pollution Control District

**Best Available Control Technology (BACT) Guideline 5.8.7\***

Last Update: 12/18/2013

**Liquid Manure Handling - Liquid/Slurry Land Application**

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC	Irrigation of crops using liquid/slurry manure from the secondary lagoon/holding/storage pond preceded by an uncovered anaerobic treatment lagoon designed to meet Natural Resources Conservation Service (NRCS) standards	1) Irrigation of crops using liquid manure from an aerobic treatment lagoon or mechanically aerated lagoon (95% VOC control efficiency)  2) Irrigation of crops using liquid manure from a holding/storage pond after being treated in a covered lagoon/digester (80% VOC control efficiency)	
NH3	All animals fed in accordance with NRCS or other District-approved guidelines		

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

**\*This is a Summary Page for this Class of Source**

San Joaquin Valley  
Unified Air Pollution Control District

**Best Available Control Technology (BACT) Guideline 5.8.8\***

Last Update: 12/18/2013

**Solid Manure Handling - Storage/Separated Solids Piles**

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
NH3	All animals fed in accordance with NRCS or other District-approved guidelines		

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

**\*This is a Summary Page for this Class of Source**

San Joaquin Valley  
 Unified Air Pollution Control District

**Best Available Control Technology (BACT) Guideline 5.8.9\***

Last Update: 12/18/2013

**Solid Manure Handling - Land Application**

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC	Rapid incorporation of solid manure into the soil after land application	<p>1a) Land Application of Solid Manure Processed by Either an Open or Enclosed Negatively-Aerated Static Pile (ASP) Vented to a biofilter (or equivalent) <math>\geq</math> 80% destruction efficiency With Rapid Incorporation of the Manure Into the Soil After Land Application;</p> <p>1b) Land Application of Solid Manure Processed by In-Vessel/Enclosed Negatively-Aerated Static Piles vented to biofilter <math>\geq</math> 80% destruction efficiency;</p> <p>2) Land Application of Solid Manure Processed by Open Negatively-Aerated Static Piles vented to biofilter <math>\geq</math> 80% destruction efficiency;</p> <p>3) Land Application of Solid Manure Processed by an Open Negatively-Aerated Static Piles (ASP) (With Thick Layer of Bulking Agent or Equivalent) With Rapid Incorporation of the Manure Into the Soil After Land Application</p>	
NH3	Rapid incorporation of solid manure into the soil after land application, and all animals fed in accordance with NRCS or other District-approved guidelines		

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

\*This is a Summary Page for this Class of Source

San Joaquin Valley  
Unified Air Pollution Control District

**Best Available Control Technology (BACT) Guideline 5.8.11\***

Last Update: 12/18/2013

**Feed Storage and Handling - Feed/TMR**

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC	District Rule 4570 Measures for Feed/TMR		

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

**\*This is a Summary Page for this Class of Source**

## **APPENDIX D**

### **BACT Analysis**

## **Top-Down BACT Analysis for Confined Animal Facility – Dairy Milking Parlor**

### **1. Top-Down BACT Analysis for VOC Emissions:**

This BACT discussion applies to the existing 16 stall herringbone milking parlor.

#### **a. Step 1 - Identify All Possible Control Technologies**

The following options were identified as possible controls for VOC emissions from the milking parlors:

- 1) Milking Parlors Vented to an Incinerator
- 2) Milking Parlor Vented to a Biofilter
- 3) Flush/Spray Milking Parlor Before, After, or During Milking Each Group of Cows

#### **Description of Control Technologies**

##### **1) Milking Parlors Vented to an Incinerator**

Milking parlors can be either naturally or mechanically ventilated. According to some dairy designers, mechanical ventilation is more reliable than natural ventilation. Mechanical ventilation can be easily applied to all areas of the milking parlors, except the holding area. The mechanical system for the milking parlors can be utilized to capture the gases emitted from the milking parlors, however in order to capture all of the gases, and to keep an appropriate negative pressure throughout the system, the holding area would also need to be entirely enclosed. No facility currently encloses the holding area since cows are continuously going in and out of the barn throughout the day. The capital required to enclose this large area would also be significant. Although the feasibility of such a technology is in question, it will be considered in this analysis.

The captured VOC emissions could then be sent to an incinerator. Thermal incineration is a well-established VOC control technique. During combustion, gaseous hydrocarbons are oxidized to form CO<sub>2</sub> and water. It is assumed that 95% of the gasses emitted from the milking parlor will be captured by the mechanical ventilation system and that 98% of the captured VOCs will be eliminated by thermal incineration<sup>2</sup>; therefore the total control for VOCs from the milking parlor = 0.95 x 0.98 = 93.1%.

---

<sup>2</sup> OAQPS Control Cost Manual, 4th Edition, EPA 450/3-90-006, January 1990, page 3-8.

## 2) Milking Parlor Vented to a Biofilter

A biofilter is a device for removing contaminants from a gas in which the gas is passed through a media that supports microbial activity by which pollutants are degraded by biological oxidation. During biofiltration, exhaust air containing pollutants passes through a media that contains an established, diverse population of aerobic microorganisms. These microorganisms oxidize the gaseous organic contaminants, ammonia, and sulfur compounds in the exhaust air resulting in carbon dioxide, nitrogen, water, salt, and biomass. The bacterial cultures (microorganisms that typically consist of several species coexisting in a colony) that use oxygen to biodegrade organics are called aerobic cultures. These aerobic cultures are usually supported by organic material contained in the biofilter, such as compost, wood chips, soil, peat, etc. Biofilters must maintain sufficient porosity to allow the contaminated air stream to pass through for treatment and to prevent anaerobic conditions. The moisture content of biofilter beds must also be regulated to ensure that there is sufficient moisture to maintain the microorganisms needed for treatment while avoiding excess moisture that can cause anaerobic conditions. A filtration system may be required upstream of the biofilter to remove particular matter which will clog the biofilter over time. Biofilters must be maintained free of rodents and weeds to avoid channeling of gases through the filter media and a loss of performance. The filter media of natural biofilters needs to be replaced periodically because of deterioration and loss of porosity.

Since biofilters rely on living organisms to function, a biofilter's performance will be affected by several factors, including: ambient temperature; temperature of the air stream being treated; the pollutant concentrations in the air stream; moisture content of the filter and air stream, and pH of the filter media. These parameters should be monitored to ensure optimum operating conditions for the biofilter.

It is assumed that 95% of the gasses emitted from the enclosed animal housing will be captured by the mechanical ventilation system and that a properly functioning biofilter will eliminate 80% of the captured VOC emissions<sup>3</sup>; therefore, the total control for VOCs from the enclosed animal housing =  $0.95 \times 0.80 = 76\%$ .

## 3) Flush/Spray Milking Parlor Before, After, or During Milking Each Group of Cows

Almost all dairy operations utilize some type of flush or spray system to wash out the manure that dairy cows deposit in the milking parlors. The primary purpose of the flush or spray system is to maintain the minimum level of sanitation required in the milking parlors. However, this system also serves as an emission control for reducing VOC and ammonia emissions. The manure deposited in the milking parlor, which is

---

<sup>3</sup> The SCAQMD Rule 1133.2 staff report (page 18) indicates control efficiencies of 80-90% for VOC for existing biofilter composting applications and that a well-designed, well-operated, and well-maintained biofilter is capable of achieving 80 percent control efficiency for VOC, <http://www.aqmd.gov/docs/default-source/rule-book/support-documents/rule-1133/stff-report.pdf?sfvrsn=2>

a source of VOC emissions, is removed from the milking parlors many times a day by flushing after each milking. Many of the VOCs emitted from fresh cow manure, such as alcohols (ethanol and methanol) and many Volatile Fatty Acids (VFAs), are highly soluble in water. Therefore, a large percentage of these compounds will dissolve in the flush water and will not be emitted from the milking parlors. The flush water can then carry the manure and the dissolved volatile compounds to an anaerobic treatment lagoon or other manure stabilization process for treatment.

It must be noted that flushing or spraying out the milking parlors before, after, or during each group of cows is milked will only control the VOCs emitted from the manure, it will have little or no effect on enteric emissions produced from the cows' digestive processes. It will be assumed that the control efficiency for VOCs emitted from manure is 75%. Enteric emissions compose approximately 78% of the VOC emissions from the milking parlor and VOC emissions from the manure make up the remaining 22%; therefore the total control for VOCs from the milking parlor =  $0.75 \times 0.22 = 16.5\%$ .

#### **b. Step 2 - Eliminate Technologically Infeasible Options**

There are no technologically infeasible options.

#### **c. Step 3 - Rank Remaining Control Technologies by Control Effectiveness**

- 1) Milking Parlor Vented to an Incinerator (93% VOC control efficiency)
- 2) Milking Parlor Vented to a Biofilter (76% VOC control efficiency)
- 3) Flush/Spray Milking Parlor Before, After, or During Milking Each Group of Cows (16.5% VOC control efficiency)

#### **d. Step 4 - Cost Effectiveness Analysis**

##### 1) Milking Parlor Vented to an Incinerator

The following cost analysis will be performed to determine whether the cost of natural gas alone, not including any capital costs, causes catalytic incineration to exceed the District VOC cost effectiveness threshold. The temperature required for catalytic incineration is 600 °F. The temperature required for thermal incineration is 1,400 °F. Since the fuel requirements and fuel cost for thermal incineration are greater than catalytic incineration, if catalytic incineration is determined not to be cost effective, then it can logically be reasoned that thermal incineration will not be cost effective as well.

##### Air Flow Rate of Milking Parlor

In order to effectively calculate the costs of this control option, the airflow rate of the milking parlors must be determined. According to Cornell University's publication "Environmental Controls for Today's Milking Center", the minimum ventilation rate



required for milking parlors is 15 room exchanges per hour in the winter and 60 to 90 room exchanges per hour in the summer. For calculation purposes, an average airflow rate of 35 room exchanges will assumed for the milking parlor.

The following analysis is based on the cost of emission reductions for 2,700 milk cows. It will assume a conservatively sized milking parlor of 200 ft long by 40 ft wide and a height of 20 feet. The total exhaust airflow rate can be calculated as follows:

$$\begin{aligned}\text{Total exhaust airflow rate} &= 200 \text{ ft} \times 40 \text{ ft} \times 20 \text{ ft} \times 35/\text{hr} \\ &= 5,600,000 \text{ ft}^3/\text{hr}\end{aligned}$$

#### Fuel Requirement for Thermal Incineration:

The gas leaving the milking parlor is principally air, with a volumetric specific heat of 0.0194 Btu/scf -°F under standard conditions.

$$\text{Natural Gas Requirement} = (\text{flow})(C_{p\text{Air}})(\Delta T)(1-\text{HEF})$$

Where:

Flow (Q) = exhaust flow rate of VOC

C<sub>pAir</sub> = specific heat of air: 0.0194 Btu/scf

ΔT = increase in the temperature of the contaminated air stream required for catalytic oxidation to occur (It will be assumed that the air stream would increase in temperature from 100 °F to 600 °F.)

HEF = heat exchanger factor: 0.7

$$\begin{aligned}\text{Natural Gas Requirement} &= (5,600,000 \text{ scf/hr})(0.0194 \text{ Btu/scf})(600 \text{ °F} - 100 \text{ °F})(1-0.7) \\ &= 16,296,000 \text{ Btu/hr}\end{aligned}$$

#### Fuel Cost for Thermal Incineration:

The cost for natural gas shall be based upon the average industrial price in California reported by the Energy Information Administration (EIA), taken from the EIA website at: [http://www.eia.gov/dnav/ng/ng\\_pri\\_sum\\_dcu\\_SCA\\_a.htm](http://www.eia.gov/dnav/ng/ng_pri_sum_dcu_SCA_a.htm). Price data for the years 2023 is not available, therefore, the average industrial price of natural gas for the year 2021 will be used for calculation purposes.

$$\begin{aligned}\text{Average industrial price for natural gas in California for the year 2021} \\ &= \$9.75/1,000 \text{ scf}\end{aligned}$$

$$\begin{aligned}\$9.75/1,000 \text{ scf} \times 1 \text{ scf}/1,000 \text{ Btu} \times 1,000,000 \text{ Btu/MMBtu} \\ &= \$9.75/\text{MMBtu}\end{aligned}$$

The oxidizer is assumed to operate 16 hours per day (2 shifts) and 365 days per year.

The fuel costs to operate the incinerator are calculated as follows:

$$\begin{aligned} & 16,296,000 \text{ Btu/hr} \times 1 \text{ MMBtu}/10^6 \text{ Btu} \times 16 \text{ hr/day} \times 365 \text{ day/year} \times \\ & \$7.05/\text{MMBtu} \\ & = \$670,939/\text{year} \end{aligned}$$

### VOC Emission Reductions for Thermal Incineration

The annual VOC Emission Reductions for the milking parlor is calculated as follows:

[Number of milk cows] x [Uncontrolled Milking Parlor VOC EF (lb/milk cow-year)] x [Capture Efficiency] x [Thermal Incinerator Control Efficiency]

$$\begin{aligned} & = (2,700 \text{ milk cows}) \times (0.44 \text{ lb-VOC/milk cow-year}) \times (0.95) \times (0.98) \\ & = 1,106 \text{ lb-VOC/year} \end{aligned}$$

### Cost of VOC Emission Reductions

$$\begin{aligned} \text{Cost of reductions} & = (\$670,939/\text{year}) / [(1,106 \text{ lb-VOC/year})(1 \text{ ton}/2000 \text{ lb})] \\ & = \$1,213,271/\text{ton of VOC reduced} \end{aligned}$$

As shown above, the natural gas cost alone for thermal or catalytic incineration would cause the cost of the VOC reductions to be greater than the \$32,900/ton cost effectiveness threshold of the District BACT policy. The equipment is therefore not cost effective and is being removed from consideration at this time.

## 2) Milking Parlor Vented to a Biofilter

The following analysis is based on the cost of emission reductions for confining 2,700 milk cows is based on a milking parlor that is 200 ft long by 40 ft wide and a height of 20 feet (the height is a conservative assumption), and venting the milking parlor to a biofilter. Costs for larger dairies would be linearly proportional.

Biofiltration can control both VOC and ammonia emissions. Although, this technology can control both pollutants, a cost effectiveness threshold has not been established for ammonia. Therefore, only achieved-in-practice options will be considered for ammonia at this time and a multi-pollutant cost effectiveness analysis for VOC and ammonia will not be performed.

### Air Flow Rate of Milking Parlor

In order to effectively calculate the costs of this control option, the airflow rate of the milking parlors must be determined. According to Cornell University's publication "Environmental Controls for Today's Milking Center", the minimum ventilation rate required for milking parlors is 15 room exchanges per hour in the winter and 60 to 90

room exchanges per hour in the summer. For calculation purposes, an average airflow rate of 35 room exchanges will assumed for the milking parlor. The total exhaust airflow rate can be calculated as follows:

$$\begin{aligned} \text{Total exhaust airflow rate} &= 200 \text{ ft} \times 440 \text{ ft} \times 20 \text{ ft} \times 35/\text{hr} \times 1/60 \text{ min} \\ &= 93,333 \text{ cfm} \end{aligned}$$

Cost of Biofiltration

The table below summarizes the cost information for biofilters found in literature. The references follow the table.

<b>Biofilter Costs from Literature</b>					
Article Number	Year published	Capital Cost Range (\$/cfm)	Adj 2019 Capital Cost (\$/cfm)	Operating Cost Range (\$/cfm/yr)	Adj 2019 Operating Cost (\$/yr)
1	2003	\$2.35 - \$7.74 biofilter	\$3.26 - \$10.75	\$3.31 biofilter	\$4.60
2	2003	\$20.20 - 30.30 biotrickling filter	\$28.20 - \$33.34	\$6.35 biotrickling filter	\$8.82
3	1991	\$12.79 - \$20.93 open biofilter	\$24.00 - \$39.27		
4	1991	\$20.93 - \$116.28 enclosed biofilter	\$39.27 - \$218.17		
5	1998	-	-	\$2 - \$14	\$3.14 - \$21.95
6	2008	\$15	\$17.80	\$2	\$2.37
7	2005	\$16.99 - \$118.93	\$22.23 - \$155.62	\$5.10 - \$16.99	\$6.67 - \$22.23
8	1996	\$2.50 - \$5.00	\$4.07 - \$8.14	\$2 - \$14	\$3.26 - \$22.80
9	1999	\$13.30 - \$18.00	\$20.40 - \$27.61	\$3.33 - \$6.67	\$5.11 - \$10.23
10	2002	\$2.79	\$3.96	10% of capital cost	
11	2004	\$0.15 - \$0.25	\$0.20 - \$0.34	\$0.005 - \$ 0.015	\$ .01 - \$0.03

The articles referenced in the previous table are cited below:

1 & 2. U.S. Environmental Protection Agency, The Clean Air Technology Center (CATC), "Using Bioreactors to Control Air Pollution" EPA-456/R-03-003, (E143-03), September 2003, <http://www.epa.gov/ttn/catc/dir1/fbiorect.pdf>

3. U.S. Environmental Protection Agency, "Emissions from Animal Feeding Operations" (Draft), EPA Contract No. 68-D6-0011, August 15, 2001, Section 9.2.3 - Biofiltration of Confinement Housing Exhaust, <http://www.epa.gov/ttn/chief/ap42/ch09/draft/draftanimalfeed.pdf>

4. Leson, G. and A.M. Winer. 1991. "Biofiltration: An Innovative Air Pollution Control Technology for VOC Emissions". Journal of the Air and Waste Management Association. 41(8):1045-54.)
5. Operating Cost Estimate for a Biofilter (1998): \$2-14/cfm (from Boyette, R. A. 1998. "Getting Down to (Biofilter) Basics". Biocycle 39(5):58-62)
6. Bohn, Hinrich, "Biofilter Technology Offers Emissions Abatement Option", Distillers Grain Quarterly, 3<sup>rd</sup> Qtr 2008, [http://www.ethanolproducer.com/dgq/article-print.jsp?article\\_id=1257](http://www.ethanolproducer.com/dgq/article-print.jsp?article_id=1257)
7. Delhoménie, Marie-Caroline; Heitz, Michèle, "Biofiltration of Air: A Review", Critical Reviews in Biotechnology, 1549-7801, Volume 25, Issue 1, 2005, Pages 53 – 72
8. Boyette, R. Allen – E&A Environmental Consultants Inc., "Biofilter Economics and Performance", 1996, <http://www.p2pays.org/ref/12/11505.pdf>
9. Govind, Rakesh – PRD Tech Inc., White Paper - "Biofiltration: An Innovative Technology for the Future", 1999, <http://www.prdtechinc.com/PDF/PRDBIOFILTRER&DMAGAZINEPAPER.pdf>
10. South Coast Air Quality Management District, "Technology Assessment for: Proposed Rule 1133: Emission Reductions from Composting and Related Operations", March 22, 2002, [http://www.aqmd.gov/rules/doc/r1133/r1133\\_techassessment.pdf](http://www.aqmd.gov/rules/doc/r1133/r1133_techassessment.pdf)
11. Schmidt, David. Janni, Kevin. Nicolai, Richard. "Biofilter Design Information". Biosystems and Agricultural Engineering Update: BAEU-18, Revised March 2004. University of Minnesota Department of Biosystems and Agricultural Engineering, College of Agricultural, Food and Environmental Sciences, <http://www.manure.umn.edu/assets/baeu18.pdf>

*Note: The capital cost estimate obtained from article number 11 was ten times lower than the low-end of the cost estimates given in other sources listed above and the estimates from biofilter suppliers presented below and the operating cost estimate from this source was more than 100 times lower than the lowest the cost estimates given in the other sources listed above. Because of this significant difference in costs, the design of this biofilter was evaluated to determine if it would meet District and EPA standards for an add-on VOC control device. This preliminary evaluation is discussed below.*

Reference #11 describes a biofilter designed to reduce odors not total VOCs. The document recommends that an open-bed biofilter used to control exhaust from animal housing have a depth of 10-18 inches and an empty bed contact time of 3-5 seconds. For an open-bed biofilter used for VOC control, the recommended depth

and contact time are generally 3-5 feet and 30-60 seconds, respectively. The lower recommended depth is the result of limitations with typical exhaust fans used for ventilation in animal housing, which are not designed for the larger pressure drops that would be caused by a deeper biofilter bed. It is likely that the much smaller recommended contact time is related to the fact that the biofilter is only designed to reduce odors. Many odorous compounds are branched-chain volatile fatty acids (VFAs) that consist of large molecules with a strong tendency to adhere to any surfaces that they contact; thus shortening the contact time required to treat these compounds. Although VFAs are largely responsible for objectionable odors from agricultural facilities, recent studies have shown that alcohols comprise the majority of VOC emissions. The biofilter design recommended in the document would not be as effective for reducing alcohols or other VOCs which are more volatile and do not have a strong tendency to adhere to surfaces. The biofilter does not appear to be designed to handle the total flow rates from the animal housing but is probably intended to handle smaller flow rates from high-odor areas such as manure pits. Another limitation with the design is that there is no dedicated outlet to allow measurement and determination of control efficiency; thus there isn't any way to accurately assess if the biofilter is functioning properly. Because of the substantial deviation from established criteria for the design of biofilters for control of VOCs and the lack of information to support and quantify total VOC reductions from this particular design, the cost estimates associated with this design will be removed from further consideration. This design may be re-evaluated at a later time if the necessary information is provided or becomes available.

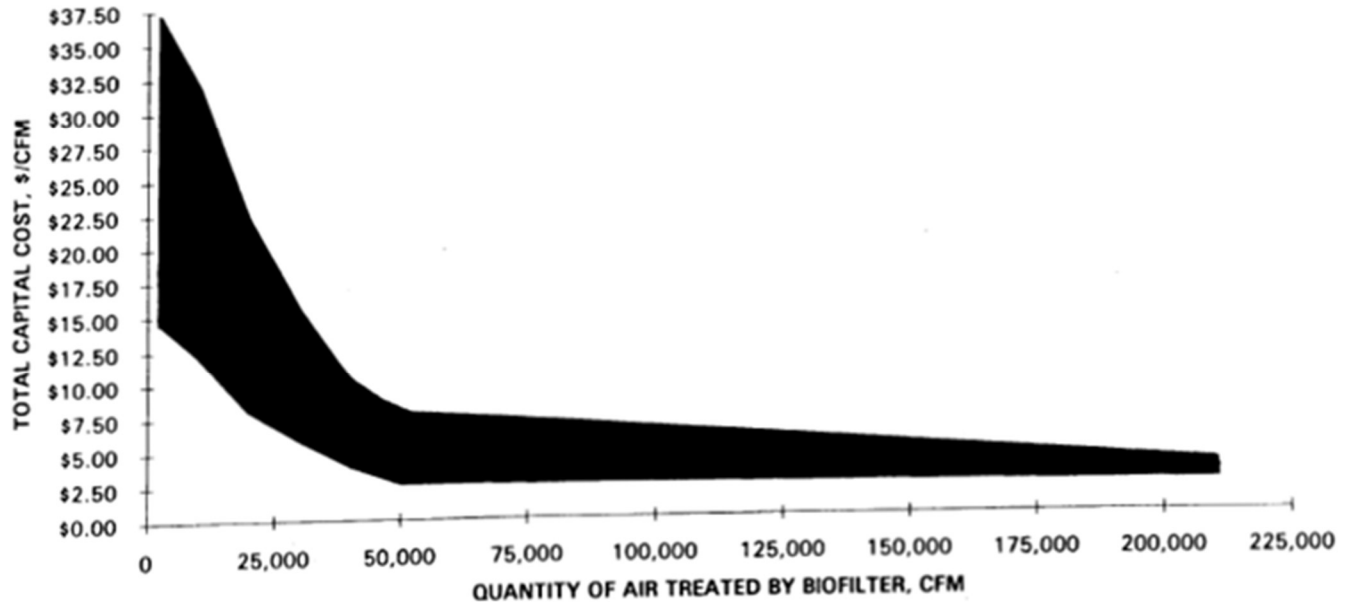
#### Reduced Capital Cost from Economy of Scale

The potential for reduced dollar-per-cfm capital costs was considered based on the large airflow rates that would be handled by biofilters for confined animal facilities. Based on the information reviewed, it was determined that there is not any additional cost reduction benefit related to economy of scale for biofilters handling such large flow rates.

The information available indicates significant reductions in biofilter costs per cfm as the flow rate treated increases to a few thousand cfm but diminishing reductions in cost after this until there is no further benefit. This is illustrated in the graph below. The graph shows no additional cost reductions benefits after approximately 50,000 cfm. Also, in a phone conversation with Jim Cash of MEGTEC Systems, Inc. he stated that economy of scale cost reductions for biofilter systems were insignificant after approximately 20,000 cfm. This was because multiple individual units are generally required to treat flows greater than this and each unit would still cost about the same. Additionally, single units, and sometimes even multiple units, handling such large flow rates would not be pre-fabricated but would have to be specially constructed on site, which can increase costs. This was also supported by the information provided by other biofilter suppliers. Therefore, any potential cost reduction benefits related to economy of scale have already been captured in the lower biofilter cost estimates given above and no additional cost benefits will be

realized at higher flow rates. As a result, the cost estimates for biofilters will be directly proportional to the airflow rate treated and the number of animals housed.

**FIGURE 1 BIOFILTER CAPITAL COST PER CFM OF AIR TREATED**



Boyette, R. Allen – E&A Environmental Consultants Inc., “Biofilter Economics and Performance”, 1996

### Cost Estimate for Biofilters for this Analysis

For purposes of this analysis, the following biofilter cost estimate will be used. The cost estimate is conservative and significantly lower than many of the capital cost estimates given in the references listed above.

Capital Cost (2019): \$3.00/cfm. Adjusted for the cost of inflation from 2019 to 2021 ([https://www.bls.gov/data/inflation\\_calculator.htm](https://www.bls.gov/data/inflation_calculator.htm) – 5.23%: \$3.16/cfm

### Capital Cost

The cost estimate for the biofilter includes the costs of the fans, media, plenum, engineering, and labor but does not include installation of the required ductwork. As stated above, a conservative capital cost of \$3.16 per cfm will be assumed in this cost analysis.

Based on the required airflow previously determined, the capital cost of the biofilter is calculated as follows:

$$\$3.16 \text{ cfm} \times 93,333 \text{ cfm} = \$294,932$$

Pursuant to District Policy APR 1305, section X (11/09/99), the cost for the purchase of the biofilter will be spread over the expected life of the system using the capital recovery equation. The biofilter media (e.g., soil, compost, wood chips) must be replaced after 3-5 years in order to remain effective. This is an additional cost that is not being considered in this cost analysis. Therefore, the expected life of the entire system (fans, media, plenum, etc) will be estimated at 10 years. A 4% interest rate is assumed in the equation and the assumption will be made that the equipment has no salvage value at the end of the ten-year cycle.

$$A = [P \times i(1+i)^n] / [(1+i)^n - 1]$$

Where: A = Annual Cost  
P = Present Value  
I = Interest Rate (4%)  
N = Equipment Life (10 years)

$$A = [\$2,162,600 \times 0.04(1.04)^{10}] / [(1.04)^{10} - 1]$$
$$= \mathbf{\$36,362/year}$$

#### VOC Emission Reductions for Biofiltration

The annual VOC Emission Reductions for the milking parlor is calculated as follows:

[Number of milk cows] x [Uncontrolled Milking Parlor VOC EF (lb/milk cow-year)] x [Capture Efficiency] x [Biofilter Control Efficiency]

$$= (2,700 \text{ milk cows}) \times (0.44 \text{ lb-VOC/milk cow-year}) \times (0.95) \times (0.80)$$
$$= \mathbf{903 \text{ lb-VOC/year}}$$

#### Cost of VOC Emission Reductions

$$\text{Cost of reductions} = (\$36,362/\text{year}) / [(903 \text{ lb-VOC/year})(1 \text{ ton}/2000 \text{ lb})]$$
$$= \mathbf{\$80,536/\text{ton of VOC reduced}}$$

As shown above, the capital cost alone for a biofilter would cause the cost of the VOC reductions to be greater than the \$23,600/ton cost effectiveness threshold of the District BACT policy. Therefore, this option is not cost effective and is being removed from consideration at this time.

### 3) Flush/Spray Milking Parlor Before, After, or During Milking Each Group of Cows

The technology/practice is currently used at all dairies and is therefore cost effective.

**e. Step 5 - Select BACT**

Since the higher-ranked options are not cost effective, the remaining Achieved in Practice option is determined to be BACT. Therefore, BACT for this operation is flush/spray milking parlor before, after, or during milking each group of cows. The facility has proposed to implement this option to satisfy BACT.



## **Top-Down BACT Analysis for Confined Animal Facility – Cow Housing – Freestall and Saudi Style Barns**

### **1. Top-Down BACT Analysis for PM<sub>10</sub> Emissions:**

This BACT discussion applies to the Shade Barns (Freestall Barns) #1-6.

#### **a. Step 1 - Identify All Possible Control Technologies**

The following options were identified as possible controls for PM<sub>10</sub> emissions from the cow housing (freestall barns and Saudi style barns):

- 1) Concrete Feedlanes and Walkways
- 2) Scraping of Exercise Pens with a Pull-Type Scraper

#### **Description of Control Technologies**

##### **1) Concrete Feedlanes and Walkways**

Constructing the feed lanes and walkways of concrete causes the dairy animals to spend an increased amount of time on a paved surface rather than dry dirt, thus reducing PM<sub>10</sub> emissions. Additionally, the manure that is deposited in the lanes and walkways will be flushed, which will prevent PM<sub>10</sub> emissions from drying manure.

##### **2) Scraping of Exercise Pens with a Pull-Type Scraper**

The surface of the freestall or Saudi Style exercise pens is composed of earth and deposited manure, both of which have the potential for particulate matter emissions either as a result of wind or animal movement. Frequent scraping of exercise pen surfaces will reduce the amount of dry manure on the corral surfaces that may be pulverized by the cows' hooves and emitted as PM<sub>10</sub>.

Increasing the frequency that exercise pen are scraped is expected to reduce emissions of gaseous pollutants from the exercise pen surface and PM that results from the cattle hooves acting on the surface of the exercise pen; however, requiring an excessively high frequency may negate these emission reductions because of the NO<sub>x</sub> and PM emitted from combustion of fuel for the tractor and PM emissions resulting from use of the tractor on the exercise pen surface.

#### **b. Step 2 - Eliminate Technologically Infeasible Options**

There are no technologically infeasible options.

**c. Step 3 - Rank Remaining Control Technologies by Control Effectiveness**

- 1) Concrete feed lanes and walkways;
- 2) Scraping of exercise pens every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions.

**d. Step 4 - Cost Effectiveness Analysis**

The options above are all achieved in practice; therefore a cost analysis is not required.

**e. Step 5 - Select BACT**

The applicant has proposed to implement the following options:

- 1) Concrete feed lanes and walkways;
- 2) Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions.

The proposal satisfies BACT for the Shade Barns (Freestall Barns) #1-6.

**2. Top-Down BACT Analysis for VOC Emissions:**

This BACT discussion applies to the Shade Barns (Freestall Barns) #1-6.

**a. Step 1 - Identify all control technologies**

The following options were identified as possible controls for VOC emissions from the cow housing (freestall barns and Saudi Style barns):

**Feed and Manure Management Practices**

- 1) Concrete feed lanes and walkways;
- 2) Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning lanes and walkways for support stock (heifers) at least once per day.
- 3) Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
- 4) Properly sloping exercise pens (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing exercise pens to maintain a dry surface;
- 5) Scraping exercise pens every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions; and
- 6) Rule 4570 Measures.

## **Description of Control Technologies**

### **1) Concrete Feed Lanes and Walkways**

Dairy animals spend a large amount of time on the feed lanes and walkways. Constructing these areas of concrete will reduce particulate matter emissions by having the animals spend more time on a paved surface rather than dry dirt. The concrete lanes and walkways create an avenue for the flush or scrape manure removal systems. The flush system will further reduce particulate matter emissions and will also reduce VOC and ammonia emissions (see below).

### **2) Frequent Cleaning of Lanes and Walkways**

Many dairy operations use flush or scrape systems to remove manure from the freestall or Saudi-style barn lanes and walkways. When dairies use a flush system, a large volume of water is introduced at the head of the paved area of the freestall or Saudi-style barn, and the cascading water removes the manure. The required volume of flush water varies with the size and slope of the area to be flushed. When dairies use a scrape system for manure management, manure is typically scraped from the cow housing lanes using a tractor or skid steer with a scraping attachment, or using an automatic mechanical scraper. The automatic scraper usually consists of a hinged v-shaped scraper driven by a cable or chain. The mechanical scraper is periodically dragged forward to draw manure to the end of a lane. After completing a pass, the chain or cable reverses direction and pulls the scraper back in the opposite direction. The scraped manure is either temporarily stored in a pile where liquids are allowed to drain off, or loaded onto a truck or tractor for transport or land application. The freestall or Saudi style barn lanes for milk and dry cows are typically flushed or scraped twice per day, but the cleaning frequency can vary between one to four times per day. The lanes for support stock are usually flushed or scraped once per day or less frequently.

In addition to cleaning the lanes and walkways, the flush and scrape systems also serve as an emission control for reducing VOC emissions. The manure deposited in the lanes, which is a source of VOC emissions, is removed from the cow housing area by the flush or scrape system. Flush systems also reduce PM<sub>10</sub> and ammonia emissions. Additionally, many of the VOCs emitted from fresh cow manure, such as alcohols (ethanol and methanol) and many Volatile Fatty Acids (VFAs), are highly soluble in water. Therefore, when a flush system is used, a large percentage of these compounds will dissolve in the flush water and will not be emitted from the cow housing permit unit. The flush water can then carry the manure and the dissolved volatile compounds to an anaerobic treatment lagoon or other manure stabilization process for treatment.

It must be noted that the system for cleaning the lanes and walkways will only control the VOCs emitted from the manure it will have little or no effect on enteric emissions produced from the cows' digestive processes. As stated above, the lanes and walkways in the cow housing areas are typically cleaned twice per day.

Cleaning the lanes four times per day will increase the frequency that manure is removed from the cow housing permit unit. Although the control efficiency for VOCs may actually be much higher, increasing the cleaning frequency of the lanes will be conservatively assumed to have a control efficiency of 10% for VOCs emitted from manure until better data becomes available.

### 3) Animals Fed in Accordance with (NRC) or other District-Approved Guidelines

Nutritional management of dairy feed is routinely practiced to improve milk production and herd health. The potential for VOC emissions can be reduced by reducing the quantity of undigested nutrients in the manure. Many of the VOCs emitted from Confined Animal Facilities, including dairies, originate from the decomposition of undigested protein in animal waste.<sup>4</sup> This undigested protein also produces ammonia and hydrogen sulfide emissions. The level of microbial action in the manure corresponds to the level of organic nitrogen content in the manure; the lower the level of nitrogen the lower the level of microbial action and the lower the production of VOCs, ammonia, and hydrogen sulfide.

A diet that is formulated to feed proper amounts of ruminantly degradable protein will result in improved nitrogen utilization by the animal and corresponding reduction in urea and organic nitrogen content of the manure, which will reduce the production of VOCs and ammonia. The latest National Research Council (NRC) guidelines for the selection of an optimal bovine diet should be followed to the maximum extent possible. The diet recommendations made in this publication seek to achieve the maximum uptake of protein by the animal and the minimum carryover of nitrogen into the manure.

Based on very limited data (Klaunser, 1998, *J Prod Agric*), diet manipulation decreased nitrogen excretion by 34% while improving milk production. Up to 70% of excess nitrogen is lost off of the farm through volatilization, denitrification and leaching. Because of limited research, feeding dairy animals in accordance with National Research Council (NRC) or other District-approved guidelines will be assumed to have a conservative control efficiency of only 5-10% for both enteric VOC emissions from dairy animals and VOC emissions from manure.

### 4) Properly sloping exercise pens

Accumulation of water on exercise pen surfaces, due to rain or on-farm activities, could result in anaerobic conditions and thereby increase emissions. Keeping exercise pen surfaces dry and properly aerated, on the other hand, promotes the aerobic conditions that reduce emissions. Proper slope design is therefore required to ensure that drainage of any water deposited on the exercise pen surfaces will be as rapid as possible.

---

<sup>4</sup> "Emissions of Volatile Organic Compounds Originating from UK Livestock Agriculture", Hobbs, P.J. 2004 – Journal of the Science of Food and Agriculture

### 5) Scraping of Exercise Pens with a Pull-Type Scraper

Frequent scraping the freestall or Saudi style barn exercise pens will reduce the amount of manure on the surfaces, which will reduce VOC and ammonia emissions resulting from decomposition of this manure. This practice will also provide a uniform surface, reducing anaerobic conditions on the surface, which will reduce gaseous pollutants from this area. The frequency that exercise pens are scraped at dairies can vary from as little as once a year to every week.

Increasing the frequency that exercise pens are scraped is expected to reduce emissions of gaseous pollutants from the surface and PM that results from the cattle hooves acting on the surface of the exercise pens; however, requiring an excessively high frequency may negate these emission reductions because of the NO<sub>x</sub> and PM emitted from combustion of fuel for the tractor and PM emissions resulting from use of the tractor on the exercise pen surface.

### **b. Step 2 - Eliminate Technologically Infeasible Options**

There are no technologically infeasible options.

### **c. Step 3 - Rank remaining options by control effectiveness**

All the options identified in step 1 are assumed to each have the same control effectiveness:

#### Feed and Manure Management Practices

- 1) Concrete feed lanes and walkways;
- 2) Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning lanes and walkways for support stock (heifers) at least once per day.
- 3) Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
- 4) Properly sloping exercise pens (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing exercise pens to maintain a dry surface;
- 5) Scraping exercise pens every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions; and
- 6) Rule 4570 Measures.

### **d. Step 4 - Cost Effectiveness Analysis**

The options above are all achieved in practice; therefore a cost analysis is not required.

### **e. Step 5 - Select BACT**

The applicant has proposed to implement the following options:

- 1) Concrete feed lanes and walkways;
- 2) Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning lanes and walkways for support stock (heifers) at least once per day.
- 3) Feeding all animals in accordance with NRC or other District-approved guidelines;
- 4) Properly sloping exercise pens (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing exercise pens to maintain a dry surface ;
- 5) Scraping exercise pens every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions; and
- 6) Rule 4570 Measures.

The proposal satisfies BACT for the Shade Barns (Freestall Barns) #1-6.

### **3. Top-Down BACT Analysis for NH<sub>3</sub> Emissions**

This BACT discussion applies to the Shade Barns (Freestall Barns) #1-6.

#### **a. Step 1 - Identify all control technologies**

The following management practices have been identified as possible control options for the NH<sub>3</sub> emissions from the cow housing (freestall barns and Saudi style barns):

Feed and Manure Management Practices

- 1) Concrete feed lanes and walkways;
- 2) Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning lanes and walkways for support stock (heifers) at least once per day.
- 3) Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
- 4) Properly sloping exercise pens (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing exercise pens to maintain a dry surface; and
- 5) Scraping exercise pens every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions; and

## **Description of Control Technologies**

### **1) Concrete Feed Lanes and Walkways**

Dairy animals spend a large amount of time on the feed lanes and walkways. Constructing these areas of concrete will reduce particulate matter emissions by having the animals spend more time on a paved surface rather than dry dirt. The concrete lanes and walkways create an avenue for the flush or scrape manure removal systems. The flush system will further reduce particulate matter emissions and will also reduce VOC and ammonia emissions (see below).

### **2) Frequent Cleaning of Lanes and Walkways**

Many dairy operations use flush or scrape systems to remove manure from the freestall and Saudi-style lanes and walkways. When dairies use a flush system, a large volume of water is introduced at the head of the paved area of the freestall and Saudi style barn, and the cascading water removes the manure. The required volume of flush water varies with the size and slope of the area to be flushed. When dairies use a scrape system for manure management, manure is typically scraped from the cow housing lanes using a tractor or skid steer with a scraping attachment, or using an automatic mechanical scraper. The automatic scraper usually consists of a hinged v-shaped scraper driven by a cable or chain. The mechanical scraper is periodically dragged forward to draw manure to the end of a lane. After completing a pass, the chain or cable reverses direction and pulls the scraper back in the opposite direction. The scraped manure is either temporarily stored in a pile where liquids are allowed to drain off, or loaded onto a truck or tractor for transport or land application. The freestall and Saudi style lanes for milk and dry cows are typically flushed or scraped twice per day, but the cleaning frequency can vary between one to four times per day. The lanes for support stock are usually flushed or scraped once per day or less frequently.

In addition to cleaning the freestall and Saudi style lanes and walkways, the flush or scrape systems also serve as an emission control for reducing emissions. The manure deposited in the lanes, which is a source of NH<sub>3</sub> emissions, is removed from the cow housing area by the flush or scrape system. Additionally, ammonia is highly soluble in water. Therefore, when a flush system is used, a large portion of ammonia will be flushed away with the flush water and will not be emitted from the cow housing permit unit.

### **3) Animals fed in accordance with (NRC) or other District-approved Guidelines**

Nutritional management of dairy feed is routinely practiced to improve milk production and herd health. The potential for ammonia emissions can be reduced by reducing the amount of undigested nitrogen compounds in the manure. The level of microbial action in the manure corresponds to the level of organic nitrogen content in the manure; the lower the level of nitrogen the lower the level of microbial action and the lower the production of ammonia and VOCs.

A diet that is formulated to feed proper amounts of ruminantly degradable protein will result in improved nitrogen utilization by the animal and corresponding reduction in urea and organic nitrogen content of the manure, which will reduce the production of VOCs and ammonia. The latest National Research Council (NRC) guidelines for the selection of an optimal bovine diet should be followed to the maximum extent possible. The diet recommendations made in this publication seek to achieve the maximum uptake of protein by the animal and the minimum carryover of nitrogen into the manure.

#### 4) Properly sloping exercise pens

Accumulation of water on exercise pen surfaces, due to rain or on-farm activities, could result in anaerobic conditions and thereby increase emissions. Keeping exercise pen surfaces dry and properly aerated, on the other hand, promotes the aerobic conditions that reduce emissions. Proper slope design is therefore required to ensure that drainage of any water deposited on the exercise pen surfaces will be as rapid as possible.

#### 5) Scraping of Exercise Pens with a Pull-Type Scraper

Frequent scraping the freestall or Saudi style barn exercise pens will reduce the amount of manure on the surfaces, which will reduce VOC and ammonia emissions resulting from decomposition of this manure. This practice will also provide a uniform surface, reducing anaerobic conditions on the surface, which will reduce gaseous pollutants from this area.

Increasing the frequency that exercise pens are scraped is expected to reduce emissions of gaseous pollutants from the surface and PM that results from the cattle hooves acting on the surface of the exercise pens; however, requiring an excessively high frequency may negate these emission reductions because of the NO<sub>x</sub> and PM emitted from combustion of fuel for the tractor and PM emissions resulting from use of the tractor on the exercise pen surface.

### **b. Step 2 - Eliminate technologically infeasible options**

There are no technologically infeasible options.

### **c. Step 3 - Rank remaining options by control effectiveness**

All the options identified in step 1 are assumed to each have the same control effectiveness:

#### Feed and Manure Management Practices

- 1) Concrete feed lanes and walkways;
- 2) Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times



- per day and cleaning lanes and walkways for support stock (heifers) at least once per day.
- 3) Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
  - 4) Properly sloping exercise pens (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing exercise pens to maintain a dry surface; and
  - 5) Scraping exercise pens every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions; and

**d. Step 4 - Cost Effectiveness Analysis**

The options above are all achieved in practice; therefore a cost analysis is not required.

**e. Step 5 - Select BACT**

The applicant has proposed to implement the following options:

- 1) Concrete feed lanes and walkways;
- 2) Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning lanes and walkways for support stock (heifers) at least once per day.
- 3) Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
- 4) Properly sloping exercise pens (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing exercise pens to maintain a dry surface; and
- 5) Scraping exercise pens every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions; and

The proposal satisfies BACT for the Shade Barns (Freestall Barns) #1-6.

## **Top Down BACT Analysis for Confined Animal Facility – Liquid Manure Handling – Lagoon/Storage Ponds**

### **1. Top-Down BACT Analysis for VOC Emissions:**

This BACT discussion applies to the liquid manure handling system consisting of two lagoons and three storage ponds.

#### **a. Step 1 - Identify all control technologies**

The following options were identified as possible controls for VOC emissions from the lagoons in the liquid manure handling system:

- 1) Aerobic treatment lagoon or mechanically aerated lagoon;
- 2) Covered lagoon digester vented to a control device with minimum 95% control
- 3) Anaerobic treatment lagoon designed according to NRCS Guideline, and solids removal/separation system (mechanical separator(s) or settling basin(s)/weeping wall(s))

#### **Description of Control Technologies**

##### **1) Aerobic Treatment Lagoon or Mechanically Aerated Lagoon**

An aerobic lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of wastewater by microbes in the presence of oxygen (O<sub>2</sub>). The process of aerobic decomposition results in the conversion of organic compounds in the wastewater into carbon dioxide (CO<sub>2</sub>), and (H<sub>2</sub>O), nitrates, sulfates, and inert biomass (sludge). The process of aerobic digestion is sometimes referred to as nitrification (especially when discussing NH<sub>3</sub> transformation). Complete aerobic digestion (100% aeration) removes nearly all malodors and also virtually eliminates VOCs, H<sub>2</sub>S, and NH<sub>3</sub> emissions from liquid waste.

In completely aerated lagoons sufficient oxygen must be provided to sustain the aerobic microorganisms. NRCS Practice Standard Code 359 specifies that naturally aerobic lagoons have a minimum surface area determined by regional climate and daily Biological Oxygen Demand (BOD<sub>5</sub>) and requires the depth of naturally aerobic lagoons have a maximum depth no greater than five feet. For mechanically aerated lagoons NRCS Practice Standard Code 359 specifies that the aeration equipment shall provide a minimum of 1 pound of oxygen for each pound of daily BOD<sub>5</sub> loading. The mechanical aerators that provide the required oxygen may float on the lagoon surface or be submerged in the lagoon. Aeration can also be performed by injection of tiny air bubbles into the lagoon water, mixing of the lagoon water, or spraying of the water into the air. According to Dr. Ruihong Zhang, a researcher at the University of California, Davis, at least 95% VOC control can be achieved if the dissolved oxygen (DO) concentration of the liquid manure is 2.0 mg/L or more. However, the DO concentrations achieved in mechanically aerated lagoons treating manure are typically much less than this and will therefore have lower control efficiencies.

## 2) Covered Lagoon Digester Vented to a Control Device

Covered treatment lagoons are one type of anaerobic digester. An anaerobic digester is an enclosed basin or tank that is designed to facilitate the decomposition of wastewater by microbes in the absence of oxygen. The process of anaerobic decomposition results in the preferential conversion of organic compounds in the wastewater into methane (CH<sub>4</sub>), carbon dioxide (CO<sub>2</sub>), and water rather than intermediate metabolites (VOCs). The gas generated by this process is known as biogas, waste gas or digester gas. In addition to methane and carbon dioxide, biogas also contains small amounts of Nitrogen (N<sub>2</sub>), Oxygen (O<sub>2</sub>), Hydrogen Sulfide (H<sub>2</sub>S), and Ammonia (NH<sub>3</sub>). Biogas will also include trace amounts of various Volatile Organic Compounds (VOCs) that remain from incomplete digestion of the volatile solids in the incoming wastewater. The small amounts of undigested solids that remain after digestion are removed from the digester as sludge. Because biogas is mostly composed of methane, the main component of natural gas, the gas produced in the digester can be cleaned to remove H<sub>2</sub>S and other impurities and used as fuel. The captured biogas can be combusted in a flare or may be sent to a boiler or internal combustion engine, where the gas can be used to generate useful heat or electrical energy.

As stated above, the gas generated in the covered lagoon anaerobic digester can be captured and then sent to a suitable combustion device. During combustion, gaseous hydrocarbons are oxidized to form CO<sub>2</sub> and water. The VOCs emitted from the liquid manure in the covered lagoon can be reduced by 95% with the use of an appropriate combustion device. Therefore, installation of the digester will lower the total VOCs emitted from the liquid manure from the liquid manure handling system. Although the control efficiency of the gas captured from the primary lagoon is expected to be 95% or more, the overall control efficiency is expected to be less since VOCs will also be emitted from the storage pond and as fugitive emissions. For this analysis, the overall control efficiency is assumed to be 80% of the emissions that would have been emitted from the lagoon system.

## 3) Anaerobic Treatment Lagoon Designed to Meet Natural Resources Conservation Service (NRCS) Standards and solids removal/separation system

### Anaerobic Treatment Lagoon

An anaerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of manure by microbes in the absence of oxygen. The process of anaerobic decomposition results in the preferential conversion of organic compounds in the wastewater into methane (CH<sub>4</sub>), carbon dioxide (CO<sub>2</sub>), and water rather than intermediate metabolites (VOCs). The National Resource Conservation Service (NRCS) California Field Office Technical Guide Code 359 - Waste Treatment Lagoon specifies the following criteria for the design of anaerobic treatment lagoons:

- Required volume: The minimum design volume should account for all potential sludge, treatment, precipitation, and runoff volumes.

- Treatment period: retention time of the material in the lagoon shall be the time required to provide environmentally safe utilization of waste. The minimum hydraulic retention time for a covered lagoon in the San Joaquin Valley is about 38 days.
- Waste loading: shall be based on the maximum daily loading considering all waste sources that will be treated by the lagoon. The loading rate is typically based on volatile solids (VS) loading per unit of volume. The suggested loading rate for the San Joaquin Valley is 6.5-11 lb-VS/1000 ft<sup>3</sup>/day depending on separation and type of system.
- The operating depth of the lagoon shall be 12 feet or greater. Maximizing the depth of the lagoon minimizes the surface area, which in turn minimizes the cover size and cost. Increasing the lagoon depth has the following advantages:
  - Minimizes surface area in contact with the atmosphere, thus reducing surface available to convection, evaporation
  - Smaller surface areas provide a more favorable and stable environment for methane bacteria
  - Better mixing of lagoon due to rising gas bubbles
  - Requires less land
  - More efficient for mechanical mixing

The lagoon design shall also consider location, soils and foundation, erosion, and depth to groundwater as required by the regional water control board.

The NRCS guideline suggests that this system consist of two cells, a treatment lagoon (primary lagoon) and a storage pond (secondary lagoon). The first stage of the lagoon system is the biological treatment stage and is designed with a constant liquid level to stabilize the anaerobic digestion. The effluent from the first stage overflows into a second lagoon designed for liquid storage capacity. Effluent from the second lagoon is used in the flush lanes and for the irrigation of cropland. The secondary (overflow) lagoon acts as the storage pond, which can be emptied when necessary. However, a single lagoon can also be considered an anaerobic lagoon as long as all the criteria are met and that the liquid manure is not drawn less than 6 feet at any time.

A properly designed anaerobic treatment lagoon will reduce the Volatile Solids (VS) by at least 50% and will reduce the biological oxygen demand (BOD), which will result in greater efficiency in degrading compounds that contain carbon into methane and carbon dioxide rather than VOCs. Although, the VS reduction is expected to be at least 50%, a conservative control efficiency of 40% will be assumed for anaerobic treatment lagoons, until better data becomes available.

### Solids Removal/Separation

#### Mechanical Separation

Mechanical separators separate solids out from the liquid/slurry stream. There are many different versions of separators on the market. The percentage of separation

varies depending on screen size and type of separation system. However, a 50% solid removal efficiency is used as a general rule of thumb. Although the separation efficiency can be improved by better separation or addition of separators or screens, it does not necessarily result in an increase in VOC emission reduction. The type of solids removed are generally non-digestible (lignins, cellulose, etc.) materials that do not easily digest in the lagoons; the amount of volatiles solids that end up in the lagoon will most likely not change even though there is an increase in solid removal efficiency. In addition, there is no data that links higher removal efficiency with an increase in VOC emission reduction.

#### Settling Basin Separation

The purpose of settling basin separation is to remove the fibrous materials prior to the liquid manure entering the lagoon. By removing the most fibrous material from the liquid stream prior to entering the pond, it is anticipated that the amount of intermediate metabolites released during digestion in the pond may be reduced. Removal of the fibrous material allows for more complete digestion in the pond and lower emissions.

Solids remaining in the settling basin are left to dry and then are removed. The separated solids can be immediately incorporated into cropland or spread in thin layers, harrowed, and dried.

The control efficiency of settling basins is not known at this time. Separation systems in general have the potential of reducing emissions from the lagoon system by allowing for more complete digestion to take place in the lagoon through the prior removal of indigestible solids. Settling basins dewater predominantly through draining. Some evaporation can occur (depending on weather), but the settling basin is drained, thereby creating a biofilter (crust) over the top of the basin.

#### Weeping Wall Separation

The purpose of weeping wall separation is to remove the fibrous materials prior to the liquid manure entering the lagoon and enhance the dewatering surface when compared to any other separation pit, basin, or pond. By removing the most fibrous material from the liquid stream prior to entering the pond, it is anticipated that the amount of intermediate metabolites released during digestion in the pond will be reduced. Removal of the fibrous material allows for more complete digestion in the pond and lower emissions. With weeping walls the effluent is allowed to weep through the slots between boards or screens while the solids are retained. Liquid manure enters the structure and slowly drains through the solids in the structure to dewater at a face. Solids from the structure can be hauled directly out of the structure if farming practices permit or they can be further dried for future use. Weeping wall systems can remove 60% of the solids in manure.

The emissions control efficiency of weeping walls is not known at this time. Separation systems in general have the potential of reducing emissions from the lagoon system by allowing for more complete digestion to take place through the removal of indigestible solids.

**b. Step 2 - Eliminate technologically infeasible options**

No technologically feasible options were removed.

**c. Step 3 - Rank remaining options by control effectiveness**

- 1) Aerobic Treatment Lagoon or Mechanically Aerated Lagoon (95% VOC control efficiency)
- 2) Covered Lagoon Digester Vented to a Control Device (80% VOC control efficiency)
- 3) Anaerobic Treatment Lagoon Designed to Meet Natural Resources Conservation Service (NRCS) Standards (40% VOC control efficiency) and solids removal/separation

**d. Step 4 - Cost Effectiveness Analysis**

1) Aerobic Treatment Lagoon or Mechanically Aerated Lagoon

The following analysis is based on the treatment of manure from 15,120 milk cows in naturally aerobic lagoons and mechanically aerated lagoons.

Space Requirement for a Naturally Aerobic Lagoon Treating Manure from 15,120 Dairy Cows

NRCS Practice Standard Code 359 requires that naturally aerobic lagoons be designed to have a minimum treatment surface area as determined on the basis of daily BOD<sub>5</sub> loading per unit of lagoon surface. The standard specifies that the maximum loading rate of naturally aerobic lagoons shall not exceed the loading rate indicated by the NRCS Agricultural Waste Management Field Handbook (AWMFH) or the maximum loading rate according to state regulatory requirements, whichever is more stringent. According to Figure 10-30 (August 2009) of the latest version of the AWMFH, the maximum aerobic lagoon loading rate for the San Joaquin Valley is 45 - 55 lb-BOD<sub>5</sub>/acre-day. According to Table 4-5 (March 2008) of the NRCS AWMFH, the total daily manure produced by a milk cow will have 2.9 lb-BOD<sub>5</sub>/day. Assuming that 80% of the manure will be flushed to the lagoon system, the minimum lagoon surface area required for a naturally aerobic lagoon treating manure from 15,120 milk cows in the San Joaquin Valley can be calculated as follows:

$$\begin{aligned} \text{BOD}_5 \text{ loading (lb/day)} &= 2,700 \text{ milk cows} \times 2.9 \text{ lb-BOD}_5/\text{cow-day} \times 0.80 \\ &= 6,264 \text{ lb-BOD/day} \end{aligned}$$

$$\begin{aligned} \text{Minimum Surface Area (acres) in areas of the San Joaquin Valley with a} \\ \text{maximum loading rate of 55 lb-BOD}_5/\text{acre-day} &= \\ 16,565 \text{ lb-BOD}_5/\text{day} \div 55 \text{ lb-BOD}_5/\text{acre-day} &= 301 \text{ acres} \end{aligned}$$

$$\begin{aligned} \text{Minimum Surface Area (acres) in areas of the San Joaquin Valley with a} \\ \text{maximum loading rate of 45 lb-BOD}_5/\text{acre-day} &= \\ 16,565 \text{ lb-BOD}_5/\text{day} \div 45 \text{ lb-BOD}_5/\text{acre-day} &= 368 \text{ acres} \end{aligned}$$

As shown above the minimum surface area required for a naturally aerobic lagoon treating manure from 2,700 milk cows in the San Joaquin Valley would range from approximately 301 to 368 acres. This does not include the additional surface area that would be required to treat manure from support stock onsite. Based on the space requirements alone it is clear that this option cannot reasonably be required and no further analysis is needed.

#### Analysis for a Mechanically Aerated Lagoon Treating Manure from 2,700 Dairy Cows

As discussed above, the very large space requirements for naturally aerobic lagoons cause this option to be infeasible for most confined animal facilities. Mechanically aerating a lagoon can achieve some of the benefits of a naturally aerobic lagoon without the large space requirements. However, the costs of energy for complete aeration have also caused this option to be infeasible. The amount of energy required for aeration is based on the amount of volatile solids excreted by animals that must be treated; thus, this cost will be directly proportional to the number of animals at a site. The following analysis will determine the cost of emission reductions that can be achieved from a mechanically aerated lagoon treating manure from 2,700 milk cows.

#### Biological Oxygen Demand (BOD<sub>5</sub>)

In order to effectively calculate the costs of this control option, the energy requirement for complete aeration must be determined. It should be noted that approximately 1.5 to 2.5 pounds of oxygen is required to digest 1 pound of Biological Oxygen Demand (BOD<sub>5</sub>) with additional oxygen required for conversion of ammonia to nitrate (nitrification). It is generally accepted that at least twice the BOD should be provided for complete aeration. According to Dr. Ruihong Zhang of the University of California, Davis, 2.4 lbs (1.1 kg) of oxygen (O<sub>2</sub>) per cow must be provided each day for removal of BOD and an additional 3 lbs (1.4 kg) per cow for oxidation of 70% of the nitrogen.

22

The proposed rule specifies that an aerobic lagoon be designed and operated in accordance with NRCS Practice Standard Code 359. NRCS Practice Standard Code 359 requires that mechanically aerated lagoons use aeration equipment that provides a minimum of one pound of oxygen for each pound of daily BOD loading. As discussed above, the total daily manure produced by a milk cow will have a BOD<sub>5</sub> of 2.9 lb/day and a lagoon handling flushed manure from 15,120 milk cows will have a loading rate of approximately 6,2654 lb-BOD<sub>5</sub>/day (2,847 kg-BOD<sub>5</sub>/day).

#### Energy Requirement a Mechanically Aerated Lagoon Treating Manure from 2,700 Milk Cows:

Based on the data gathered in a UC Davis study on aerator performance for wastewater lagoons, aeration efficiencies for mechanical aerators ranged from 0.10 to 0.68 kg of oxygen provided per kW-hr of energy utilized. The most efficient aerator tested that had been installed in dairy lagoons had an aeration efficiency of 0.49 kg-O<sub>2</sub>/kW-hr. These efficiency tests were performed in clean water and lower aeration

efficiencies are expected in liquid manure because of the significant amount of solids that it contains. The yearly energy requirement mechanically aerated lagoon treating flushed manure from 2,700 milk cows is calculated as follows:

High Efficiency Aerator

$$2,847 \text{ kg-BOD}_5/\text{day} \div (0.68 \text{ kg-O}_2/\text{kW-hr}) \times (365 \text{ day/year}) = 1,528,169 \text{ kW-hr/year}$$

Low Efficiency Aerator

$$2,847 \text{ kg-BOD}_5/\text{day} \div (0.10 \text{ kg-O}_2/\text{kW-hr}) \times (365 \text{ day/year}) = 10,391,550 \text{ kW-hr/year}$$

Cost of Electricity for a Mechanically Aerated Lagoon Treating Manure from 2,700 Milk Cows:

The cost for electricity will be based upon the average price for industrial electricity in California as of May 2023, as taken from the Energy Information Administration (EIA) Website:

[http://www.eia.gov/electricity/monthly/epm\\_table\\_grapher.cfm?t=epmt\\_5\\_06\\_b](http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_06_b)

Average Cost for electricity = \$0.1638/kW-hr

The electricity costs for complete aeration are calculated as follows:

Low Cost Estimate (High Efficiency Aerator)

$$1,528,169 \text{ kW-hr/year} \times \$0.1638/\text{kW-hr} = \$250,314/\text{year}$$

High Cost Estimate (Low Efficiency Aerator)

$$10,391,550 \text{ kW-hr/year} \times \$0.1638/\text{kW-hr} = \$1,702,136/\text{year}$$

VOC Emission Reductions from a Mechanically Aerated Lagoon Treating Manure from 2,700 Milk Cows:

It will be conservatively assumed that a mechanically aerated lagoon providing 1 lb of oxygen for every 1 lb of BOD<sub>5</sub> loading will control 90% of the VOC emissions from the lagoon/storage pond. However, as noted above, it is generally accepted that the oxygen provided should be twice the BOD<sub>5</sub> loading rate for complete aeration; therefore, the actual control from providing 1 lb of oxygen for every 1 lb of BOD<sub>5</sub> loading is probably closer to 50%.

The annual VOC Emission Reductions for mechanically aerated lagoon(s) treating the manure from 2,700 milk cows are calculated as follows and shown in the table below:

$$[\text{Number of cows}] \times [\text{Lagoon/Storage Pond VOC EF (lb/cow-year)}] \times [\text{Complete Aeration Control Efficiency for Lagoon/Storage Pond}]$$



VOC Reductions for a Mechanically Aerated Lagoon							
Type of Animal	# of cows	x	Lagoon EF (lb/cow-yr)	x	Control (%)	=	lb-VOC/yr
Milk Cow (freestall)	2,700	x	1.3	x	90%	=	<b>3,159</b>

Cost of VOC Emission Reductions

Low Estimate = (\$250,314/year)/[(3,159 lb-VOC/year)(1 ton/2000 lb)]  
 = \$158,477/ton of VOC reduced

High Estimate = (\$1,702,136/year)/[(3,159 lb-VOC/year)(1 ton/2000 lb)]  
 = \$1,077,642/ton of VOC reduced

As shown above, the electricity cost alone for a mechanically aerated lagoon would cause the cost of the VOC reductions (\$158,477/ton) to be greater than the \$23,600/ton cost effectiveness threshold of the District BACT policy. This cost does not include the additional electricity cost for nitrification that would naturally occur as the lagoons were aerated or equipment costs. Even without these costs, this control technology would not be cost effective.

2) Covered Anaerobic Digester Lagoon

The facility has proposed to construct a covered anaerobic digester lagoon that will be used to treat all the liquid manure at the dairy. However, instead of venting the biogas (emissions) to a control device with minimum 95% VOC control efficiency, the facility will transport the biogas offsite through a pipeline system. The District assumes 100% of the biogas is collected and transported offsite and as a result, there are no additional combustion emissions from a control device. The District considers the proposed covered anaerobic digester lagoon to be equivalent to the Technologically Feasible option. Since the facility has proposed to implement this option, a cost effectiveness analysis is not required.

**e. Select BACT**

The facility has proposed to implement a covered anaerobic digester lagoon. As previously discussed above, the proposed option is equivalent to the current Technologically Feasible option. Therefore, BACT is satisfied.

**2. Top-Down BACT Analysis for NH<sub>3</sub> Emissions:**

This BACT discussion applies to the liquid manure handling system consisting of one lagoon and one covered anaerobic digester lagoon.

**a. Step 1 - Identify all control technologies**

The following options were identified as possible controls for NH<sub>3</sub> emissions from the lagoons in the liquid manure handling system:

- 1) All animal fed in accordance with NRCS or other District-approved guidelines

## **Description of Control Technologies**

### 1) Animals fed in accordance with NRCS or other District-approved Guidelines

Nutritional management of dairy feed is routinely practiced to improve milk production and herd health. The potential for ammonia emissions can be reduced by reducing the amount of undigested nitrogen compounds in the manure. The level of microbial action in the manure corresponds to the level of organic nitrogen content in the manure; the lower the level of nitrogen the lower the level of microbial action and the lower the production of ammonia and VOCs.

A diet that is formulated to feed proper amounts of ruminantly degradable protein will result in improved nitrogen utilization by the animal and corresponding reduction in urea and organic nitrogen content of the manure, which will reduce the production of VOCs and ammonia. The latest National Research Council (NRC) guidelines for the selection of an optimal bovine diet should be followed to the maximum extent possible. The diet recommendations made in this publication seek to achieve the maximum uptake of protein by the animal and the minimum carryover of nitrogen into the manure, which will reduce ammonia emissions from liquid manure applied to cropland.

#### **b. Step 2 - Eliminate technologically infeasible options**

There are no technologically infeasible options.

#### **c. Step 3 - Rank remaining options by control effectiveness**

There is only one BACT option, therefore, ranking is unnecessary.

#### **d. Step 4 - Cost Effectiveness Analysis**

The only option listed above is achieved in practice; therefore a cost analysis is not required.

#### **e. Step 5 - Select BACT**

The facility has proposed to implement this option to satisfy BACT.

## **Top Down BACT Analysis for Confined Animal Facility – Liquid Manure Handling – Liquid/Slurry Manure Land Application**

### **1. Top-Down BACT Analysis for VOC Emissions:**

This BACT discussion applies to the liquid/slurry manure taken from the liquid manure handling system and applied to land.

#### **a. Step 1 - Identify all control technologies**

The following options were identified as possible controls for VOC emissions from the liquid/slurry land application:

- 1) Irrigation of crops using liquid/slurry manure from an aerobic treatment lagoon or mechanically aerated lagoon
- 2) Irrigation of crops using liquid/slurry manure from a holding/storage pond after being treated in a covered lagoon/digester
- 3) Irrigation of crops using liquid/slurry manure from the secondary lagoon/holding/storage pond where preceded by an uncovered anaerobic treatment lagoon designed to meet Natural Resources Conservation Service (NRCS) standards

#### **Description of Control Technologies**

- 1) Irrigation of crops using liquid/slurry manure from an aerobic treatment lagoon or mechanically aerated lagoon

An aerobic lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of wastewater by microbes in the presence of oxygen ( $O_2$ ). The process of aerobic decomposition results in the conversion of organic compounds in the wastewater into carbon dioxide ( $CO_2$ ), and ( $H_2O$ ), nitrates, sulfates, and inert biomass (sludge). The process of aerobic digestion is sometimes referred to as nitrification (especially when discussing  $NH_3$  transformation). Complete aerobic digestion (100% aeration) removes nearly all malodors and also virtually eliminates VOCs,  $H_2S$ , and  $NH_3$  emissions from liquid waste.

In completely aerated lagoons, sufficient oxygen must be provided to sustain the aerobic microorganisms. NRCS Practice Standard Code 359 specifies that naturally aerobic lagoons have a minimum surface area determined by regional climate and daily Biological Oxygen Demand ( $BOD_5$ ) and requires the depth of naturally aerobic lagoons have a maximum depth no greater than five feet. For mechanically aerated lagoons NRCS Practice Standard Code 359 specifies that the aeration equipment shall provide a minimum of 1 pound of oxygen for each pound of daily  $BOD_5$  loading. The mechanical aerators that provide the required oxygen may float on the lagoon surface or be submerged in the lagoon. Aeration can also be performed by injection of tiny air bubbles into the lagoon water, mixing of the lagoon water, or spraying of the water into the air. According to Dr. Ruihong Zhang, a researcher at the University of California, Davis, at

least 95% VOC control can be achieved if the dissolved oxygen (DO) concentration of the liquid manure is 2.0 mg/L or more. However, the DO concentrations achieved in mechanically aerated lagoons treating manure are typically much less than this and will therefore have lower control efficiencies.

2) Irrigation of crops using liquid/slurry manure from a holding/storage pond after being treated in a covered lagoon/digester

This practice would only allow the irrigation of liquid manure to cropland from the secondary lagoon after proper treatment has taken place in a covered lagoon/anaerobic digester. Covered treatment lagoons are one type of anaerobic digester. An anaerobic digester is an enclosed basin or tank that is designed to facilitate the decomposition of wastewater by microbes in the absence of oxygen. The process of anaerobic decomposition results in the preferential conversion of organic compounds in the wastewater into methane (CH<sub>4</sub>), carbon dioxide (CO<sub>2</sub>), and water rather than intermediate metabolites (VOCs). The gas generated by this process is known as biogas, waste gas or digester gas. In addition to methane and carbon dioxide, biogas also contains small amounts of Nitrogen (N<sub>2</sub>), Oxygen (O<sub>2</sub>), Hydrogen Sulfide (H<sub>2</sub>S), and Ammonia (NH<sub>3</sub>). Biogas will also include trace amounts of various Volatile Organic Compounds (VOCs) that remain from incomplete digestion of the volatile solids in the incoming wastewater. The small amounts of undigested solids that remain after digestion are removed from the digester as sludge.

Assumptions:

- 80% of the Volatile Solids (VS) can be removed from the covered anaerobic digestion process.
- 20% of the remaining VS will be assumed to be in the manure during land application. This will be considered worst-case because further digestion of the VS is likely to occur from the secondary lagoon.
- As a worst-case scenario, it will be assumed that all remaining VS will be emitted as VOCs during land application.

Since 80% of the VS is removed or digested in the covered lagoon and the remaining VS have been assumed to be emitted as VOCs, a control efficiency of 80% can be applied when applying liquid manure to land from a holding/storage pond after a covered lagoon.

3) Irrigation of crops using liquid/slurry manure from the secondary lagoon/holding/storage pond where preceded by an uncovered anaerobic treatment lagoon designed to meet Natural Resources Conservation Service (NRCS) standards

This practice would only allow the irrigation of liquid manure to cropland from the secondary lagoon after going through a treatment phase in an anaerobic treatment lagoon, or the primary lagoon.

An anaerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of manure by microbes in the absence of oxygen. The process of anaerobic decomposition results in the preferential conversion of organic compounds

in the wastewater into methane (CH<sub>4</sub>), carbon dioxide (CO<sub>2</sub>), and water rather than intermediate metabolites (VOCs).

The National Resource Conservation Service (NRCS) California Field Office Technical Guide Code 359 - Waste Treatment Lagoon specifies the following criteria for the design of anaerobic treatment lagoons:

- Required volume: The minimum design volume should account for all potential sludge, treatment, precipitation, and runoff volumes.
- Treatment period: retention time of the material in the lagoon shall be the time required to provide environmentally safe utilization of waste. The minimum hydraulic retention time for a covered lagoon in the San Joaquin Valley is about 38 days.
- Waste loading: shall be based on the maximum daily loading considering all waste sources that will be treated by the lagoon. The loading rate is typically based on volatile solids (VS) loading per unit of volume. The suggested loading rate for the San Joaquin Valley is 6.5-11 lb-VS/1000 ft<sup>3</sup>/day depending on separation and type of system.
- The operating depth of the lagoon shall be 12 feet or greater. Maximizing the depth of the lagoon minimizes the surface area, which in turn minimizes the cover size and cost. Increasing the lagoon depth has the following advantages:
  - Minimizes surface area in contact with the atmosphere, thus reducing surface available to convection, evaporation
  - Smaller surface areas provide a more favorable and stable environment for methane bacteria
  - Better mixing of lagoon due to rising gas bubbles
  - Requires less land
  - More efficient for mechanical mixing

The lagoon design shall also consider location, soils and foundation, erosion, and depth to groundwater as required by the regional water control board.

The NRCS guideline suggests that this system consist of two cells, a treatment lagoon (primary lagoon) and a storage pond (secondary lagoon). The first stage of the lagoon system is the biological treatment stage and is designed with a constant liquid level to stabilize the anaerobic digestion. The effluent from the first stage overflows into a second lagoon designed for liquid storage capacity. Effluent from the second lagoon is used in the flush lanes and for the irrigation of cropland. The secondary (overflow) lagoon acts as the storage pond, which can be emptied when necessary.

A properly designed anaerobic treatment lagoon will reduce the Volatile Solids (VS) by at least 50% and will reduce the biological oxygen demand (BOD), which will result in greater efficiency in degrading compounds that contain carbon into methane and carbon dioxide rather than VOCs. Since 50% of the Volatile Solids in the liquid manure will have been removed or digested in the lagoon, there will be less Volatile Solids remaining in the effluent to decompose into VOCs. Although, the Volatile Solids

reduction will be at least 50%, to be conservative a 40% control will be applied to irrigation from a storage pond after an anaerobic treatment lagoon.

**b. Step 2 - Eliminate technologically infeasible options**

No technologically feasible options were removed.

**c. Step 3 - Rank remaining options by control effectiveness**

- 1) Irrigation of crops using liquid/slurry manure from an aerobic treatment lagoon or mechanically aerated lagoon (95% VOC control efficiency)
- 2) Irrigation of crops using liquid/slurry manure from a holding/storage pond after being treated in a covered lagoon/digester (80% VOC control efficiency)
- 3) Irrigation of crops using liquid/slurry manure from the secondary lagoon/holding/storage pond where preceded by an uncovered anaerobic treatment lagoon designed to meet Natural Resources Conservation Service (NRCS) standards (40% VOC control efficiency)

**d. Step 4 - Cost Effectiveness Analysis**

- 1) Irrigation of crops using liquid/slurry manure from an aerobic treatment lagoon or mechanically aerated lagoon

The following analysis is based on the treatment of manure from 2,700 milk cows in naturally aerobic lagoons and mechanically aerated lagoons. Because the liquid/slurry manure applied to land will come from an aerobic treatment lagoon or mechanically aerated lagoon, it will be assumed the reduction in VOC emissions from the lagoon will result in similar VOC reductions to land application.

Space Requirement for a Naturally Aerobic Lagoon Treating Manure from 2,700 Dairy Cows

NRCS Practice Standard Code 359 requires that naturally aerobic lagoons be designed to have a minimum treatment surface area as determined on the basis of daily BOD<sub>5</sub> loading per unit of lagoon surface. The standard specifies that the maximum loading rate of naturally aerobic lagoons shall not exceed the loading rate indicated by the NRCS Agricultural Waste Management Field Handbook (AWMFH) or the maximum loading rate according to state regulatory requirements, whichever is more stringent. According to Figure 10-30 (August 2009) of the latest version of the AWMFH, the maximum aerobic lagoon loading rate for the San Joaquin Valley is 45 - 55 lb-BOD<sub>5</sub>/acre-day. According to Table 4-5 (March 2008) of the NRCS AWMFH, the total daily manure produced by a milk cow will have 2.9 lb-BOD<sub>5</sub>/day. Assuming that 80% of the manure will be flushed to the lagoon system, the minimum lagoon surface area required for a naturally aerobic lagoon treating manure from 2,700 milk cows in the San Joaquin Valley can be calculated as follows:

$$\begin{aligned} \text{BOD}_5 \text{ loading (lb/day)} &= 2,700 \text{ milk cows} \times 2.9 \text{ lb-BOD}_5/\text{cow-day} \times 0.80 \\ &= 6,264 \text{ lb-BOD}_5/\text{day} \end{aligned}$$

$$\begin{aligned} \text{Minimum Surface Area (acres) in areas of the San Joaquin Valley with a} \\ \text{maximum loading rate of 55 lb-BOD}_5/\text{acre-day} &= \\ 16,565 \text{ lb-BOD}_5/\text{day} \div 55 \text{ lb-BOD}_5/\text{acre-day} &= 301 \text{ acres} \end{aligned}$$

$$\begin{aligned} \text{Minimum Surface Area (acres) in areas of the San Joaquin Valley with a} \\ \text{maximum loading rate of 45 lb-BOD}_5/\text{acre-day} &= \\ 16,565 \text{ lb-BOD}_5/\text{day} \div 45 \text{ lb-BOD}_5/\text{acre-day} &= 368 \text{ acres} \end{aligned}$$

As shown above the minimum surface area required for a naturally aerobic lagoon treating manure from 2,700 milk cows in the San Joaquin Valley would range from approximately 301 to 368 acres. This does not include the additional surface area that would be required to treat manure from support stock onsite. Based on the space requirements alone it is clear that this option cannot reasonably be required and no further analysis is needed.

#### Analysis for a Mechanically Aerated Lagoon Treating Manure from 2,700 Dairy Cows

As discussed above, the very large space requirements for naturally aerobic lagoons cause this option to be infeasible for most confined animal facilities. Mechanically aerating a lagoon can achieve some of the benefits of a naturally aerobic lagoon without the large space requirements. However, the costs of energy for complete aeration have also caused this option to be infeasible. The amount of energy required for aeration is based on the amount of volatile solids excreted by animals that must be treated; thus, this cost will be directly proportional to the number of animals at a site. The following analysis will determine the cost of emission reductions that can be achieved from a mechanically aerated lagoon treating manure from 2,700 milk cows.

#### Biological Oxygen Demand (BOD<sub>5</sub>)

In order to effectively calculate the costs of this control option, the energy requirement for complete aeration must be determined. It should be noted that approximately 1.5 to 2.5 pounds of oxygen is required to digest 1 pound of Biological Oxygen Demand (BOD<sub>5</sub>) with additional oxygen required for conversion of ammonia to nitrate (nitrification). It is generally accepted that at least twice the BOD should be provided for complete aeration. According to Dr. Ruihong Zhang of the University of California, Davis, 2.4 lbs (1.1 kg) of oxygen (O<sub>2</sub>) per cow must be provided each day for removal of BOD and an additional 3 lbs (1.4 kg) per cow for oxidation of 70% of the nitrogen. 22

The proposed rule specifies that an aerobic lagoon be designed and operated in accordance with NRCS Practice Standard Code 359. NRCS Practice Standard Code 359 requires that mechanically aerated lagoons use aeration equipment that provides a minimum of one pound of oxygen for each pound of daily BOD loading. As discussed above, the total daily manure produced by a milk cow will have a BOD<sub>5</sub> of 2.9 lb/day and a lagoon handling flushed manure from 2,700 milk cows will have a loading rate of approximately 6,264 lb-BOD<sub>5</sub>/day (2,847 kg-BOD<sub>5</sub>/day).

Energy Requirement a Mechanically Aerated Lagoon Treating Manure from 2,700 Milk Cows:

Based on the data gathered in a UC Davis study on aerator performance for wastewater lagoons, aeration efficiencies for mechanical aerators ranged from 0.10 to 0.68 kg of oxygen provided per kW-hr of energy utilized. The most efficient aerator tested that had been installed in dairy lagoons had an aeration efficiency of 0.49 kg-O<sub>2</sub>/kW-hr. These efficiency tests were performed in clean water and lower aeration efficiencies are expected in liquid manure because of the significant amount of solids that it contains. The yearly energy requirement mechanically aerated lagoon treating flushed manure from 2,700 milk cows is calculated as follows:

High Efficiency Aerator

$$2,847 \text{ kg-BOD}_5/\text{day} \div (0.68 \text{ kg-O}_2/\text{kW-hr}) \times (365 \text{ day/year}) = 1,528,169 \text{ kW-hr/year}$$

Low Efficiency Aerator

$$2,847 \text{ kg-BOD}_5/\text{day} \div (0.10 \text{ kg-O}_2/\text{kW-hr}) \times (365 \text{ day/year}) = 10,391,550 \text{ kW-hr/year}$$

Cost of Electricity for a Mechanically Aerated Lagoon Treating Manure from 2,700 Milk Cows:

The cost for electricity will be based upon the average price for industrial electricity in California as of May 2023, as taken from the Energy Information Administration (EIA) Website:

[http://www.eia.gov/electricity/monthly/epm\\_table\\_grapher.cfm?t=epmt\\_5\\_06\\_b](http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_06_b)

$$\text{Average Cost for electricity} = \$0.1638/\text{kW-hr}$$

The electricity costs for complete aeration are calculated as follows:

Low Cost Estimate (High Efficiency Aerator)

$$1,528,169 \text{ kW-hr/year} \times \$0.1638/\text{kW-hr} = \$250,314/\text{year}$$

High Cost Estimate (Low Efficiency Aerator)

$$10,391,550 \text{ kW-hr/year} \times \$0.1638/\text{kW-hr} = \$1,702,136/\text{year}$$

VOC Emission Reductions from a Mechanically Aerated Lagoon Treating Manure from 2,700 Milk Cows that will be applied to land:

It will be conservatively assumed that a mechanically aerated lagoon providing 1 lb of oxygen for every 1 lb of BOD<sub>5</sub> loading will control 90% of the VOC emissions from the lagoon/storage pond. However, as noted above, it is generally accepted that the oxygen provided should be twice the BOD<sub>5</sub> loading rate for complete aeration; therefore, the actual control from providing 1 lb of oxygen for every 1 lb of BOD<sub>5</sub> loading is probably closer to 50%.



The annual VOC Emission Reductions for a mechanically aerated lagoon treating land applied manure from 2,700 milk cows are calculated as follows and shown in the table below:

$$[\text{Number of cows}] \times [\text{Liquid Manure Land Application VOC EF (lb/cow-year)}] \times [\text{Complete Aeration Control Efficiency for Lagoon/Storage Pond}]$$

VOC Reductions for a Mechanically Aerated Lagoon							
Type of Animal	# of cows	x	Liquid Manure Land Application EF (lb/cow-yr)	x	Control (%)	=	lb-VOC/yr
Milk Cow (freestall)	2,700	x	1.4	x	90%	=	<b>3,402</b>

Cost of VOC Emission Reductions

$$\begin{aligned} \text{Low Estimate} &= (\$250,314/\text{year}) / [(3,402 \text{ lb-VOC/year})(1 \text{ ton}/2000 \text{ lb})] \\ &= \$147,157/\text{ton of VOC reduced} \end{aligned}$$

$$\begin{aligned} \text{High Estimate} &= (\$1,702,136/\text{year}) / [(3,402 \text{ lb-VOC/year})(1 \text{ ton}/2000 \text{ lb})] \\ &= \$1,000,668/\text{ton of VOC reduced} \end{aligned}$$

As shown above, the electricity cost alone for a mechanically aerated lagoon would cause the cost of the VOC reductions (\$147,157/ton) to be greater than the \$23,600/ton cost effectiveness threshold of the District BACT policy. This cost does not include the additional electricity cost for nitrification that would naturally occur as the lagoons were aerated or equipment costs. Even without these costs, this control technology would not be cost effective.

2) Irrigation of crops using liquid/slurry manure from a holding/storage pond after being treated in a covered lagoon/digester

The facility has proposed to irrigate their crops using liquid/slurry manure from a lagoon after being treated in a covered lagoon/digester. Since the facility has proposed to implement this option, a cost effectiveness analysis is not required.

**e. Step 5 - Select BACT**

The facility has proposed to irrigate their crops using liquid/slurry manure from a lagoon after being treated in a covered lagoon/digester, which is a Technologically Feasible option. Therefore, BACT is satisfied.

## **2. Top-Down BACT Analysis for NH<sub>3</sub> Emissions:**

This BACT discussion applies to the liquid/slurry manure taken from the liquid manure handling system and applied to land.

### **a. Step 1 - Identify all control technologies**

The following options were identified as possible controls for NH<sub>3</sub> emissions from the liquid/slurry land application:

- 1) All animal fed in accordance with NRCS or other District-approved guidelines

### **Description of Control Technologies**

- 1) Animals fed in accordance with NRCS or other District-approved Guidelines

Nutritional management of dairy feed is routinely practiced to improve milk production and herd health. The potential for ammonia emissions can be reduced by reducing the amount of undigested nitrogen compounds in the manure. The level of microbial action in the manure corresponds to the level of organic nitrogen content in the manure; the lower the level of nitrogen the lower the level of microbial action and the lower the production of ammonia and VOCs.

A diet that is formulated to feed proper amounts of ruminantly degradable protein will result in improved nitrogen utilization by the animal and corresponding reduction in urea and organic nitrogen content of the manure, which will reduce the production of VOCs and ammonia. The latest National Research Council (NRC) guidelines for the selection of an optimal bovine diet should be followed to the maximum extent possible. The diet recommendations made in this publication seek to achieve the maximum uptake of protein by the animal and the minimum carryover of nitrogen into the manure, which will reduce ammonia emissions from liquid manure applied to cropland.

### **b. Step 2 - Eliminate technologically infeasible options**

There are no technologically infeasible options to eliminate from step 1.

### **c. Step 3 - Rank remaining options by control effectiveness**

There is only one BACT option, therefore, ranking is unnecessary.

### **d. Step 4 - Cost Effectiveness Analysis**

The only option listed above is achieved in practice; therefore a cost analysis is not required.

### **e. Step 5 - Select BACT**

Achieved in Practice option is determined to be BACT. Therefore, BACT for this operation is feeding all animals in accordance with NRCS or other District-approved guidelines. The facility has proposed to implement this option to satisfy BACT.

## Top Down BACT Analysis for Confined Animal Facility – Solid Manure Handling – Land Application

### 1. Top-Down BACT Analysis for NH<sub>3</sub> Emissions:

This BACT discussion applies to the solid manure that applied to land.

#### a. Step 1 - Identify all control technologies

The following options were identified as possible controls for NH<sub>3</sub> emissions from the solid manure handling – land application:

- 1) Rapid incorporation of solid manure into the soil after land application, and all animals fed in accordance with NRCS or other District-approved guidelines.

#### Description of Control Technologies

- 1) Rapid incorporation of solid manure into the soil after land application, and all animals fed in accordance with NRCS or other District-approved guidelines.

#### Rapid incorporation of solid manure into the soil after land application

Various types of spreading techniques, such as box spreaders, flail type spreaders, side discharge spreaders, and spinner spreaders, are used to apply solid manure to cropland. Regardless of which technique is used, this practice requires the immediate incorporation of the manure into the soil, reducing emissions and surface run-off while minimizing the loss of nitrogen into the atmosphere. Based on a study by a local Valley dairy, there is a great potential of reducing emissions by incorporating slurry manure rapidly into the soil. A similar reduction may be obtained by the rapid incorporation of solid manure. This technology is expected to yield a NH<sub>3</sub> control efficiency ranging from 49% to upwards of 98%.<sup>5</sup>

#### All animals fed in accordance with NRCS or other District-approved guidelines

Nutritional management of dairy feed is routinely practiced to improve milk production and herd health. The potential for ammonia emissions can be reduced by reducing the amount of undigested nitrogen compounds in the manure. The level of microbial action in the manure corresponds to the level of organic nitrogen content in the manure; the lower the level of nitrogen the lower the level of microbial action and the lower the production of ammonia and VOCs.

A diet that is formulated to feed proper amounts of ruminantly degradable protein will result in improved nitrogen utilization by the animal and corresponding reduction in urea and organic nitrogen content of the manure, which will reduce the production of VOCs and ammonia. The latest NRCS guidelines for the selection of an optimal bovine diet should be

---

<sup>5</sup> Page 81 of "Recommendations to the San Joaquin Valley Air Pollution Control Officer Regarding Best Available Control Technology for Dairies in the San Joaquin Valley" January 31, 2006  
([http://www.valleyair.org/busind/pto/dpag/dpag\\_idx.htm](http://www.valleyair.org/busind/pto/dpag/dpag_idx.htm)).

followed to the maximum extent possible. The diet recommendations made in this publication seek to achieve the maximum uptake of protein by the animal and the minimum carryover of nitrogen into the manure, which will reduce ammonia emissions from solid manure.

**b. Step 2 - Eliminate technologically infeasible options**

There are no technologically infeasible options to eliminate from step 1.

**c. Step 3 - Rank remaining options by control effectiveness**

- 1) Rapid incorporation of solid manure into the soil after land application
- 2) All animals fed in accordance with NRCS or other District-approved guidelines

**d. Step 4 - Cost Effectiveness Analysis**

- 1) Rapid incorporation of solid manure into the soil after land application

This option is achieved in practice; therefore a cost analysis is not required.

- 2) All animals fed in accordance with NRCS or other District-approved guidelines

This option is achieved in practice; therefore a cost analysis is not required.

**e. Step 5 - Select BACT**

Achieved in Practice option is determined to be BACT. Therefore, BACT for this operation is rapid incorporation of solid manure into the soil after land application, and to feed all animals at the dairy in accordance with NRCS or other District-approved guidelines. The facility has proposed to implement these options to satisfy BACT.

## **Top Down BACT Analysis for Confined Animal Facility – Solid Manure Handling – Solid Manure Storage/Separated Solids Piles**

### **1. Top-Down BACT Analysis for NH<sub>3</sub> Emissions:**

This BACT discussion applies to the solid manure stored in piles or separated solids stored in piles.

#### **Step 1 - Identify all control technologies**

The following options were identified as possible controls for NH<sub>3</sub> emissions from the solid manure handling – solid manure storage/separated solids piles:

- 1) All animals fed in accordance with NRCS or other District-approved guidelines.

#### **Description of Control Technologies**

- 1) All animals fed in accordance with NRCS or other District-approved guidelines

Nutritional management of dairy feed is routinely practiced to improve milk production and herd health. The potential for ammonia emissions can be reduced by reducing the amount of undigested nitrogen compounds in the manure. The level of microbial action in the manure corresponds to the level of organic nitrogen content in the manure; the lower the level of nitrogen the lower the level of microbial action and the lower the production of ammonia and VOCs.

A diet that is formulated to feed proper amounts of ruminantly degradable protein will result in improved nitrogen utilization by the animal and corresponding reduction in urea and organic nitrogen content of the manure, which will reduce the production of VOCs and ammonia. The latest National Research Council (NRC) guidelines for the selection of an optimal bovine diet should be followed to the maximum extent possible. The diet recommendations made in this publication seek to achieve the maximum uptake of protein by the animal and the minimum carryover of nitrogen into the manure, which will reduce ammonia emissions from solid manure.

#### **b. Step 2 - Eliminate technologically infeasible options**

There are no technologically infeasible options to eliminate from step 1.

#### **c. Step 3 - Rank remaining options by control effectiveness**

There is only one option listed, therefore, ranking is unnecessary.

#### **d. Step 4 - Cost Effectiveness Analysis**

This option is achieved in practice; therefore a cost analysis is not required.

**e. Step 5 - Select BACT**

Achieved in Practice option is determined to be BACT. Therefore, BACT for this operation is to feed all animals at the dairy in accordance with NRCS or other District-approved guidelines. The facility has proposed to implement this option to satisfy BACT.

## **Top Down BACT Analysis for Confined Animal Facility – Feed Storage and Handling System – Total Mixed Ration (TMR)**

### **1. Top-Down BACT Analysis for VOC Emissions:**

This BACT discussion applies to the TMR that is stored and used to feed the cows at the dairy.

#### **a. Step 1 - Identify all control technologies**

The following options were identified as possible controls for VOC emissions from feed storage and handling system - TMR:

- 1) District Rule 4570 measures for Feed/TMR.

#### **Description of Control Technologies**

- 1) District Rule 4570 measures for Feed/TMR

District Rule 4570 requires the implementation of various management practices to reduce VOC emissions from TMR. These practices include pushing feed so that it is within three feet of feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals, so the area of the feed is minimized and the feed can be consumed by the cows in a shorter time period instead of continuing to emit VOCs; beginning feeding total mixed rations within two hours of grinding and mixing rations, reducing the time that fresh feed emits VOCs; storing grain in a weatherproof storage structure or under a weatherproof covering from October through May; feeding stream-flaked, dry rolled, cracked or ground corn or other ground cereal grains; removal of uneaten wet feed from feeding areas; and preparing TMR with a minimum moisture content, which reduces VOC since most of the compounds emitted are highly soluble in water.

#### **b. Step 2 - Eliminate technologically infeasible options**

There are no technologically infeasible options to eliminate from step 1.

#### **c. Step 3 - Rank remaining options by control effectiveness**

There is only one option listed, therefore, ranking is unnecessary.

#### **d. Step 4 - Cost Effectiveness Analysis**

This option is achieved in practice; therefore a cost analysis is not required.

#### **e. Step 5 - Select BACT**

The facility has proposed to implement this options to satisfy BACT.

## **APPENDIX E**

### **HRA/AAQA Summary**



## San Joaquin Valley Air Pollution Control District Risk Management Review and Ambient Air Quality Analysis

To: John Yoshimura – Permit Services  
 From: Keanu Morin – Technical Services  
 Date: April 19, 2022  
 Facility Name: Antonio Azevedo Dairy #4  
 Location: 1261 W. Roosevelt Rd., El Nido, CA  
 Application #(s): N-8350-1-1, -2-2, -3-1, -4-1, -5-1  
 Project #: N-1203782

### Summary

#### RMR

Units	Prioritization Score	Acute Hazard Index	Chronic Hazard Index	Maximum Individual Cancer Risk	T-BACT Required	Special Permit Requirements
1-1	1.91	0.00	0.00	4.65E-07	No	No
2-2	57.10	0.22	0.18	1.16E-05	Yes <sup>1</sup>	No
3-1	336.00	0.77 <sup>2</sup>	0.01	7.74E-06	Yes <sup>1</sup>	Yes
4-1	0.28	0.01	0.00	N/A <sup>3</sup>	No	No
5-1	N/A <sup>4</sup>	N/A <sup>4</sup>	N/A <sup>4</sup>	N/A <sup>4</sup>	No	No
<b>Project Totals</b>	>1	1.00	0.19	1.98E-05		
<b>Facility Totals</b>	>1	1.00 <sup>5</sup>	0.19	2.00E-05 <sup>5</sup>		

Notes:

- T-BACT is determined on an emission unit by emission unit basis. T-BACT will be addressed in the Conclusions section of this report.
- Acute Hazard Index for Unit 3-1 was calculated using the District's H<sub>2</sub>S Calculator.
- Cancer Risk was not calculated for Unit 4-1 since there is no risk factor or the risk factor is so low that it has been determined to be insignificant for this type of unit.
- There is no risk associated with Unit 5 as the District does not have an approved toxic speciation profile for dairy feed and storage handling operations.
- The facility has reached District threshold for the Acute Hazard Index and the Maximum Individual Cancer Risk. Future projects shall not be approved without re-evaluating previous projects.

#### AAQA

Pollutant	Air Quality Standard (State/Federal)				
	1 Hour	3 Hours	8 Hours	24 Hours	Annual
CO	Pass		Pass		
NO <sub>x</sub>	Pass				Pass
SO <sub>x</sub>	Pass	Pass		Pass	Pass
H <sub>2</sub> S	Pass				
PM <sub>10</sub>				Pass	Pass
PM <sub>2.5</sub>				Pass	Pass

Notes:

- Results were taken from the attached AAQA Report.
- The criteria pollutants are below EPA's level of significance as found in 40 CFR Part 51.165 (b)(2) unless otherwise noted below.
- Modeled PM<sub>10</sub> concentrations were below the District SIL for fugitive sources of 10.4 µg/m<sup>3</sup> for the 24-hour average concentration and 2.08 µg/m<sup>3</sup> for the annual concentration.
- Modeled PM<sub>2.5</sub> concentrations were below the District SIL for fugitive sources of 2.5 µg/m<sup>3</sup> for the 24-hour average concentration and 0.63 µg/m<sup>3</sup> for the annual concentration.
- The California Ambient Air Quality Standard for H<sub>2</sub>S is 42 µg/m<sup>3</sup> for 1-hour.

To ensure that human health risks will not exceed District allowable levels; the following shall be included as requirements for:

Unit # 3-1

1. The pH value cannot be any lower than 7.5.
2. The quarterly H<sub>2</sub>S concentration shall not exceed 3.00 mg/L

**T-BACT is required for Unit 2: Shade Barn 1, Shade Barn 2, and Shade Barn 5 because of DBCP which is a VOC. T-BACT is required for Unit 3: Lagoon 1 and Lagoon 2 because of emissions of Naphthalene which is a VOC.**

## Project Description

*Technical Services received a request on April 4, 2022 to perform a Risk Management Review (RMR) and Ambient Air Quality Analysis (AAQA) for the following:*

- *Unit -1-1: MODIFICATION OF 475 COW MILKING OPERATION WITH ONE 16 STALL HERRINGBONE MILKING PARLOR: INCREASE MAXIMUM NUMBER OF MILK COWS TO 6,000 AND ADD RULE 4570 MITIGATION MEASURES*
- *Unit -2-2: MODIFICATION OF COW HOUSING - 475 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 575 MATURE COWS (MILK AND DRY COWS); 335 TOTAL SUPPORT STOCK (HEIFERS, CALVES AND BULLS); AND LOAFING BARN WITH SCRAPE SYSTEM: INSTALL THREE SHADE BARN AND INCREASE HERD SIZE TO 3,000 MILK COWS (MILK AND DRY) AND 1,000 SUPPORT STOCK AND ADD RULE 4570 MITIGATION MEASURES*
- *Unit -3-1: MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF THREE STORAGE PONDS; MANURE LAND APPLIED THROUGH FLOOD IRRIGATION: INSTALL TWO PONDS AND A MECHANICAL SEPARATOR AND ADD RULE 4570 MITIGATION MEASURES*
- *Unit -4-1: MODIFICATION OF SOLID MANURE HANDLING CONSISTING OF SOLID MANURE HAULED OFFSITE: ADD RULE 4570 MITIGATION MEASURES*
- *Unit -5-1: MODIFICATION OF FEED STORAGE AND HANDLING CONSISTING OF COVERED FEED STORAGE OR COMMODITY BARN, SILAGE PILES, DRY GRAIN TANKS AND BINS: ADD RULE 4570 MITIGATION MEASURES*

## RMR Report

### Analysis

*The District performed an analysis pursuant to the District's Risk Management Policy for Permitting New and Modified Sources (APR 1905, May 28, 2015) to determine the possible cancer and non-cancer health impact to the nearest resident or worksite. This policy requires that an assessment be performed on a unit by unit basis, project basis, and on a facility-wide basis. If a preliminary prioritization analysis demonstrates that:*

- *A unit's prioritization score is less than the District's significance threshold and;*
- *The project's prioritization score is less than the District's significance threshold and;*
- *The facility's total prioritization score is less than the District's significance threshold*

*Then, generally no further analysis is required.*

*The District's significant prioritization score threshold is defined as being equal to or greater than 1.0. If a preliminary analysis demonstrates that either the unit(s) or the project's or the facility's total prioritization score is greater than the District threshold, a screening or a refined assessment is required*

If a refined assessment is greater than one in a million but less than 20 in one million for carcinogenic impacts (Cancer Risk) and less than 1.0 for the Acute and Chronic hazard indices(Non-Carcinogenic) on a unit by unit basis, project basis and on a facility-wide basis the proposed application is considered less than significant. For unit's that exceed a cancer risk of 1 in one million, Toxic Best Available Control Technology (TBACT) must be implemented.

Toxic emissions for this project were calculated using the following methods:

- Toxic emissions for the Cow Housing, Lagoons, and Milk Parlor were calculated using emission factors derived from the District's evaluation of dairy research studies conducted by California colleges and universities. PM based toxic emissions for the Cow Housing were calculated using emission factors generated from using the worst case
- Toxic emissions for this proposed Lagoons were calculated utilizing the District's H<sub>2</sub>S calculator.

These emissions were input into the San Joaquin Valley APCD's Hazard Assessment and Reporting Program (SHARP). In accordance with the District's Risk Management Policy, risks from the proposed unit's toxic emissions were prioritized using the procedure in the 2016 CAPCOA Facility Prioritization Guidelines. The prioritization score for this proposed unit was less than 1.0 (see RMR Summary Table). Therefore, no further analysis was necessary.

The following parameters were used for the review:

Source Process Rate							
	PM10 lb/hr	PM10 lb/yr	VOC lb/hr	VOC lb/yr	NH3 lb/hr	NH3 lb/yr	H2S lb/yr
Milking Parlor (Unit 1-1)							
Milking Parlor	-	-	0.10	857	0.03	279	-
Cow Housing (Unit 2-2)							
Shade Barn 1	0.05	491	0.38	3,274	0.25	2,158	-
Shade Barn 2	0.10	839	0.72	6,264	0.96	8,443	-
Shade Barn 3	0.03	213	0.09	820	0.06	513	-
Shade Barn 4	0.04	350	0.17	1,450	0.21	1,849	-
Shade Barn 5	0.12	1,048	1.15	10,020	2.41	21,128	-
Shade Barn 6	0.04	350	0.17	1,450	0.21	1,849	-
Liquid Manure Handling (Unit 3-1)							
Liquid Manure	-	-	0.49	4,315	0.54	4,754	-
Lagoon/Storage Ponds	-	-	0.15	1,278	-	-	-
Land Application Liquid	-	-	0.35	3,066	0.70	6,096	-
Solid Manure Handling (Unit 4-1)							
Solid Manure	-	-	0.13	1,137	0.77	6,721	-
Solid Manure Storage	-	-	0.05	438	0.38	3,358	-

Area Source Parameters					
Unit ID	Unit Description	Release Height (m)	X-Length (m)	Y -Length (m)	Area (m <sup>2</sup> )
1-1	Milking Parlor	1	23.94	57.09	1,367
2-2	Shade Barn 2	1	108.08	221.80	23,972
2-2	Shade Barn 4	1	38.03	152.10	5,784
2-2	Shade Barn 5	1	93.03	220.00	20,467
2-2	Shade Barn 6	1	50.00	230.73	11,537
3-1	Lagoon 1	0	37.91	300.06	11,375
3-1	Lagoon 2	0	44.41	298.98	13,278
4-1	Solid Manure Storage	1.52	38.58	65.19	2,515

Polygon Area Source Parameters				
Unit ID	Unit Description	Release Height (m)	No. Vertices	Area (m <sup>2</sup> )
2-2	Shade Barn 1	1	7	14,779
2-1	Shade Barn 3	1	7	9,997
3-1	Land Application (Liquid)	0	12	434,069

### AAQA Report

The District modeled the impact of the proposed project on the National Ambient Air Quality Standard (NAAQS) and/or California Ambient Air Quality Standard (CAAQS) in accordance with District Policy APR-1925 (Policy for District Rule 2201 AAQA Modeling) and EPA’s Guideline for Air Quality Modeling (Appendix W of 40 CFR Part 51). The District uses a progressive three level approach to perform AAQAs. The first level (Level 1) uses a very conservative approach. If this analysis indicates a likely exceedance of an AAQS or Significant Impact Level (SIL), the analysis proceeds to the second level (Level 2) which implements a more refined approach. For the 1-hour NO<sub>2</sub> standard, there is also a third level that can be implemented if the Level 2 analysis indicates a likely exceedance of an AAQS or SIL.

The modeling analyses predicts the maximum air quality impacts using the appropriate emissions for each standard’s averaging period. Required model inputs for a refined AAQA include background ambient air quality data, land characteristics, meteorological inputs, a receptor grid, and source parameters including emissions. These inputs are described in the sections that follow.

Ambient air concentrations of criteria pollutants are recorded at monitoring stations throughout the San Joaquin Valley. Monitoring stations may not measure all necessary pollutants, so background data may need to be collected from multiple sources. The following stations were used for this evaluation:

Monitoring Stations				
Pollutant	Station Name	County	City	Measurement Year
PM10	2334 'M' ST.	Merced	Merced	2018
PM2.5	Merced-Coffee	Merced	Merced	2018

Technical Services performed modeling for directly emitted criteria pollutants with the emission rates below:

Source Process Rates (PM <sub>10</sub> )					
Unit ID	Process ID	Process Material	Process Units	Hourly Process Rate	Annual Process Rate
2-2	1	Shade Barn 1 (PM <sub>10</sub> )	Lbs.	0.05	491
2-2	1	Shade Barn 2 (PM <sub>10</sub> )	Lbs.	0.10	839
2-2	1	Shade Barn 3 (PM <sub>10</sub> )	Lbs.	0.03	213
2-2	1	Shade Barn 4 (PM <sub>10</sub> )	Lbs.	0.04	350
2-2	1	Shade Barn 5 (PM <sub>10</sub> )	Lbs.	0.12	1,048
2-2	1	Shade Barn 6 (PM <sub>10</sub> )	Lbs.	0.04	350

Source Process Rates (PM <sub>2.5</sub> )					
Unit ID	Process ID	Process Material	Process Units	Hourly Process Rate	Annual Process Rate
2-2	1	Shade Barn 1 (PM <sub>2.5</sub> )	Lbs.	0.014	123
2-2	1	Shade Barn 2 (PM <sub>2.5</sub> )	Lbs.	0.024	210
2-2	1	Shade Barn 3 (PM <sub>2.5</sub> )	Lbs.	0.006	53
2-2	1	Shade Barn 4 (PM <sub>2.5</sub> )	Lbs.	0.010	88
2-2	1	Shade Barn 5 (PM <sub>2.5</sub> )	Lbs.	0.030	262
2-2	1	Shade Barn 6 (PM <sub>2.5</sub> )	Lbs.	0.010	88

The AERMOD model was used to determine if emissions from the project would cause or contribute to an exceedance of any state of federal air quality standard. The parameters outlined below and meteorological data for Merced from 2013-2017 (rural dispersion coefficient selected) were used for the analysis:

The following parameters were used for the review:

Area Source Parameters					
Unit ID	Unit Description	Release Height (m)	X-Length (m)	Y -Length (m)	Area (m <sup>2</sup> )
2-2	Shade Barn 2	1	108.08	221.80	23,972
2-2	Shade Barn 4	1	38.03	152.10	5,784
2-2	Shade Barn 5	1	93.03	220.00	20,467
2-2	Shade Barn 6	1	50.00	230.73	11,537

Polygon Area Source Parameters				
Unit ID	Unit Description	Release Height (m)	No. Vertices	Area (m <sup>2</sup> )
2-2	Shade Barn 1	1	7	14,779
2-1	Shade Barn 3	1	7	9,997

## Conclusion

### RMR

The cumulative acute and chronic indices for this facility, including this project, are below 1.0; and the cumulative cancer risk for this facility, including this project, is less than 20 in a million. However, the cancer risk for one or more units in this project is greater than 1.0 in a million. **In accordance with the District's Risk Management Policy, the project is approved with Toxic Best Available Control Technology (T-BACT) for Unit 2: Shade 1, Shade 2, and Shade 5, and Unit 3: Lagoon 1 and Lagoon 2.**

To ensure that human health risks will not exceed District allowable levels; the permit requirements listed on page 1 of this report must be included for this proposed unit.

These conclusions are based on the data provided by the applicant and the project engineer. Therefore, this analysis is valid only as long as the proposed data and parameters do not change.

### AAQA

The ambient air quality impacts from PM<sub>10</sub> emissions at the proposed dairy (modification) (does not) exceed the District's 24-hour or Annual interim threshold for fugitive dust sources.

## Attachments

- A. Modeling request from the project engineer
- B. Additional information from the applicant/project engineer
- C. Prioritization score w/ toxic emissions summary
- D. Facility Summary
- E. AAQA results

**APPENDIX F**  
**Quarterly Net Emissions Change (QNEC)**

### Quarterly Net Emissions Change (QNEC)

The Quarterly Net Emissions Change is used to complete the emission profile screen for the District's PAS database. The QNEC shall be calculated as follows:

QNEC = PE2 - PE1, where:

- QNEC = Quarterly Net Emissions Change for each emissions unit, lb/qtr
- PE2 = Post-Project Potential to Emit for each emissions unit, lb/qtr
- PE1 = Pre-Project Potential to Emit for each emissions unit, lb/qtr

The quarterly PE values are calculated as follows: PE (lb/yr) ÷ 4 (qtr/yr)

Using the annual PE2 and PE1 values previously calculated, the QNEC (lb/qtr) for each permit unit is shown below:

Milking Parlor						
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	0	0	1,080	369
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	3.0	1.0
Quarterly Net Emissions Change (lb/qtr)	0.0	0.0	0.0	0.0	214.25	69.75
1:	0.0	0.0	0.0	0.0	214.25	69.75
2:	0.0	0.0	0.0	0.0	214.25	69.75
3:	0.0	0.0	0.0	0.0	214.25	69.75
4:	0.0	0.0	0.0	0.0	214.25	69.75

Cow Housing						
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	7,581	0	32,564	65,795
Daily PE2 (lb/day)	0.0	0.0	20.8	0.0	89.2	180.2
Quarterly Net Emissions Change (lb/qtr)	0.0	0.0	814.50	0.0	5,477.75	8,272.00
1:	0.0	0.0	814.50	0.0	5,477.75	8,272.00
2:	0.0	0.0	814.50	0.0	5,477.75	8,272.00
3:	0.0	0.0	814.50	0.0	5,477.75	8,272.00
4:	0.0	0.0	814.50	0.0	5,477.75	8,272.00

Liquid Manure Handling							
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Annual PE2 (lb/yr)	0	0	0	0	4,789	15,254	301
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	13.1	41.7	0.8
Quarterly Net Emissions Change (lb/qtr)	0.0	0.0	0.0	0.0	667.75	1,188.50	0.0
1:	0.0	0.0	0.0	0.0	667.75	1,188.50	0.0
2:	0.0	0.0	0.0	0.0	667.75	1,188.50	0.0
3:	0.0	0.0	0.0	0.0	667.75	1,188.50	0.0
4:	0.0	0.0	0.0	0.0	667.75	1,188.50	0.0

Solid Manure Handling						
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	0	0	1,547	8,820
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	4.2	24.2
Quarterly Net Emissions Change (lb/qtr)	0.0	0.0	0.0	0.0	284.25	1,680.25
1:	0.0	0.0	0.0	0.0	284.25	1,680.25
2:	0.0	0.0	0.0	0.0	284.25	1,680.25
3:	0.0	0.0	0.0	0.0	284.25	1,680.25
4:	0.0	0.0	0.0	0.0	284.25	1,680.25

Feed Storage and Handling						
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	0	0	50,529	0
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	138.5	0.0
Quarterly Net Emissions Change (lb/qtr)	0.0	0.0	0.0	0.0	2,854.50	0.0
1:	0.0	0.0	0.0	0.0	2,854.50	0.0
2:	0.0	0.0	0.0	0.0	2,854.50	0.0
3:	0.0	0.0	0.0	0.0	2,854.50	0.0
4:	0.0	0.0	0.0	0.0	2,854.50	0.0



## **APPENDIX G**

### **Emission Profiles**

Permit #: N-8350-1-1	<b>Last Updated</b>
Facility: ANTONIO	05/03/2023 YOSHIMUJ
AZEVEDO DAIRY #4	

Equipment Pre-Baselined: NO

	<u>NOX</u>	<u>SOX</u>	<u>PM10</u>	<u>CO</u>	<u>VOC</u>
Potential to Emit (lb/Yr):	0.0	0.0	0.0	0.0	1080.0
Daily Emis. Limit (lb/Day)	0.0	0.0	0.0	0.0	3.0
Quarterly Net Emissions Change (lb/Qtr)					
Q1:	0.0	0.0	0.0	0.0	214.0
Q2:	0.0	0.0	0.0	0.0	214.0
Q3:	0.0	0.0	0.0	0.0	214.0
Q4:	0.0	0.0	0.0	0.0	215.0
Check if offsets are triggered but exemption applies	N	N	N	N	Y
Offset Ratio					
Quarterly Offset Amounts (lb/Qtr)					
Q1:					
Q2:					
Q3:					
Q4:					

Permit #: N-8350-2-2	<b>Last Updated</b>
Facility: ANTONIO	05/03/2023 YOSHIMUJ
AZEVEDO DAIRY #4	

Equipment Pre-Baselined: NO

	<u>NOX</u>	<u>SOX</u>	<u>PM10</u>	<u>CO</u>	<u>VOC</u>
Potential to Emit (lb/Yr):	0.0	0.0	7581.0	0.0	32564.0
Daily Emis. Limit (lb/Day)	0.0	0.0	20.8	0.0	89.2
Quarterly Net Emissions Change (lb/Qtr)					
Q1:	0.0	0.0	814.0	0.0	5477.0
Q2:	0.0	0.0	814.0	0.0	5478.0
Q3:	0.0	0.0	815.0	0.0	5478.0
Q4:	0.0	0.0	815.0	0.0	5478.0
Check if offsets are triggered but exemption applies	N	N	N	N	Y
Offset Ratio					
Quarterly Offset Amounts (lb/Qtr)					
Q1:					
Q2:					
Q3:					
Q4:					

Permit #: N-8350-3-1	<b>Last Updated</b>
Facility: ANTONIO	05/03/2023 YOSHIMUJ
AZEVEDO DAIRY #4	

Equipment Pre-Baselined: NO

	<u>NOX</u>	<u>SOX</u>	<u>PM10</u>	<u>CO</u>	<u>VOC</u>
Potential to Emit (lb/Yr):	0.0	0.0	0.0	0.0	4789.0
Daily Emis. Limit (lb/Day)	0.0	0.0	0.0	0.0	13.1
Quarterly Net Emissions Change (lb/Qtr)					
Q1:	0.0	0.0	0.0	0.0	667.0
Q2:	0.0	0.0	0.0	0.0	668.0
Q3:	0.0	0.0	0.0	0.0	668.0
Q4:	0.0	0.0	0.0	0.0	668.0
Check if offsets are triggered but exemption applies	N	N	N	N	Y
Offset Ratio					
Quarterly Offset Amounts (lb/Qtr)					
Q1:					
Q2:					
Q3:					
Q4:					

Permit #: N-8350-4-1	<b>Last Updated</b>
Facility: ANTONIO	05/03/2023 YOSHIMUJ
AZEVEDO DAIRY #4	

Equipment Pre-Baselined: NO

	<u>NOX</u>	<u>SOX</u>	<u>PM10</u>	<u>CO</u>	<u>VOC</u>
Potential to Emit (lb/Yr):	0.0	0.0	0.0	0.0	1547.0
Daily Emis. Limit (lb/Day)	0.0	0.0	0.0	0.0	4.2
Quarterly Net Emissions Change (lb/Qtr)					
Q1:	0.0	0.0	0.0	0.0	284.0
Q2:	0.0	0.0	0.0	0.0	284.0
Q3:	0.0	0.0	0.0	0.0	284.0
Q4:	0.0	0.0	0.0	0.0	285.0
Check if offsets are triggered but exemption applies	N	N	N	N	Y
Offset Ratio					
Quarterly Offset Amounts (lb/Qtr)					
Q1:					
Q2:					
Q3:					
Q4:					

Permit #: N-8350-5-1	<b>Last Updated</b>
Facility: ANTONIO AZEVEDO DAIRY #4	05/03/2023 YOSHIMUJ

Equipment Pre-Baselined: NO

	<u>NOX</u>	<u>SOX</u>	<u>PM10</u>	<u>CO</u>	<u>VOC</u>
Potential to Emit (lb/Yr):	0.0	0.0	0.0	0.0	50529.0
Daily Emis. Limit (lb/Day)	0.0	0.0	0.0	0.0	138.5
Quarterly Net Emissions Change (lb/Qtr)					
Q1:	0.0	0.0	0.0	0.0	2854.0
Q2:	0.0	0.0	0.0	0.0	2854.0
Q3:	0.0	0.0	0.0	0.0	2855.0
Q4:	0.0	0.0	0.0	0.0	2855.0
Check if offsets are triggered but exemption applies	N	N	N	N	Y
Offset Ratio					
Quarterly Offset Amounts (lb/Qtr)					
Q1:					
Q2:					
Q3:					
Q4:					

## **APPENDIX H**

### **Dairy Emissions Calculator**

### Pre-Project Facility Information

- Does this facility house Holstein or Jersey cows?   
Most facilities house Holstein cows unless explicitly stated on the PTO or application.
- Does the facility have an anaerobic treatment lagoon?
- Does the facility land apply liquid manure?   
Answering "yes" assumes worst case.
- Does the facility land apply solid manure?   
Answering "yes" assumes worst case.
- Is any scraped manure sent to a lagoon/storage pond?   
Answering "yes" assumes worst case.

Pre-Project Herd Size							
Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals		
Milk Cows	475				475		
Dry Cows	100				100		
Support Stock (Heifers, Calves, and Bulls)			335		335		
Large Heifers					0		
Medium Heifers					0		
Small Heifers					0		
Bulls					0		
	Calf Hutches				Calf Corrals		Total # of Calves
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	
Calves							0

Total Herd Summary	
Total Milk Cows	475
Total Mature Cows	575
Support Stock (Heifers, Calves, and Bulls)	335
Total Calves	0
Total Dairy Head	910

Pre-Project Silage Information			
Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	2	25	90
Alfalfa			
Wheat	2	25	90

### Post-Project Facility Information

- Does this facility house Holstein or Jersey cows?   
Most facilities house Holstein cows unless explicitly stated on the PTO or application.
- Does the facility have an anaerobic treatment lagoon?
- Does the facility land apply liquid manure?   
Answering "yes" assumes worst case.
- Does the facility land apply solid manure?   
Answering "yes" assumes worst case.
- Is any scraped manure sent to a lagoon/storage pond?   
Answering "yes" assumes worst case.
- Does this project result in an increase or relocation of uncovered surface area for any lagoon/storage pond?

NOTE: An increase in total lagoon/storage pond surface area may result in an increase in H2S emissions. The District's Technical Services Division may need to conduct H2S modeling.

Post-Project Herd Size							
Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals		
Milk Cows	2,700				2,700		
Dry Cows	300				300		
Support Stock (Heifers, Calves, and Bulls)	668		332		1,000		
Large Heifers					0		
Medium Heifers					0		
Small Heifers					0		
Bulls					0		
	Calf Hutches				Calf Corrals		Total # of Calves
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	
Calves							0

Total Herd Summary	
Total Milk Cows	2,700
Total Mature Cows	3,000
Support Stock (Heifers, Calves, and Bulls)	1,000
Total Calves	0
Total Dairy Head	4,000

Post-Project Silage Information			
Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	2	25	90
Alfalfa			
Wheat	2	25	90

This spreadsheet serves only as a resource to calculate potential emissions from dairies, and may not reflect the final emissions used by the District due to parameters not addressed in this spreadsheet and/or omissions from the spreadsheet. Any other permissible equipment (e.g. IC engines, gasoline tanks, etc.) at a facility will need to be calculated separately. All final calculations used in permitting projects will be conducted by District staff.



## VOC Mitigation Measures and Control Efficiencies

Milking Parlor				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	VOC Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
<b>Enteric Emissions Mitigations</b>				
<input type="checkbox"/>	<input checked="" type="checkbox"/>	(D) Feed according to NRC guidelines	0%	10%
<b>Total Control Efficiency</b>			0%	10%
<b>Milking Parlor Floor Mitigations</b>				
<input type="checkbox"/>	<input checked="" type="checkbox"/>	(D) Feed according to NRC guidelines	0%	10%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	(D) Flush or hose milk parlor immediately prior to, immediately after, or during each milking. <i>Note: If selected for dairies &gt; 999 milk cows, control efficiency is already included in EF.</i>	0%	0%
<b>Total Control Efficiency</b>			0%	10%

Cow Housing				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	VOC Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
<b>Enteric Emissions Mitigations</b>				
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Feed according to NRC guidelines	0%	10%
<b>Total Control Efficiency</b>			0%	10%
<b>Corrals/Pens Mitigations</b>				
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Feed according to NRC guidelines	0%	10%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Inspect water pipes and troughs and repair leaks at least once every seven days. <i>Note: If selected for dairies &gt; 999 milk cows, CE is already included in EF.</i>	0%	0%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<b>Dairies:</b> Clean manure from corrals at least four times per year with at least 60 days between cleaning, or clean corrals at least once between April and July and at least once between September and December. <i>Note: If selected for dairies &gt; 999 milk cows, CE is already included in EF. Note: No additional control given for increased cleaning frequency (e.g. BACT requirement). Heifer/Calf Ranches:</i> Scrape corrals twice a year with at least 90 days between cleanings, excluding in-corral mounds. <i>Note: No additional control given for increased cleaning frequency (e.g. BACT requirement).</i>	0%	0%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Scrape, vacuum, or flush concrete lanes in corrals at least once every day for mature cows and every seven days for support stock, or clean concrete lanes such that the depth of manure does not exceed 12 inches at any point or time. <i>Note: No additional control given for increased cleaning frequency (e.g. BACT requirement).</i>	0%	10%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Implement one of the following: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 sq ft or less and slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 sq ft; 2) maintain corrals to ensure proper drainage preventing water from standing more than 48 hrs; 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface. <i>Note: If selected for dairies &gt; 999 milk cows, CE already included in EF.</i>	0%	0%
<input type="checkbox"/>	<input type="checkbox"/>	Install shade structures such that they are constructed with a light permeable roofing material. <i>Note: If selected for dairies &gt; 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.</i>	0%	5%
<input type="checkbox"/>	<input type="checkbox"/>	Install all shade structures uphill of any slope in the corral. <i>Note: If selected for dairies &gt; 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.</i>		
<input type="checkbox"/>	<input type="checkbox"/>	Clean manure from under corral shades at least once every 14 days, when weather permits access into corral. <i>Note: If selected for dairies &gt; 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.</i>		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Install shade structure so that the structure has a North/South orientation. <i>Note: If selected for dairies &gt; 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.</i>	0%	0%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Manage corrals such that the manure depth in the corral does not exceed 12 inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. The manure facility must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. <i>Note: If selected for dairies &gt; 999 milk cows, control efficiency is already included in EF.</i>		
<input type="checkbox"/>	<input type="checkbox"/>	Knockdown fence line manure build-up prior to it exceeding a height of 12 inches at any time or point. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. The facility must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible.	0%	0%
<input type="checkbox"/>	<input type="checkbox"/>	Use lime or a similar absorbent material in the corral according to the manufacturer's recommendation to minimize moisture in the corrals.	0%	0%
<input type="checkbox"/>	<input type="checkbox"/>	Apply thymol to the corral soil in accordance with the manufacturer's recommendation.	0%	0%
<b>Total Control Efficiency</b>			0.00%	23.05%
<b>Bedding Mitigations</b>				
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Feed according to NRC guidelines	0%	10%
<input type="checkbox"/>	<input type="checkbox"/>	Use non-manure-based bedding and non-separated solids based bedding for at least 90% of the bedding material, by weight, for freestalls (e.g. rubber mats, almond shells, sand, or waterbeds).	0%	0%

<input type="checkbox"/>	<input checked="" type="checkbox"/>	For a large dairy (1,000 milk cows or larger) or a heifer/calf ranch - Remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every 7 days.	0%	10%
<input type="checkbox"/>	<input type="checkbox"/>	(D) For a medium dairy only (500 to 999 milk cows) - Remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every 14 days.	0%	0%
<b>Total Control Efficiency</b>			0.00%	19.00%
<b>Lanes Mitigations</b>				
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Feed according to NRC guidelines	0%	10%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers. <b>Note: No control efficiency at this time.</b>	0%	0%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<b>Dairies:</b> Flush, scrape, or vacuum freestall flush lanes immediately prior to or after, or during each milking; or flush or scrape freestall flush lanes at least 3 times per day. <b>Heifer/Calf Ranches:</b> Vacuum, scrape, or flush freestalls at least once every seven days.	0%	10%
<input type="checkbox"/>	<input type="checkbox"/>	(D) Have no animals in exercise pens or corrals at any time.	0%	0%
<b>Total Control Efficiency</b>			0.00%	19.00%

Liquid Manure Handling				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	VOC Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
<b>Lagoons/Storage Ponds Mitigations</b>				
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Feed according to NRC guidelines	0%	10%
<input type="checkbox"/>	<input type="checkbox"/>	Use phototropic lagoon	0%	0%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Use an anaerobic treatment lagoon designed according to NRCS Guideline No. 359, or aerobic treatment lagoon, or mechanically aerated lagoon, or covered lagoon digester vented to a control device with minimum 95% control	0%	40%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Remove solids from the waste system with a solid separator system, prior to the waste entering the lagoon. <b>Note: If selected for dairies &gt; 999 milk cows, control efficiency is already included in EF.</b>	0%	0%
<input type="checkbox"/>	<input type="checkbox"/>	Maintain lagoon pH between 6.5 and 7.5	0%	0%
<b>Total Control Efficiency</b>			0.00%	46.00%
<b>Liquid Manure Land Application Mitigations</b>				
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Feed according to NRC guidelines	0%	10%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Only apply liquid manure that has been treated with an anaerobic or aerobic treatment lagoon, aerobic lagoon, or digester system	0%	40%
<input type="checkbox"/>	<input type="checkbox"/>	Allow liquid manure to stand in the fields for no more than 24 hours after irrigation. <b>Note: If selected for dairies &gt; 999 milk cows, control efficiency is already included in EF.</b>	0%	0%
<input type="checkbox"/>	<input type="checkbox"/>	Apply liquid/slurry manure via injection with drag hose or similar apparatus	0%	0%
<b>Total Control Efficiency</b>			0.00%	46.00%

Solid Manure Handling				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	VOC Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
<b>Solid Manure Storage Mitigations</b>				
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Feed according to NRC guidelines	0%	10%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<b>LARGE CAFO ONLY:</b> Within 72 hours of removal from housing, either a) remove dry manure from the facility, or b) cover dry manure outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed 24 hours per event.	0%	10%
<b>Total Control Efficiency</b>			0.00%	19.00%
<b>Separated Solids Piles Mitigations</b>				
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Feed according to NRC guidelines	0%	10%
<input type="checkbox"/>	<input type="checkbox"/>	<b>LARGE CAFO ONLY:</b> Within 72 hours of removal from the drying process, either a) remove separated solids from the facility, or b) cover separated solids outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed 24 hours per event.	0%	0%
<b>Total Control Efficiency</b>			0.00%	10.00%
<b>Solid Manure Land Application Mitigations</b>				
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Feed according to NRC guidelines	0%	10%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Incorporate all solid manure within 72 hours of land application. <b>Note: If selected for dairies &gt; 999 milk cows, control efficiency is already included in EF. Note: No additional control given for rapid manure incorporation (e.g. BACT requirement).</b>	0%	0%
<input type="checkbox"/>	<input type="checkbox"/>	Only apply solid manure that has been treated with an anaerobic treatment lagoon, aerobic lagoon or digester system.	0%	0%
<input type="checkbox"/>	<input type="checkbox"/>	Apply no solid manure with a moisture content of more than 50%	0%	0%
<b>Total Control Efficiency</b>			0.00%	10.00%

Silage and TMR				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	VOC Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
<b>Corn/Alfalfa/Wheat Silage Mitigations</b>				
<input type="checkbox"/>	<input type="checkbox"/>	1. Utilize a sealed feed storage system (e.g. Ag-Bag) for bagged silage, or		

<input type="checkbox"/>	<input checked="" type="checkbox"/>	<p>2. Cover the surface of silage piles, except for the area where feed is being removed from the pile, with a plastic tarp that is at least 5 mils thick (0.005 inches), multiple plastic tarps with a cumulative thickness of at least 5 mils (0.005 inches), or an oxygen barrier film covered with a UV resistant material within 72 hours of last delivery of material to the pile, and implement one of the following:</p> <p>a) build silage piles such that the average bulk density is at least 44 lb/cu-ft for corn silage and 40 lb/cu-ft for other silage types, as measured in accordance with Section 7.10 of Rule 4570.</p> <p>b) when creating a silage pile, adjust filling parameters to assure a calculated average bulk density of at least 44 lb/cu-ft for corn silage and at least 40 lb/cu-ft for other silage types, using a spreadsheet approved by the District,</p> <p>c) harvest silage crop at &gt; or = 65% moisture for corn; and &gt;= 60% moisture for alfalfa/grass and other silage crops; manage silage material delivery such that no more than 6 inches of materials are uncompacted on top of the pile; and incorporate the applicable Theoretical Length of Chop (TLC) and roller opening for the crop being harvested.</p> <p><b>For dairies</b> - implement <u>two</u> of the following:  <b>For heifer/calf ranches</b> - implement <u>one</u> of the following:</p> <p><b>Manage Exposed Silage.</b> a) manage silage piles such that only one silage pile has an uncovered face and the uncovered face has a total exposed surface area of less than 2,150 sq. ft., or b) manage multiple uncovered silage piles such that the total exposed surface area of all silage piles is less than 4,300 sq ft.</p> <p><b>Maintain Silage Working Face.</b> a) use a shaver/facer to remove silage from the silage pile, or b) maintain a smooth vertical surface on the working face of the silage pile</p> <p><b>Silage Additive:</b> a) inoculate silage with homolactic acid bacteria in accordance with manufacturer recommendations to achieve a concentration of at least 100,000 colony forming units per gram of wet forage or apply propionic acid, benzoic acid, sorbic acid, sodium benzoate, or potassium sorbate at a rate specified by the manufacturer to reduce yeast counts when forming silage pile; or b) apply other additives at specified rates that have been demonstrated to reduce alcohol concentrations in silage and/or VOC emissions from silage and have been approved by the District and EPA.</p>	0.0%	39.0%
<b>Total Control Efficiency*</b>		0.00%	39.00%	

\*Assumes 25% control for density mitigation measures and 10% each for the two optional measures, resulting in an overall control of 39%. The same conservative control efficiency will be applied to the sealed feed storage system (Ag-Bag).

		<b>TMR Mitigations</b>		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	(D) Push feed so that it is within 3 feet of feedlane fence within 2 hrs of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the cows.	0%	10%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	(D) Begin feeding total mixed rations within 2 hrs of grinding and mixing rations. <b>Note: If selected for dairies &gt; 999 milk cows, control efficiency already included in EF.</b>	0%	0%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Feed steam-flaked, dry rolled, cracked or ground corn or other ground cereal grains.	0%	10%
<input type="checkbox"/>	<input type="checkbox"/>	Remove uneaten wet feed from feed bunks within 24 hrs after then end of a rain event.	0%	0%
<input type="checkbox"/>	<input type="checkbox"/>	(D) For total mixed rations that contain at least 30% by weight of silage, feed animals total mixed rations that contain at least 45% moisture.	0%	0%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Feed according to NRC guidelines. <b>Note: If selected for dairies, control efficiency already included in EF.</b>	0%	0%
<b>Total Control Efficiency</b>			0.00%	19.00%

## Ammonia Mitigation Measures and Control Efficiencies

Milking Parlor				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	NH3 Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<b>Milking Parlor Floor Mitigations</b>		
		Feed according to NRC guidelines	0%	28%
<b>Total Control Efficiency</b>			0%	28%

Cow Housing				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	NH3 Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<b>Corrals/Pens Mitigations</b>		
		Feed according to NRC guidelines	0%	28%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Clean manure from corrals at least four times per year with at least 60 days between cleaning, or clean corrals at least once between April and July and at least once between September and December. <b>OR</b> Use lime or a similar absorbent material in the corral according to the manufacturer's recommendation to minimize moisture in the corrals. <b>OR</b> Apply thymol to the corral soil in accordance with the manufacturer's recommendation.	0%	50%
<b>Total Control Efficiency</b>			0%	64%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<b>Bedding Mitigations</b>		
		Feed according to NRC guidelines	0%	28%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Use non-manure-based bedding and non-separated solids based bedding for at least 90% of the bedding material, by weight, for freestalls (e.g. rubber mats, almond shells, sand, or waterbeds). <b>OR</b> For a <b>large dairy only</b> (1,000 milk cows or larger) - Remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every 7 days. <b>OR</b> For a <b>medium dairy only</b> (500 to 999 milk cows) - Remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every 14 days.	0.0%	47.7%
<b>Total Control Efficiency</b>			0.00%	62.34%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<b>Lanes Mitigations</b>		
		Feed according to NRC guidelines	0%	28%
<b>Total Control Efficiency</b>			0%	28%

Liquid Manure Handling				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	NH3 Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<b>Lagoons/Storage Ponds Mitigations</b>		
		Feed according to NRC guidelines	0%	28%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Use phototropic lagoon <b>OR</b> Remove solids from the waste system with a solid separator system, prior to the waste entering the lagoon.	0%	80%
<b>Total Control Efficiency</b>			0.0%	85.6%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<b>Liquid Manure Land Application Mitigations</b>		
		Feed according to NRC guidelines	0%	28%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Only apply liquid manure that has been treated with an anaerobic treatment lagoon	0%	42%
<b>Total Control Efficiency</b>			0.00%	58.24%

Solid Manure Handling				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	NH3 Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<b>Solid Manure Land Application Mitigations</b>		
		Feed according to NRC guidelines	0%	28%
<input type="checkbox"/>	<input type="checkbox"/>	Incorporate all solid manure within 72 hours of land application. <b>AND</b> Only apply solid manure that has been treated with an anaerobic treatment lagoon, aerobic lagoon or digester system. <b>AND</b> Apply no solid manure with a moisture content of more than 50%	0%	0%
<b>Total Control Efficiency</b>			0.00%	28.00%

Dairy Emission Factors

		lb/hd-yr Dairy Emissions Factors for Holstein Cows																												
		Milk Cows				Dry Cows				Large Heifers (15 to 24 months)				Medium Heifers (7 to 14 months)				Small Heifers (3 to 6 months)				Calves (0 - 3 months)				Bulls				
		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		
		<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	
Milking Parlor	VOC	Enteric Emissions in Milking Parlors	0.43	0.41	0.43	0.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
		Milking Parlor Floor	0.04	0.03	0.04	0.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
		<b>Total</b>	<b>0.47</b>	<b>0.44</b>	<b>0.47</b>	<b>0.40</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Cow Housing	VOC	Enteric Emissions in Cow Housing	3.89	3.69	3.89	3.32	2.33	2.23	2.33	2.01	1.81	1.71	1.81	1.54	1.23	1.17	1.23	1.05	0.69	0.65	0.69	0.58	0.32	0.31	0.32	0.28	1.10	1.04	1.10	0.94
		Corrals/Pens	10.00	6.60	10.00	5.08	5.40	3.59	5.40	2.76	4.20	2.76	4.20	2.12	2.85	1.88	2.85	1.45	1.60	1.04	1.60	0.80	0.75	0.50	0.75	0.39	2.55	1.67	2.55	1.29
		Bedding	1.05	1.00	1.05	0.81	0.57	0.54	0.57	0.44	0.44	0.42	0.44	0.34	0.30	0.28	0.30	0.23	0.17	0.16	0.17	0.13	0.08	0.08	0.08	0.06	0.27	0.25	0.27	0.20
Liquid Manure Handling	VOC	Lanes	0.84	0.80	0.84	0.65	0.45	0.44	0.45	0.35	0.35	0.33	0.35	0.27	0.24	0.23	0.24	0.18	0.13	0.13	0.13	0.10	0.06	0.06	0.06	0.05	0.21	0.20	0.21	0.16
		<b>Total</b>	<b>15.78</b>	<b>12.09</b>	<b>15.78</b>	<b>9.86</b>	<b>8.75</b>	<b>6.80</b>	<b>8.75</b>	<b>5.57</b>	<b>6.81</b>	<b>5.22</b>	<b>6.81</b>	<b>4.27</b>	<b>4.62</b>	<b>3.56</b>	<b>4.62</b>	<b>2.91</b>	<b>2.59</b>	<b>1.98</b>	<b>2.59</b>	<b>1.62</b>	<b>1.22</b>	<b>0.95</b>	<b>1.22</b>	<b>0.78</b>	<b>4.13</b>	<b>3.16</b>	<b>4.13</b>	<b>2.59</b>
		Enteric Emissions in Cow Housing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Solid Manure Handling	VOC	Corrals/Pens	41.90	41.90	41.90	15.08	21.20	21.20	21.20	7.63	11.00	11.00	11.00	3.96	7.90	7.90	7.90	2.84	6.00	6.00	6.00	2.16	1.80	1.80	1.80	0.65	15.30	15.30	15.30	5.51
		Bedding	6.30	6.30	6.30	2.37	3.20	3.20	3.20	1.20	1.70	1.70	1.70	0.64	1.20	1.20	1.20	0.45	0.90	0.90	0.90	0.34	0.30	0.30	0.30	0.11	2.30	2.30	2.30	0.87
		Lanes	5.10	5.10	5.10	3.67	2.60	2.60	2.60	1.87	1.30	1.30	1.30	0.94	1.00	1.00	1.00	0.72	0.70	0.70	0.70	0.50	0.20	0.20	0.20	0.14	1.90	1.90	1.90	1.37
Feed Storage and Handling	VOC	Lagoons/Storage Ponds	8.20	8.20	8.20	1.18	4.20	4.20	4.20	0.60	2.20	2.20	2.20	0.32	1.50	1.50	1.50	0.22	1.20	1.20	1.20	0.17	0.35	0.35	0.35	0.05	3.00	3.00	3.00	0.43
		Liquid Manure Land Application	8.90	8.90	8.90	3.72	4.50	4.50	4.50	1.88	2.30	2.30	2.30	0.96	1.70	1.70	1.70	0.71	1.30	1.30	1.30	0.54	0.37	0.37	0.37	0.15	3.23	3.23	3.23	1.35
		<b>Total</b>	<b>17.10</b>	<b>17.10</b>	<b>17.10</b>	<b>4.90</b>	<b>8.70</b>	<b>8.70</b>	<b>2.48</b>	<b>4.50</b>	<b>4.50</b>	<b>4.50</b>	<b>1.28</b>	<b>3.20</b>	<b>3.20</b>	<b>3.20</b>	<b>0.93</b>	<b>2.50</b>	<b>2.50</b>	<b>2.50</b>	<b>0.72</b>	<b>0.72</b>	<b>0.72</b>	<b>0.72</b>	<b>0.20</b>	<b>6.23</b>	<b>6.23</b>	<b>6.23</b>	<b>1.78</b>	
Solid Manure Handling	VOC	Lagoons/Storage Ponds	0.16	0.15	0.16	0.12	0.09	0.08	0.09	0.07	0.07	0.06	0.07	0.05	0.05	0.04	0.05	0.03	0.03	0.02	0.03	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.02
		Separated Solids Piles	0.06	0.06	0.06	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02
		Solid Manure Land Application	0.39	0.33	0.39	0.30	0.21	0.18	0.21	0.16	0.16	0.14	0.16	0.12	0.11	0.09	0.11	0.08	0.06	0.05	0.06	0.05	0.03	0.03	0.03	0.02	0.10	0.08	0.10	0.07
Solid Manure Handling	NH3	Enteric Emissions in Cow Housing	0.95	0.95	0.95	0.95	0.48	0.48	0.48	0.48	0.25	0.25	0.25	0.25	0.18	0.18	0.18	0.18	0.13	0.13	0.13	0.13	0.04	0.04	0.04	0.04	0.35	0.35	0.35	0.35
		Separated Solids Piles	0.38	0.38	0.38	0.38	0.19	0.19	0.19	0.19	0.10	0.10	0.10	0.10	0.07	0.07	0.07	0.07	0.05	0.05	0.05	0.05	0.02	0.02	0.02	0.02	0.14	0.14	0.14	0.14
		Solid Manure Land Application	2.09	2.09	2.09	1.50	1.06	1.06	1.06	0.76	0.55	0.55	0.55	0.40	0.39	0.39	0.39	0.28	0.30	0.30	0.30	0.22	0.09	0.09	0.09	0.06	0.76	0.76	0.76	0.55
Solid Manure Handling	NH3	<b>Total</b>	<b>3.42</b>	<b>3.42</b>	<b>3.42</b>	<b>2.83</b>	<b>1.73</b>	<b>1.73</b>	<b>1.73</b>	<b>1.43</b>	<b>0.90</b>	<b>0.90</b>	<b>0.90</b>	<b>0.75</b>	<b>0.64</b>	<b>0.64</b>	<b>0.64</b>	<b>0.53</b>	<b>0.48</b>	<b>0.48</b>	<b>0.48</b>	<b>0.40</b>	<b>0.15</b>	<b>0.15</b>	<b>0.15</b>	<b>0.12</b>	<b>1.25</b>	<b>1.25</b>	<b>1.25</b>	<b>1.04</b>

Silage and TMR (Total Mixed Ration) Emissions (µg/m <sup>2</sup> -min)					
Feed Storage and Handling	VOC	Silage Type	Uncontrolled	EF1	EF2
		Corn Silage	34,681	34,681	21,155
Alfalfa Silage	17,458	17,458	10,649		
Wheat Silage	43,844	43,844	26,745		
TMR	13,056	13,056	10,575		

Assumptions: 1) Each silage pile is completely covered except for the front face and 2) Rations are fed within 48 hours.

PM <sub>10</sub> Emission Factors (lb/hd-yr)		
Type of Cow	Dairy EF	Source
Cows in Freestalls	1.37	Based on a Summer 2003 study by Texas A&M ASAE at a West Texas Dairy
Milk/Dry in Loafing Barns	2.73	SJVAPCD
Heifers/Bulls in Loafing Barns	5.28	SJVAPCD
Calves in Loafing Barns	0.69	SJVAPCD
Milk/Dry in Corrals	5.46	Based on a Summer 2003 study by Texas A&M ASAE at a West Texas Dairy
Support Stock (Heifers/Bulls) in Open Corrals	10.55	Based on a USDA/UC Davis report quantifying dairy and feedlot emissions in Tulare & Kern Counties (April '01)
Large Heifers in Open Corrals	8.01	SJVAPCD
Calf (under 3 mo.) open corrals	1.37	SJVAPCD
Calf on-ground hutches	0.343	SJVAPCD
Calf above-ground flushed	0.069	SJVAPCD
Calf above-ground scraped	0.206	SJVAPCD

The controlled PM10 EF will be calculated based on the specific PM10 mitigation measures, if any, for each freestall, corral, or calf hutch area. See the PM Mitigation Measures for calculations.

PM10 Mitigation Measures and Control Efficiencies

Control Measure	PM10 Control Efficiency
Shaded corrals (milk and dry cows)	16.7%
Shaded corrals (heifers and bulls)	8.3%
Downwind shelterbelts	12.5%
Upwind shelterbelts	10%
Freestall with no exercise pens and non-manure based bedding	90%
Freestall with no exercise pens and manure based bedding	80%
Fibrous layer in dusty areas (i.e. hay, etc.)	10%
Bi-weekly corral/exercise pen scraping and/or manure removal using a pull type manure harvesting equipment in morning hours when moisture in air except during periods of rainy weather	15%
Sprinkling of open corrals/exercise pens	12.5%
Feeding young stock (heifers and calves) near dusk	10%

Pre-Project PM10 Mitigation Measures

Pre-Project PM10 Mitigation Measures														
Housing Name(s) or #s)	Type of Housing	Type of cow	Total # of cows in Each Housing Structure(s)	Maximum Design Capacity of Each Structure	# of Combined Housing Structures in row	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk
1	Shade Barn 1	saudi style barn	milk cows	237	237	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Shade Barn 2	saudi style barn	milk cows	238	238	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Shade Barn 3	saudi style barn	dry cows	100	100	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Corral 1	open corral	support stock	96	96	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Corral 2	open corral	support stock	96	96	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Corral 3	open corral	support stock	96	96	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Corral 4	open corral	support stock	47	47	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Pre-Project Total # of Cows</b>			<b>910</b>											

Pre-Project PM10 Control Efficiencies and Emission Factors															
Housing Name(s) or #s)	Type of Housing	Type of cow	Total # of cows in Each Housing Structure(s)	Maximum Design Capacity of Each Structure	Uncontrolled EF (lb/hd-yr)	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk	Controlled EF (lb/hd-yr)
1	Shade Barn 1	saudi style barn	milk cows	237	237	1,370									1.37
2	Shade Barn 2	saudi style barn	milk cows	238	238	1,370									1.37
3	Shade Barn 3	saudi style barn	dry cows	100	100	1,370									1.37
4	Corral 1	open corral	support stock	96	96	10,550									10.55
5	Corral 2	open corral	support stock	96	96	10,550									10.55
6	Corral 3	open corral	support stock	96	96	10,550									10.55
7	Corral 4	open corral	support stock	47	47	10,550									10.55
<b>Pre-Project Total # of Cows</b>			<b>910</b>												

Post-Project PM10 Mitigation Measures

Post-Project PM10 Mitigation Measures														
Housing Name(s) or #s)	Type of Housing	Type of cow	Total # of cows in Each Housing Structure(s)	Maximum Design Capacity of Each Structure	# of Combined Housing Structures in row	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk
1	Shade Barn 1	saudi style barn	milk cows	700	700	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Shade Barn 2	saudi style barn	milk cows	1,000	1,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Shade Barn 3	saudi style barn	dry cows	300	300	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Corral 1	open corral	support stock	95	96	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Corral 2	open corral	support stock	95	96	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Corral 3	open corral	support stock	95	96	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Corral 4	open corral	support stock	47	47	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Post-Project PM10 Mitigation Measures for New Housing Units at an Expanding Dairy														
Housing Name(s) or #s)	Type of Housing	Type of cow	Total # of cows in Each Housing Structure(s)	Maximum Design Capacity of Each Structure	# of Combined Housing Structures in row	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk
1	Shade Barn 4	saudi style barn	support stock	334	334	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	Shade Barn 5	saudi style barn	milk cows	1,000	1,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	Shade Barn 6	saudi style barn	support stock	334	334	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Post-Project Total # of Cows</b>			<b>4,000</b>			(The post-project total includes			dairy cows already on-site and			new cows from the expansion.)		

Post-Project PM10 Control Efficiencies and Emission Factors															
Housing Name(s) or #s)	Type of Housing	Type of cow	Total # of cows in Each Housing Structure(s)	Maximum Design Capacity of Each Structure	Uncontrolled EF (lb/hd-yr)	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk	Controlled EF (lb/hd-yr)
1	Shade Barn 1	saudi style barn	milk cows	700	700	1,370						15%			1.17
2	Shade Barn 2	saudi style barn	milk cows	1,000	1,000	1,370						15%			1.17
3	Shade Barn 3	saudi style barn	dry cows	300	300	1,370						15%			1.17
4	Corral 1	open corral	support stock	95	96	10,550									10.55
5	Corral 2	open corral	support stock	95	96	10,550									10.55
6	Corral 3	open corral	support stock	95	96	10,550									10.55
7	Corral 4	open corral	support stock	47	47	10,550									10.55

Post-Project PM10 Control Efficiencies and Emission Factors for New Housing Emissions Units															
Housing Name(s) or #s)	Type of Housing	Type of cow	Total # of cows in Each Housing Structure(s)	Maximum Design Capacity of Each Structure	Uncontrolled EF (lb/hd-yr)	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk	Controlled EF (lb/hd-yr)
1	Shade Barn 4	saudi style barn	support stock	334	334	1,370						15%		10%	1.05
2	Shade Barn 5	saudi style barn	milk cows	1000	1000	1,370						15%	10.0%		1.05
3	Shade Barn 6	saudi style barn	support stock	334	334	1,370						15%		10%	1.05

### Pre-Project Potential to Emit - Cow Housing

Pre-Project Potential to Emit - Cow Housing												
Housing Name(s) or # (s)	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)	
1	Shade Barn 1	milk cows	237	15.78	53.30	1.37	10.2	3,740	34.6	12,632	0.9	325
2	Shade Barn 2	milk cows	238	15.78	53.30	1.37	10.3	3,756	34.8	12,685	0.9	326
3	Shade Barn 3	dry cows	100	8.75	27.00	1.37	2.4	875	7.4	2,700	0.4	137
4	Corral 1	support stock	96	6.81	14.00	10.55	1.8	654	3.7	1,344	2.8	1,013
5	Corral 2	support stock	96	6.81	14.00	10.55	1.8	654	3.7	1,344	2.8	1,013
6	Corral 3	support stock	96	6.81	14.00	10.55	1.8	654	3.7	1,344	2.8	1,013
7	Corral 4	support stock	47	6.81	14.00	10.55	0.9	320	1.8	658	1.4	496
<b>Pre-Project Total # of Cows</b>		<b>910</b>				<b>29.2</b>	<b>10,653</b>	<b>89.7</b>	<b>32,707</b>	<b>12.0</b>	<b>4,323</b>	

\*Multiple emissions units (freestalls, corrals, calf hutch areas, etc.) are combined in these rows.

Pre-Project Totals						
Total # of Cows	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
910	29.2	10,653	89.7	32,707	12.0	4,323

**Calculations:**

Annual PE 1 for each pollutant (lb/yr) = Controlled EF (lb/hd-yr) x # of cows (hd)  
 Daily PE1 for each pollutant (lb/day) = [Controlled EF (lb/hd-yr) x # of cows (hd)] ÷ 365 (day/yr)

### Post-Project Potential to Emit - Cow Housing

Post-Project Potential to Emit - Cow Housing												
Housing Name(s) or # (s)	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)	
1	Shade Barn 1	milk cows	700	9.86	21.13	1.17	18.9	6,902	40.5	14,790	2.2	816
2	Shade Barn 2	milk cows	1,000	9.86	21.13	1.17	27.0	9,860	57.9	21,128	3.2	1,165
3	Shade Barn 3	dry cows	300	5.57	10.71	1.17	4.6	1,671	8.8	3,213	1.0	350
4	Corral 1	support stock	95	4.27	5.54	10.55	1.1	406	1.4	526	2.7	1,002
5	Corral 2	support stock	95	4.27	5.54	10.55	1.1	406	1.4	526	2.7	1,002
6	Corral 3	support stock	95	4.27	5.54	10.55	1.1	406	1.4	526	2.7	1,002
7	Corral 4	support stock	47	4.27	5.54	10.55	0.6	201	0.7	260	1.4	496
<b>Post-Project # of Cows (non-expansion)</b>		<b>2,332</b>				<b>54.4</b>	<b>19,852</b>	<b>112.1</b>	<b>40,969</b>	<b>15.9</b>	<b>5,833</b>	

\*Multiple emissions units (freestalls, corrals, calf hutch areas, etc.) are combined in these rows.

### Post-Project Potential to Emit - Cow Housing: New Housing Units at an Expanding Dairy

Post-Project Potential to Emit - Cow Housing: New Housing Units at an Expanding Dairy												
Housing Name(s) or # (s)	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)	
1	Shade Barn 4	support stock	334	4.27	5.54	1.05	3.9	1,426	5.1	1,849	1.0	350
2	Shade Barn 5	milk cows	1000	9.86	21.13	1.05	27.0	9,860	57.9	21,128	2.9	1,048
3	Shade Barn 6	support stock	334	4.27	5.54	1.05	3.9	1,426	5.1	1,849	1.0	350
<b>Total # of Cows From Expansion</b>		<b>1,668</b>				<b>34.8</b>	<b>12,712</b>	<b>68.1</b>	<b>24,826</b>	<b>4.9</b>	<b>1,748</b>	

\*Multiple emissions units (freestalls, corrals, calf hutch areas, etc.) are combined in these rows.

Post-Project Totals						
Total # of Cows	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
4,000	89.2	32,564	180.2	65,795	20.8	7,581

**Calculations:**

Annual PE 2 for each pollutant (lb/yr) = Controlled EF (lb/hd-yr) x # of cows (hd)  
 Daily PE2 for each pollutant (lb/day) = [Controlled EF (lb/hd-yr) x # of cows (hd)] ÷ 365 (day/yr)

**Pre-Project Worst Case BACT Calculations - Cow Housing**

This table uses the worst case emission factor for each cow type and the maximum design capacity of the housing unit. This should only be used for BACT calculation purposes.

Worst-Case Pre-Project Potential to Emit - Cow Housing												
Housing Name(s) or #(s)	Type of Cow	Capacity per housing unit	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)	
1	Shade Barn 1	milk cows	237	15.78	53.30	10.55	10.2	3,740	34.6	12,632	6.8	2,500
2	Shade Barn 2	milk cows	238	15.78	53.30	10.55	10.3	3,756	34.8	12,685	6.9	2,511
3	Shade Barn 3	dry cows	100	15.78	53.30	10.55	4.3	1,578	14.6	5,330	2.9	1,055
4	Corral 1	support stock	96	15.78	53.30	10.55	4.2	1,515	14.0	5,117	2.8	1,013
5	Corral 2	support stock	96	15.78	53.30	10.55	4.2	1,515	14.0	5,117	2.8	1,013
6	Corral 3	support stock	96	15.78	53.30	10.55	4.2	1,515	14.0	5,117	2.8	1,013
7	Corral 4	support stock	47	15.78	53.30	10.55	2.0	742	6.9	2,505	1.4	496
						<b>39.4</b>	<b>14,361</b>	<b>132.9</b>	<b>48,503</b>	<b>26.4</b>	<b>9,601</b>	

\*Multiple emissions units (freestalls, corrals, calf hutch areas, etc.) are combined in these rows. BACT applicability has been calculated for EACH emissions unit in this row.

Pre-Project Totals					
VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
<b>39.4</b>	<b>14,361</b>	<b>132.9</b>	<b>48,503</b>	<b>26.4</b>	<b>9,601</b>

Calculations:  
 Annual PE 1 for each pollutant (lb/yr) = Controlled EF (lb/hd-yr) x # of cows (hd)  
 Daily PE1 for each pollutant (lb/day) = [Controlled EF (lb/hd-yr) x # of cows (hd)] ÷ 365 (day/yr)

**Post-Project Worst Case BACT Calculations - Existing Cow Housing**

This table uses the worst case emission factor for each cow type and the maximum design capacity of the housing unit. This should only be used for BACT calculation purposes.

Post-Project Worst Case BACT Calculations - Existing Cow Housing																		
Housing Name(s) or #(s)	Type of Cow	Capacity per housing unit	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)	VOC AIPE	NH3 AIPE	PM10 AIPE	BACT Triggered for VOC?	BACT Triggered for NH3?	BACT Triggered for PM10?	
1	Shade Barn 1	milk cows	700	9.86	21.13	8.97	18.9	6,902	40.5	14,790	17.2	6,278	12.5	26.8	11.4	Yes	Yes	Yes
2	Shade Barn 2	milk cows	1,000	9.86	21.13	8.97	27.0	9,860	57.9	21,128	24.6	8,968	20.6	44.1	18.7	Yes	Yes	Yes
3	Shade Barn 3	dry cows	300	9.86	21.13	8.97	8.1	2,958	17.4	6,338	7.4	2,690	5.4	11.6	4.9	Yes	Yes	Yes
4	Corral 1	support stock	96	9.86	21.13	10.55	2.6	947	5.6	2,028	2.8	1,013	0.0	0.1	0.0	No	No	No
5	Corral 2	support stock	96	9.86	21.13	10.55	2.6	947	5.6	2,028	2.8	1,013	0.0	0.1	0.0	No	No	No
6	Corral 3	support stock	96	9.86	21.13	10.55	2.6	947	5.6	2,028	2.8	1,013	0.0	0.1	0.0	No	No	No
7	Corral 4	support stock	47	9.86	21.13	10.55	1.3	463	2.7	993	1.4	496	0.1	0.0	0.0	No	No	No
						<b>63.1</b>	<b>23,024</b>	<b>135.3</b>	<b>49,333</b>	<b>59.0</b>	<b>21,471</b>							

\*Multiple emissions units (freestalls, corrals, calf hutch areas, etc.) are combined in these rows. BACT applicability has been calculated for EACH emissions unit in this row.

Calculations:  
 Annual PE 2 for each pollutant (lb/yr) = Controlled EF (lb/hd-yr) x # of cows (hd)  
 Daily PE2 for each pollutant (lb/day) = [Controlled EF (lb/hd-yr) x # of cows (hd)] ÷ 365 (day/yr)

**Post-Project Worst Case BACT Calculations - New Cow Housing**

This table uses the worst case emission factor for each cow type and the maximum design capacity of the housing unit. This should only be used for BACT calculation purposes.

Post-Project Potential to Emit - Cow Housing: New Freestalls at Existing Dairy																
Housing Name(s) or #(s)	Type of Cow	Capacity per housing unit	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)	BACT Triggered for VOC?	BACT Triggered for NH3?	BACT Triggered for PM10?		
1	Shade Barn 4	support stock	334	9.86	21.13	8.07	9.0	3,293	19.3	7,057	7.4	2,696	Yes	Yes	Yes	
2	Shade Barn 5	milk cows	1000	9.86	21.13	8.07	27.0	9,860	57.9	21,128	22.1	8,071	Yes	Yes	Yes	
3	Shade Barn 6	support stock	334	9.86	21.13	8.07	9.0	3,293	19.3	7,057	7.4	2,696	Yes	Yes	Yes	
						<b>45.0</b>	<b>16,446</b>	<b>96.5</b>	<b>35,242</b>	<b>36.9</b>	<b>13,463</b>					

\*Multiple emissions units (freestalls, corrals, calf hutch areas, etc.) are combined in these rows. BACT applicability has been calculated for EACH emissions unit in this row.

Post-Project Totals					
VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
<b>108.1</b>	<b>39,470</b>	<b>231.8</b>	<b>84,575</b>	<b>95.9</b>	<b>34,934</b>

Calculations:  
 Annual PE 2 for each pollutant (lb/yr) = Controlled EF (lb/hd-yr) x # of cows (hd)  
 Daily PE2 for each pollutant (lb/day) = [Controlled EF (lb/hd-yr) x # of cows (hd)] ÷ 365 (day/yr)



BACT Applicability

Milking Parlor						
VOC Emissions						
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)	
Milk Cows	3.0	0.6	0.40	0.47	2.5	
<b>BACT triggered for VOC for milking parlor</b>					<b>Total</b>	<b>2.5</b>
NH3 Emissions						
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)	
Milk Cows	1.0	0.2	0.14	0.19	0.9	
<b>Total</b>					<b>0.9</b>	

**Cow Housing**  
See detailed cow housing AIPE calculations on the BACT Calcs page.

Liquid Manure Handling						
VOC Emissions - Lagoon/Storage Pond(s)						
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)	
Milk Cows	5.2	2.0	0.70	1.52	4.3	
Dry Cows	0.3	0.2	0.38	0.82	0.2	
Support Stock (Heifers, Calves, and Bulls)	0.8	0.6	0.29	0.64	0.5	
Large Heifers	0.0	0.0	0.29	0.64	0.0	
Medium Heifers	0.0	0.0	0.20	0.43	0.0	
Small Heifers	0.0	0.0	0.11	0.24	0.0	
Calves	0.0	0.0	0.05	0.11	0.0	
Bulls	0.0	0.0	0.18	0.40	0.0	
<b>BACT triggered for VOC for Lagoon/Storage Ponds</b>					<b>Total</b>	<b>5.0</b>

VOC Emissions - Land Application						
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)	
Milk Cows	5.6	2.1	0.76	1.64	4.6	
Dry Cows	0.3	0.2	0.41	0.89	0.2	
Support Stock (Heifers, Calves, and Bulls)	0.9	0.6	0.32	0.69	0.6	
Large Heifers	0.0	0.0	0.32	0.69	0.0	
Medium Heifers	0.0	0.0	0.22	0.47	0.0	
Small Heifers	0.0	0.0	0.12	0.26	0.0	
Calves	0.0	0.0	0.06	0.12	0.0	
Bulls	0.0	0.0	0.19	0.42	0.0	
<b>BACT triggered for VOC for Liquid Manure Land Application</b>					<b>Total</b>	<b>5.5</b>

NH3 Emissions - Lagoon/Storage Pond(s)						
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)	
Milk Cows	8.7	10.7	1.18	8.20	7.2	
Dry Cows	0.5	1.2	0.60	4.20	0.3	
Support Stock (Heifers, Calves, and Bulls)	0.9	2.0	0.32	2.20	0.6	
Large Heifers	0.0	0.0	0.32	2.20	0.0	
Medium Heifers	0.0	0.0	0.22	1.50	0.0	
Small Heifers	0.0	0.0	0.17	1.20	0.0	
Calves	0.0	0.0	0.05	0.35	0.0	
Bulls	0.0	0.0	0.43	3.00	0.0	
<b>BACT triggered for NH3 for Lagoon/Storage Ponds</b>					<b>Total</b>	<b>8.1</b>

NH3 Emissions - Land Application						
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)	
Milk Cows	27.5	11.6	3.72	8.90	22.7	
Dry Cows	1.5	1.2	1.88	4.50	1.0	
Support Stock (Heifers, Calves, and Bulls)	2.6	2.1	0.96	2.30	1.7	
Large Heifers	0.0	0.0	0.96	2.30	0.0	
Medium Heifers	0.0	0.0	0.71	1.70	0.0	
Small Heifers	0.0	0.0	0.54	1.30	0.0	
Calves	0.0	0.0	0.15	0.37	0.0	
Bulls	0.0	0.0	1.35	3.23	0.0	
<b>BACT triggered for NH3 for Liquid Manure Land Application</b>					<b>Total</b>	<b>25.4</b>

H2S Emissions - Lagoon/Storage Pond(s)						
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)	
Milk Cows	N/A	N/A	N/A	N/A	#VALUE!	
Dry Cows	N/A	N/A	N/A	N/A	#VALUE!	
Support Stock (Heifers, Calves, and Bulls)	N/A	N/A	N/A	N/A	#VALUE!	
Large Heifers	N/A	N/A	N/A	N/A	#VALUE!	
Medium Heifers	N/A	N/A	N/A	N/A	#VALUE!	
Small Heifers	N/A	N/A	N/A	N/A	#VALUE!	
Calves	N/A	N/A	N/A	N/A	#VALUE!	
Bulls	N/A	N/A	N/A	N/A	#VALUE!	
<b>BACT for H2S emissions will be calculated separately.</b>					<b>Total</b>	<b>#VALUE!</b>

Solid Manure Handling					
VOC Emissions - Solid Manure Storage/Separated Solids Piles					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	1.3	0.3	0.18	0.22	1.1
Dry Cows	0.1	0.0	0.10	0.12	0.1
Support Stock (Heifers, Calves, and Bulls)	0.2	0.1	0.10	0.09	0.1
Large Heifers	0.0	0.0	0.07	0.09	0.0
Medium Heifers	0.0	0.0	0.05	0.06	0.0
Small Heifers	0.0	0.0	0.03	0.04	0.0
Calves	0.0	0.0	0.01	0.02	0.0
Bulls	0.0	0.0	0.05	0.06	0.0
<b>Total</b>					<b>1.3</b>

VOC Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	2.2	0.5	0.30	0.39	1.8
Dry Cows	0.1	0.1	0.16	0.21	0.0
Support Stock (Heifers, Calves, and Bulls)	0.3	0.2	0.12	0.16	0.1
Large Heifers	0.0	0.0	0.12	0.16	0.0
Medium Heifers	0.0	0.0	0.08	0.11	0.0
Small Heifers	0.0	0.0	0.05	0.06	0.0
Calves	0.0	0.0	0.02	0.03	0.0
Bulls	0.0	0.0	0.07	0.10	0.0
<b>Total</b>					<b>2.0</b>

NH3 Emissions - Solid Manure Storage/Separated Solids Piles						
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)	
Milk Cows	9.8	1.7	1.33	1.33	8.1	
Dry Cows	0.6	0.2	0.67	0.67	0.4	
Support Stock (Heifers, Calves, and Bulls)	1.0	0.3	0.35	0.35	0.7	
Large Heifers	0.0	0.0	0.35	0.35	0.0	
Medium Heifers	0.0	0.0	0.25	0.25	0.0	
Small Heifers	0.0	0.0	0.18	0.18	0.0	
Calves	0.0	0.0	0.06	0.06	0.0	
Bulls	0.0	0.0	0.49	0.49	0.0	
<b>BACT triggered for NH3 for Solid Manure Storage</b>					<b>Total</b>	<b>9.2</b>

NH3 Emissions - Land Application						
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)	
Milk Cows	11.1	2.7	1.50	2.09	9.2	
Dry Cows	0.6	0.3	0.76	1.06	0.4	
Support Stock (Heifers, Calves, and Bulls)	1.1	0.5	0.40	0.55	0.7	
Large Heifers	0.0	0.0	0.40	0.55	0.0	
Medium Heifers	0.0	0.0	0.28	0.39	0.0	
Small Heifers	0.0	0.0	0.22	0.30	0.0	
Calves	0.0	0.0	0.06	0.09	0.0	
Bulls	0.0	0.0	0.55	0.76	0.0	
<b>BACT triggered for NH3 for Solid Manure Land Application</b>					<b>Total</b>	<b>10.3</b>

Feed Storage and Handling						
VOC Emissions - Silage						
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)	
Corn Silage	22.2	36.4	21,155	34,681	0.0	
Alfalfa Silage	0.0	0.0	10,649	17,458	0.0	
Wheat Silage	28.1	46.0	26,745	43,844	0.0	
<b>Total</b>					<b>0.0</b>	
VOC Emissions - TMR						
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)	
TMR	88.2	24.8	10,575	13,056	68.1	
<b>BACT triggered for VOC for TMR</b>					<b>Total</b>	<b>68.1</b>





## Increase in Emissions

<b>SSIPE (lb/yr)</b>							
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	857	279	0
Cow Housing	0	0	3,258	0	21,911	33,088	0
Liquid Manure	0	0	0	0	2,671	4,754	N/A
Solid Manure	0	0	0	0	1,137	6,721	0
Feed Handling	0	0	0	0	11,418	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>3,258</b>	<b>0</b>	<b>37,994</b>	<b>44,842</b>	<b>N/A</b>

<b>Total Daily Change in Emissions (lb/day)</b>							
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0.0	0.0	0.0	0.0	2.4	0.8	0.0
Cow Housing	0.0	0.0	8.8	0.0	60.0	90.5	0.0
Liquid Manure	0.0	0.0	0.0	0.0	7.3	12.9	N/A
Solid Manure	0.0	0.0	0.0	0.0	3.1	18.4	0.0
Feed Handling	0.0	0.0	0.0	0.0	31.3	0.0	0.0
<b>Total</b>	<b>0.0</b>	<b>0.0</b>	<b>8.8</b>	<b>0.0</b>	<b>104.1</b>	<b>122.6</b>	<b>N/A</b>

<b>Total Annual Change in Non-Fugitive Emissions (Major Source Emissions) (lb/yr)</b>							
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	0	0	0
Cow Housing	0	0	0	0	0	0	0
Liquid Manure	0	0	0	0	1,276	0	N/A
Solid Manure	0	0	0	0	0	0	0
Feed Handling	0	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1,276</b>	<b>0</b>	<b>N/A</b>

# **APPENDIX I**

## **Anaerobic Lagoon Design Check**

## Lagoon Design Check in Accordance with NRCS Guideline #359

### Proposed Lagoon Volume

$$\text{Volume of treatment lagoon} = (L \times W \times D) - (S \times D^2) \times (W + L) + (4 \times S^2 \times D^3 \div 3)$$

#### Primary Treatment Lagoon Dimensions

Length	975	ft
Width	125	ft
Depth	15	ft
Slope	2	ft

(Subtract 2 feet from the actual lagoon depth for run-off or miscellaneous water.)

**Primary Lagoon Volume**      **1,351,125 ft<sup>3</sup>**

#### Secondary Treatment Lagoon Dimensions

Length	975	ft
Width	125	ft
Depth	15	ft
Slope	2	ft

(Subtract 2 feet from the actual lagoon depth for run-off or miscellaneous water.)

**Secondary Lagoon Volume**      **1,351,125 ft<sup>3</sup>**

**Total Lagoon Volume**      **2,702,250 ft<sup>3</sup>**

#### INSTRUCTIONS

\* only input yellow fields

- Step 1** Enter primary lagoon dimensions on this sheet
- Step 2** Go to "Net Volatile Solids Loading" sheet and enter number of animals flushing manure to lagoon
- Step 3** Adjust % in flush and separation as necessary (see notes on sheet)
- Step 4** Go to "Minimum Treatment Volume"
- Step 5** Minimum treatment volume should be less than lagoon volume to be considered anaerobic treatment lagoon
- Step 6** Go to "Hydraulic Retention Time"
- Step 7** Adjust fresh water as applicable
- Step 8** Hydraulic retention time should be greater than 34 days to be considered anaerobic treatment lagoon.

# Lagoon Design Check in Accordance with NRCS Guideline #359

## Net Volatile Solids loading Calculation

Net Volatile Solids (VS) Loading of Treatment Lagoons									
Breed: Holstein Type of Cow	Number of Animals	x	VS Excreted[1] (lb/day)	x	% Manure in Flush[2]	x	(1 - % VS Removed in Separation[3])	=	Net VS Loading (lb/day)
Milk Cows	2,500	x	17	x	71%	x	50%	=	15,088
Dry Cow	500	x	9.2	x	71%	x	50%	=	1,633
Heifer (15 to 24 months)	1,000	x	7.1	x	48%	x	50%	=	1,704
Heifer (7 to 14 months)		x	4.9	x	48%	x	50%	=	0
Heifer (3 to 6 months)		x	2.7	x	48%	x	50%	=	0
Calf (under 3 months)		x	1.0	x	100%	x	50%	=	0
Bulls		x	9.2	x	48%	x	50%	=	0
<b>Total for Dairy</b>									<b>18,425</b>

[1]The Volatile Solids (VS) excretion rates for Holstein cattle are based on Table 1.b – Section 3 of ASAE D384.2 (March 2005). VS excretion rates for milk cows, dry cows, & heifers 15-24 months were taken directly from the table. The VS excretion rate for heifers 3-6 months was estimated based on total solids excretion. The VS excretion rate for heifers 7-14 months was estimated as the average of heifers 15-24 months and heifers 3-6 months. The table did not give values for total solids or volatile solids excreted by baby calves. The VS excretion rate for baby calves was estimated based on an estimated dry matter intake (DMI) of 1.7% of body weight and the ratio of DMI to VS excretion for 150 kg calves. The VS excretion rate for mature bulls was assumed to be similar to dry cows.

[2] The % manure was taken from Table 3-1 of the California Regional Water Quality Control Board Document “Managing Dairy Manure in the Central Valley of California”, UC Davis, June 2005. This document estimated that 21-48% of the manure in open corral dairies is handled as a liquid. Therefore, as a worst case assumption, 48% will be used for all cows housed in open corrals with flush lanes. The document also estimates a range of 42-100% manure handled as a liquid in the freestalls. For freestalls without exercise pens, 100% of manure as a liquid in the flush will be used; for freestalls with exercise pens, the average of the range  $((100+42)/2 = 71\%)$  will be used. (<http://groundwater.ucdavis.edu/Publications/uc-committee-of-experts-final-report%202006.pdf>) Saudi style/loafing barns are hybrids between freestalls and open corrals, the percentage of manure collected on the concrete feed lanes will be averaged between the values from the cows housed in freestall barns and open corrals. Therefore the % of manure deposited on the concrete lanes is equal to  $60\% [(71+48)/2]$ .

[3] Chastain, J.P., Vanotti, M. B., and Wingfield, M. M., Effectiveness of Liquid-Solid Separation For Treatment of Flushed Dairy Manure: A Case Study, Applied Engineering in Agriculture, Vol 17(3): 343-354 - This document outlines a VS removal rate of 50.1% to 70% depending on the type of separation system used, however to be conservative, a 50% VS removal will be used for all systems.

# Lagoon Design Check in Accordance with NRCS Guideline #359

## Minimum Treatment Volume Calculation

$$MTV = TVS/VSLR$$

Where:

MTV = Minimum Treatment Volume (ft<sup>3</sup>)

TVS = daily Total Volatile solids Loading (lb/day) = 0.011 lb/ft<sup>3</sup>-day

VSLR = Volatile Solids Loading Rate (lb/1000 ft<sup>3</sup>-day)

Minimum Treatment Volume in Primary Lagoon					
Breed: Holstein	Net VS Loading (lb/day)		VSLR (lb/ft <sup>3</sup> -day)[1]		MTV (ft <sup>3</sup> )
Type of Cow					
Milk Cows	15,088	÷	0.011	=	<b>1,371,591</b>
Dry Cow	1,633	÷	0.011	=	<b>148,455</b>
Heifer (15 to 24 months)	1,704	÷	0.011	=	<b>154,909</b>
Heifer (7 to 14 months)	0	÷	0.011	=	<b>0</b>
Heifer (3 to 6 months)	0	÷	0.011	=	<b>0</b>
Calf (under 3 months)	0	÷	0.011	=	<b>0</b>
Bulls	0	÷	0.011	=	<b>0</b>
<b>Total for Dairy</b>					<b>1,674,955</b>

[1] VSLR for an anaerobic treatment lagoon in San Joaquin Valley would be 6.5 lb VS/1000 ft<sup>3</sup>-day to 11 lb VS/1000 ft<sup>3</sup>-day according to the NRCS and USDA AWTFH. Based on phone conversation with Matt Summers (USDA) on July 14, 2006, he suggested that the 11 lb VS/1000 ft<sup>3</sup>-day



# Lagoon Design Check in Accordance with NRCS Guideline #359

## Sludge Accumulation Volume

The sludge accumulation volume accounts for the solids contained in the manure that cannot be fully digested by bacteria and that gradually settle to the bottom of the lagoon as sludge. The sludge accumulation volume for lagoon systems without solids separation can be calculated from the USDA Field Handbook. However, there are no accepted guidelines for calculating the sludge accumulation volume for lagoon systems with solids separation, but many designers of digester expect it to be minimal.

This facility has an efficient solids separation system consisting prior to the anaerobic treatment lagoon system. The separation system will remove a large portion of the fibers, lignin, cellulose, and other fibrous materials from the manure. These are the materials that would otherwise cause sludge accumulation from the lack of digestion in a lagoon or digester. Because fibrous materials and other solids will not enter the lagoon system, the sludge accumulation volume required will be minimized and can be considered negligible.

Nevertheless, the primary lagoon will have sufficient space remaining for sludge accumulation, as shown by the following calculation:

$$\text{SAV} = \text{VPL} - \text{MTV}$$

Where:

SAV = Sludge Accumulation Volume (ft<sup>3</sup>)

VPL = total Volume of Primary Lagoon (ft<sup>3</sup>)

MTV = Minimum Treatment Volume (ft<sup>3</sup>)

$$\text{SAV} = \text{VPL} - \text{MTV}$$

$$\text{SAV} = 2,702,250 - 1,674,955 = 1,027,295 \text{ (ft}^3\text{)}$$

## Lagoon Design Check in Accordance with NRCS Guideline #359

### Hydraulic Retention Time (HRT) Calculation

The anaerobic treatment lagoon and covered lagoon anaerobic digester must be designed to provide sufficient Hydraulic Retention Time (HRT) to adequately treat the waste entering the lagoon and to allow environmentally safe utilization of this waste. The NRCS Technical Guide Code 365 – Anaerobic Digester – Ambient Temperature specifies a minimum HRT 38 days in the San Joaquin Valley.

The Hydraulic Retention Time (HRT) is calculated as follows:

$$HRT = MTV/HFR$$

where:

HFR = Hydraulic flow rate (1000ft<sup>3</sup>/day)

HRT = Hydraulic Retention Time (day)

The Hydraulic Flow Rate is Calculated below

Type	# of cows		Amount of Manure*		HFR
Milk Cows	2,500	x	2.40	ft <sup>3</sup>	= 6,000 ft <sup>3</sup> /day
Dry Cows	500	x	1.30	ft <sup>3</sup>	= 650 ft <sup>3</sup> /day
Heifers (15-24 mo)	1,000	x	0.78	ft <sup>3</sup>	= 780 ft <sup>3</sup> /day
Heifers (7-14 mo)	0	x	0.78	ft <sup>3</sup>	= - ft <sup>3</sup> /day
Heifers (3-6 mo)	0	x	0.30	ft <sup>3</sup>	= - ft <sup>3</sup> /day
Calves	0	x	0.15	ft <sup>3</sup>	= - ft <sup>3</sup> /day
Bulls	0	x	1.30	ft <sup>3</sup>	= - ft <sup>3</sup> /day
<b>Total</b>	<b>4,000</b>				<b>7,430 ft<sup>3</sup>/day</b>
Fresh water per milk cow used in flush at milk parlor			50	gal/day	

\*Table 1.b - Section 3 of ASAE D384.2 (March 2005). The calf manure was estimated to be 1/2 of the calf number found in the table, since the average weight of these calves is approx. 1/2 of the calves identified in the table.

## Lagoon Design Check in Accordance with NRCS Guideline #359 Cont.

Formula:

Gallon	#	x	ft <sup>3</sup>	+	ft <sup>3</sup>
Milk Cow*Day	Milk Cows		gallon		day

Total HFR:

$$\begin{array}{r} \Rightarrow \\ \frac{50 \text{ gal}}{\text{milk cow}^* \text{ day}} \end{array} \times \begin{array}{r} 2500 \text{ milk cows} \\ \end{array} = \begin{array}{r} 7.48 \\ \text{gal} \end{array} + \begin{array}{r} 7,430 \\ \text{ft}^3 \\ \text{day} \end{array} = \begin{array}{r} 24,141.2 \\ \text{ft}^3/\text{day} \end{array}$$

Formula:

MTV (ft <sup>3</sup> )	/	(day)	=
		HFR (ft <sup>3</sup> )	

HRT:

$$\Rightarrow \frac{1,674,955 \text{ ft}^3}{24,141.2 \text{ ft}^3} = \begin{array}{r} \text{day} \\ \end{array} = \begin{array}{r} 69.3814917 \\ \text{days} \end{array}$$