San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

NOV 05 2014

Jim Kopshever
Fagundes Dairy
11158 Ave 24
Chowchilla, CA 93610

Re: Notice of Preliminary Decision - Authority to Construct
Facility Number: C-5502
Project Number: C-1101179

Dear Mr. Kopshever:

Enclosed for your review and comment is the District's analysis of Fagundes Dairy's application for an Authority to Construct for an increase in the permitted herd size from 3,000 milk cows (6,000 total head) to 4,750 milk cows (7,450 total head), at 23732 Road 12, Chowchilla, CA.

The notice of preliminary decision for this project will be published approximately three days from the date of this letter. 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. Ramon Norman of Permit Services at (559) 230-5909.

Sincerely,

Arnaud Marjollet
Director of Permit Services

AM:rn

Enclosures

cc: Mike Tollstrup, CARB (w/ enclosure) via email

Seyed Sadredin
Executive Director/Air Pollution Control Officer

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San Joaquin Valley Air Pollution Control District
Authority to Construct
Application Review
Increase Permitted Herd Size at a Dairy

Facility Name:	Fagundes Dairy	Date:	November 3, 2014
Mailing Address:	11158 Avenue 24 Chowchilla, CA 93610	Engineer:	Ramon Norman
		Lead Engineer:	Brian Clements
Contact Person:	Jim Kopshever, Manager	Dairy Owner:	Fred Fagundes
Telephone:	(559) 260-6318	Telephone:	(559) 665-7435
Email:	jmkopshever@sbcglobal.net		
Application #s:	C-5502-1-3, -2-2, -3-2, -4-2, & -6-1		
Project #:	C-1101179		
Deemed Complete:	November 20, 2013		

I. Proposal

Fagundes Dairy has requested Authority to Construct (ATC) permits to increase the permitted herd size at their existing 3,000 Holstein milk cow (6,000 total head) dairy operation to 4,750 Holstein milk cows (7,450 total head). (See Appendix A for current dairy Permits to Operate) This project will modify the District permits for the dairy operation to increase the permitted herd size to match the number of animal units allowed at the site by the recently amended Madera County Conditional Use Permit (CUP #2012-008) (See Appendix B for CUP #2012-008 Conditions of Approval). Additionally, the mitigation measures that the applicant selected to comply with District Rule 4570 Phase II, which were added to the permits for the dairy under ATC Project C-1110850, will also be incorporated into the ATCs for expansion of the dairy.

The dairy includes a small milking barn that was constructed prior to January 1, 2004, which is now used as a hospital milking parlor. Most of the corrals at the dairy also were constructed or had commenced construction prior to January 1, 2004. Therefore, the hospital milking barn and the corrals that commenced construction prior to January 1, 2004 are grandfathered into permits and will not be subject to New and Modified Source Review (NSR). The dairy also includes a newer large milking parlor, located east of the northern portion of the dairy, and 15 newer corrals in 3 rows, located on the northernmost portion of the dairy (Facility Pens # 31-45, located north of Latitude 37.09642 N), that were constructed after January 1, 2004 and these units will be subject to applicable NSR requirements, including Best Available Control Technology (BACT).

The dairy is currently permitted for the following herd size: 3,000 milk cows, not to exceed a combined total of 4,000 mature cows (milk and dry); and 2,000 support stock (heifers and bulls). After approval of this project to increase the permitted herd size, the dairy will be permitted for the following herd composition: 4,750 milk cows, not to exceed a combined total of 5,550 mature cows (milk and dry); and 1,900 support stock (heifers and bulls). Madera

County CUP #2012-008 indicates that this herd size is allowed at this site by the Madera County. (See Appendix C for Herd Size allowed at the site by Madera County CUP #2012-008)

The dairy requires ATC permits for each of the following permit units: Milking Operation (C-5502-1) including a double-40 parallel milking parlor with 80 stalls and one hospital milking parlor; Cow Housing Permit (C-5502-2) including open corrals with scraped/flushed lanes; Liquid Manure Handling System (C-5502-3) including a storage pond; Solid Manure Handling System (C-5502-4) consisting of manure stockpiles with solid manure applied to land and/or hauled offsite; and Feed Storage and Handling Permit (C-5502-6) including commodity barns and covered silage piles.

The proposed modifications and new units to increase the permitted herd size of the dairy from 3,000 Holstein milk cow (6,000 total head) to 4,750 Holstein milk cows (7,450 total head) will result in emissions exceeding the BACT threshold of 2.0 lb/day for the following pollutants from the operations at the dairy: VOC from the large milking parlor constructed after January 1, 2004 (Permit C-5502-1); PM_{10}, VOC, and NH_3 from the corrals constructed after January 1, 2004 (Permit C-5502-2); VOC and NH_3 emissions from the storage pond and liquid manure land application (Permit C-5502-3 - liquid manure handling system); and VOC emissions from the Total Mixed Ration (TMR) dairy feed (Permit C-5502-6 - feed storage and handling system). Therefore, BACT will be required for these units.

The project triggers the public notice requirements of District Rule 2201. Therefore, the preliminary decision for the project will be submitted to the California Air Resources Board (CARB), a public notice will be published in a local newspaper of general circulation in the county of the project, and a 30-day public comment period will be completed prior to issuance of the ATCs.

The expansion of the dairy is a discretionary project subject to the requirements of the California Environmental Quality Act (CEQA). Madera County is the Lead Agency, which has principal responsibility for approving this dairy project. Madera County approved the project after preparing a Mitigated Negative Declaration (MND #2012-11) in accordance with the Madera County General Plan Dairy Element[1] and the Madera County Dairy Operations Standards[2]. Madera County prepared a Program Environmental Impact Report (EIR) (State Clearinghouse (SCH) Number 2006081050) to address environmental concerns resulting from the Madera County General Plan Dairy Element and the Madera County Dairy Operations Standards. The Program EIR for the Dairy Element was certified by the Madera County Board of Supervisors on October 27, 2008. As a responsible agency, the District must decide on the adequacy of the environmental documents prepared by the Lead Agency, Madera County, make appropriate findings, and file the required notices. Prior to reaching a final decision to approve the project and issue the ATCs the District will prepare any necessary findings and upon approval of the project will file a Notice of Determination consistent with CEQA Guidelines §15096 requirements.

[1] For the Madera County General Plan Dairy Element see: http://www.madera-county.com/index.php/forms-and-documents/category/46-general-plan-document-materials?download=1620:1290210408documentuploaddairyelement

[2] For the Madera County Dairy Operations Standards see: http://www.madera-county.com/index.php/forms-and-documents/category/49-madera-county-reports-and-documents?download=1628:1290210382documentuploaddairyoperationstandards

II. Applicable Rules

Rule 2010 Permits Required (12/17/92)
Rule 2410 Prevention of Significant Deterioration (6/16/11)
Rule 2201 New and Modified Stationary Source Review Rule (4/21/11)
Rule 2520 Federally Mandated Operating Permits (6/21/01)
Rule 2550 Federally Mandated Preconstruction Review for Major Sources of Air Toxics (6/18/98)
Rule 4101 Visible Emissions (2/17/05)
Rule 4102 Nuisance (12/17/92)
Rule 4550 Conservation Management Practices (CMP) (8/19/04)
Rule 4570 Confined Animal Facilities (CAF) (10/21/10)
CH&SC 41700 Health Risk Assessment
CH&SC 42301.6 School Notice
Senate Bill 700 (SB 700)
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 23732 Road 12, Chowchilla, CA, at the southwest corner of Avenue 24 and Road 12 in Madera County (APN 025-190-002). The facility 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 Fagundes Dairy 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 are usually different ages and types of cows at most dairies. At this dairy, calves are sent offsite to be raised rather than kept onsite.

The Holstein 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 (dry lots), 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.

Cow Housing

The majority of milk cows at this dairy and all of the dry cows and heifers at this dairy are housed in open corrals with scraped or flushed lanes. An open corral is a large open area where cows are confined with unlimited access to feed and water. The 15 new open corrals in 3 rows, located on the northernmost part of the dairy (Facility Pens # 31-45) will be required to have structures that provide shade for the animals. The scrape and flush system is used to remove manure from the corral lanes and walkways.

Special Needs Housing

The special needs area serves the gestating cows at the dairy or any cows that are in need of medical condition. This area acts as a veterinary space. It is also the area in which cows are given special attention as they progress from dry cow, a mature cow that is gestating and not lactating, to maternity, to milking status or until their health improves.

The dairy also includes one small freestalll barn to house special needs milk cows. In a freestall barn, the cows are grouped in large pens with free access to feed bunks, water, and stalls for resting. A standard freestall barn design has a feed alley in the center of the barn separating two feed bunks on each side

Milking Parlors

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. The dairy includes one new (constructed after 1/1/2004) double-40 parallel milking parlor with 80 milking stalls and one existing double-16 parallel hospital milking parlor with 32 milking stalls. The lactating cows are milked two times per day in the milking parlor. 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 after each milking. The effluent from the milking parlors will be carried through pipes to the liquid manure handling system. No additional milking parlors will be constructed under this project; however, the new large milking parlor will be treated as a new unit subject to NSR and BACT.

Liquid Manure Handling System

The liquid manure handling system for the dairy will include:

- One 2,680 ft x 101 ft x 18 ft anaerobic treatment lagoon with a side slope of 1.0

The dairy does not include a solids separation prior to the lagoon system; therefore, the facility will be required to minimize the solids that enter the lagoon system to prevent excessive sludge buildup.

Anaerobic Treatment Lagoon

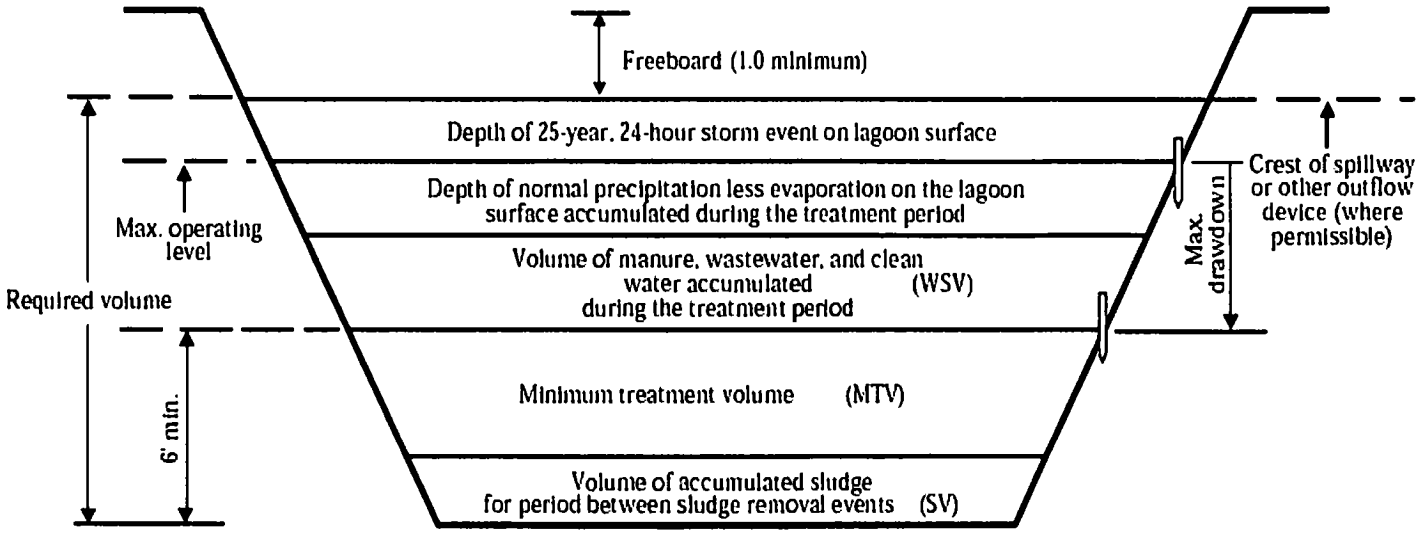
An anaerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of manure by microbes in the absence of oxygen. This process of anaerobic decomposition results in the preferential conversion of organic compounds in the manure into

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^3/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 dairy currently includes a large storage pond that was previously divided into sections. The dimensions of the existing storage pond are 2,680 ft x 101 ft x 18 ft and the slope (run/rise) of the storage pond is 1.0. For the project, the applicant has proposed to operate the existing storage pond as a single-cell anaerobic treatment lagoon designed in accordance with the specifications set forth in NRCS practice standard 359. Proper operation of a single-cell anaerobic treatment lagoon requires that the minimum treatment volume, which depends on the volatile solids loading rate, be maintained in the lower portion of the lagoon to ensure that there is a stable bacterial population to promote more efficient anaerobic digestion. The lower portion of the lagoon must also maintain sufficient volume for sludge accumulation. The upper portion of the lagoon is designed to store liquid manure and irrigation water used to dilute waste prior to application to cropland. The upper portion of the lagoon must 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 lagoons; and precipitation during a 25 year, 24 hour storm event.

The liquid level of the anaerobic treatment lagoon can fluctuate. However, the liquid level should never fall below the minimum depth established for the lagoon that maintains the minimum treatment and sludge accumulation volumes. This level is the level of maximum drawdown and markers should be placed in the lagoon so that the lagoon will not be pumped below this level. All of the liquid at the manure at the dairy will be sent to the anaerobic treatment lagoon. The liquid manure from the anaerobic treatment lagoon will be used to irrigate crops.



Manure Stock Piles (Storage)

The solid manure stockpiled at this dairy will include the scraped manure from the surface of the corrals and any scraped manure removed from the corral lanes. The scraped solid manure will be immediately incorporated into the dairy's cropland or will be dried and stored for use as fertilizer.

V. Equipment Listing

C-5502-1

Pre-Project Equipment Description:

C-5502-1-4: 3,000 COW MILKING OPERATION WITH ONE DOUBLE 40 PARALLEL (80 STALLS) MILKING PARLOR AND ONE HOSPITAL MILKING BARN

Proposed Modification:

Increase the number of milking cows to 4,750

Post Project Equipment Description:

C-5502-1-3: 4,750 COW MILKING OPERATION WITH ONE DOUBLE 40 PARALLEL (80 STALLS) MILKING PARLOR AND ONE HOSPITAL MILKING BARN

C-5502-2

Pre-Project Equipment Description:

C-5502-2-5: COW HOUSING - 3,000 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 4,000 MATURE COWS (MILK AND DRY); 2,000 TOTAL SUPPORT STOCK (HEIFERS AND BULLS); AND ONE FREESTALL WITH FLUSH/SCRAPE SYSTEM

Proposed Modification:

Increase herd size to 4,750 milk cows, not to exceed a combined total of 5,550 mature cows (milk and dry); and 1,900 total support stock (heifers and bulls)

Post Project Equipment Description:

C-5502-2-2: COW HOUSING – 4,750 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 5,550 MATURE COWS (MILK AND DRY); 1,900 SUPPORT STOCK (HEIFERS AND BULLS); AND 1 FREESTALL WITH FLUSH/SCRAPE SYSTEM

C-5502-3

Pre-Project Equipment Description:

C-5502-3-3: LIQUID MANURE HANDLING SYSTEM CONSISTING OF ONE STORAGE POND; MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION

Proposed Modification:

Modify liquid manure management for increase in herd size

Post Project Equipment Description:

C-5502-3-2: LIQUID MANURE HANDLING SYSTEM CONSISTING ONE ANAEROBIC TREATMENT LAGOON (2,680' X 101' X 18'); MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION

C-5502-4

Pre-Project Equipment Description:

C-5502-4-3: SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; SOLID MANURE APPLICATION TO LAND AND/OR HAULED OFFSITE

Proposed Modification:

Modify solid manure management for increase in herd size

Post Project Equipment Description:

C-55026-4-2: SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; SOLID MANURE APPLICATION TO LAND AND/OR HAULED OFFSITE

C-5502-6

Pre-Project Equipment Description (ATC):

C-5502-6-2: FEED STORAGE AND HANDLING CONSISTING OF COMMODITY BARNS AND SILAGE PILES

Proposed Modification:

Modify feed handling for increase in herd size

Post Project Equipment Description:

C-5502-6-1: FEED STORAGE AND HANDLING CONSISTING OF COMMODITY BARNS AND SILAGE PILES

VI. Emission Control Technology Evaluation

Particulate Matter (PM), Volatile Organic Compounds (VOCs), and Ammonia (NH_3) are the major pollutants of concern from dairy operations. Hydrogen sulfide (H_2S) is also emitted from anaerobic processes on dairies. Gaseous pollutant emissions at a dairy result from the ruminant digestive processes (enteric emissions), the decomposition and fermentation of feed, and also from the decomposition of organic material in dairy manure. Volatile Organic Compounds 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. Hydrogen sulfide and other reduced sulfur compounds are produced when sulfur-containing compounds in manure decompose anaerobically. 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 will be used to control emissions at this dairy. Examples of some of these practices are discussed below:

Milking Parlor(s) (C-5502-1):

This dairy uses a flush/spray system to wash out the manure from the milking parlors after each group of cows is milked. Since the milking parlors are 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 parlors 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. Flushing the milking parlor after each milking will also reduce anaerobic decomposition of manure on the milking parlor floor thereby eliminating the potential for H_2S emissions from the milking parlor floor.

Cow Housing (C-5502-2) and Feed

Milk cows at Fagundes Dairy will be primarily housed in open corrals. The dry cows and heifers at the dairy will also be housed in open corrals. Fagundes Dairy will be required to install shade structures in the corrals located on the northern portion of the dairy that commenced construction after January 1, 2004. Practices that will be utilized to reduce emissions at the dairy include: frequent flushing or scraping of lanes; scraping of exercise pens and corrals; and feeding animals in accordance with NRC guidelines. These practices are described below.

The District has also typically required downwind windbreaks to control dust from the corrals at new dairies. However, this project for an increase in permitted herd size will occur at an existing dairy facility. The applicant has indicated that there is not sufficient space for the

installation of windbreaks downwind of the corrals. Because the roots of the trees in a vegetative windbreak would not have sufficient space for optimum establishment of the vegetative windbreak, this option was not required for this particular facility.

Shade Structures and Scraping of Corrals

The milk cows, dry cows, and heifers at Fagundes Dairy will be housed in open corrals with concrete lanes. As mentioned above, Fagundes Dairy will be required to install shade structures in the corrals located on the northernmost portion of the dairy that commenced construction after January 1, 2004 (Facility Pens # 31-45, located north of Latitude 37.09642 N). Providing shade for the animals reduces movement and unnecessary activity during hot weather, which reduces PM_{10} emissions. The surfaces of the corrals will be scraped in the morning hours every two weeks except during wet conditions. Frequent scraping of the corrals will reduce the amount of dry manure on the surfaces that may be pulverized by the cows' hooves and emitted as PM_{10}. This practice will also reduce the chance of anaerobic conditions developing in the manure pack of the corral surface, potentially reducing VOC emissions.

Frequent Flushing or Scraping of Lanes

Manure, which is a source of emissions, will be removed from the corral lanes by flushing and scraping. When a flush system is used, a large proportion of the VOCs emitted from fresh cow manure will dissolve in the flush water and will not be emitted from the cow housing permit unit. Because of ammonia's high affinity for and solubility in water, flushing the lanes and walkways will also reduce volatilization of ammonia from the manure deposited in the corral lanes. For the corrals that were constructed after January 1, 2004, the lanes and walkways for the mature cows (lactating and dry cows) will be flushed or scraped four times per day and the lanes and walkways in the corrals for the heifers will be flushed or scraped once per day.

Feeding Animals in Accordance with the NRC Guidelines

All animals housed at the dairy will be fed in accordance with National Research Council (NRC) guidelines using routine nutritional analysis for rations. Feeding the cows in accordance with NRC guidelines minimizes undigested protein and other undigested nutrients in the manure, which would emit NH_3, VOCs, and H_2S upon decomposition.

Liquid Manure Handling System (C-5502-3)

All emissions from the liquid manure handling system are the result of manure decomposition.

Anaerobic Treatment Lagoon

As stated above, the liquid manure handling system at Fagundes Dairy includes a large storage pond that was previously divided into sections that will be modified to operate as a single-cell anaerobic treatment lagoon designed in accordance with the specifications set forth in NRCS practice standard 359. A properly designed and operated anaerobic treatment lagoon system will reduce VOC emissions because the organic compounds in the manure will be mostly converted into methane, carbon dioxide, and water rather than a significant amount of VOCs. An anaerobic treatment lagoon also has an air pollution benefit over a system with only a storage pond. Odorous emissions are reduced with an anaerobic treatment lagoon since the

lagoon has a constant treatment volume, which promotes more efficient anaerobic digestion. The proposed anaerobic treatment lagoon system meets the appropriate design requirements (see design check in Appendix D).

Liquid Manure Land Application

Liquid manure from the storage pond will be applied through flood irrigation. The dairy will apply liquid manure to cropland at agronomic rates. Liquid manure will be applied in thin layers and will be blended with irrigation water in compliance with the dairy's comprehensive nutrient management plan and the requirements of the Regional Water Quality Control Board. These practices will reduce odors and result in faster uptake of nutrients, including organic nitrogen, which can emit VOCs and ammonia during decomposition, and ammonium nitrogen, which is readily lost to the atmosphere as gaseous ammonia.

Solid Manure Handling (C-5502-4) - Rapid Incorporation of Solid Manure Applied to Land:

Based on the information currently available, emissions from solid manure applied to cropland are small in comparison to other sources. However, to ensure that any possible emissions are minimized, this dairy will be required to incorporate solid manure applied to cropland immediately (within two hours) after application. Immediate incorporation of the manure into the soil will reduce any volatilization of gaseous pollutants, including ammonia and VOC. Reduction in gaseous emissions is achieved by minimizing the amount of time that the manure is exposed to the atmosphere. Once manure has been incorporated into the soil, VOCs, ammonia, and any hydrogen sulfide are absorbed onto particles of soil providing the opportunity for these soil microbes to oxidize these compounds into carbon dioxide, water, nitrates, and sulfates[3].

Feed Handling and Storage (C-5502-6):

The feed storage system at Fagundes Dairy includes one corn silage pile (150 feet wide by 30 feet high), one wheat/oat/winter grain silage pile (150 feet wide by 30 feet high), and one alfalfa/grass/haylage silage pile (150 feet wide by 30 feet high), and silage storage bags.. The proposed emission reduction measures for feed handling and storage include best management practices such as minimizing the surface area of silage exposed to the atmosphere. This can be done by covering the silage pile securely with a tarp and removing feed only from a small area of the pile (face of pile).

VII. General Calculations

A. Assumptions

- Potential to Emit for the dairy will be based on the maximum design capacity of the number and types of cows at the dairy.
- Only emissions from lagoons/storage pond and IC engine at the dairy will be used to determine if the facility is a major source since these units are considered the only source of non-fugitive emissions at the dairy.

[3] Page 9-38 of U.S. EPA's Draft Document Emissions From Animal Feeding Operations (http://www.epa.gov/ttn/chief/ap42/ch09/draft/draftanimalfeed.pdf)

- Potential to Emit for the 252 bhp emergency standby IC engine (Permit #C-5502-5-0) is taken from Project C-1062740 and is based on 100 hours of operation per year.
- Potential to Emit for the 287 bhp emergency standby IC engine (Permit #C-5502-7-0) is taken from Project C-1094904 and is based on 100 hours of operation per year.
- For conservative emission calculations it will be assumed that all of the milk cows, dry cows, and heifers at Fagundes Dairy will be housed in open corrals with flushed lanes.
- There are no calves housed onsite at this dairy.
- All PM_{10} emissions from the dairy will be allocated to the cow housing permit unit (C-5502-2).
- The PM_{10} control efficiencies are based on the SJVAPCD memo – *Dairy and Feedlot PM_{10} Mitigation Practices and their Control Efficiencies.*
- Because of the moisture content of the separated solids, PM_{10} emissions from solid manure handling are considered negligible.
- Because H_2S is produced as a result of the decomposition of sulfur compounds under anaerobic conditions and the lagoons and storage ponds will be the primary source of H_2S emissions at a dairy, all H_2S emissions from the dairy will be allocated to the lagoon/storage of the liquid manure handling permit unit (C-5502-3).
- The PM_{10} emission factors for the dairy animals are based on a District document entitled "Dairy and Feedlot PM_{10} 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 VOC Emission Factors for milk cows used in this evaluation are from the "APCO's Revision to the Dairy VOC Emission Factor", dated January 2010. The VOC emission factors for the support stock were developed by taking the ratio of volatile solids excreted by the different types of cows to the milk cow and multiplying it by the milk cow VOC emission factor.
- The NH_3 emission factor for milk cows is based on the dairy cattle ammonia emission factor used by the California Air Resources Board. This emission factor was apportioned to the dairy permit units based on VOC emissions from manure. The NH_3 emission factors for the support stock were developed by taking the ratio of nitrogen excreted by the different types of cows to the milk cow and multiplying it by the milk cow NH_3 emission factor.
- For BACT analysis purposes, the following units are considered separate emission units at dairy: 1) Milking Operation – each milking parlor; 2) Cow Housing – a) each individual freestall barn, b) each individual corral, and c) each calf hutch area (i.e. each fenced off or designated housing area); 3) Liquid Manure Handling: a) lagoon(s)/storage pond(s) and b) liquid manure land application; 4) Solid Manure Handling: a) solid manure storage and b) solid manure land application; 5) Feed Storage and Handling: a) each silage pile and b) total mixed ration (TMR).
- The existing small hospital milking parlor and the existing corrals at the dairy that were in existence or for which construction commenced prior to January 1, 2004 are considered existing emission units and are not subject to BACT. The new larger milking parlor and the 15 new corrals located on the northern portion of the dairy for which

construction commenced after January 1, 2004 (Facility Pens # 31-45, located north of Latitude 37.09642 N) are considered new emission units subject to BACT.

- Because the large milking parlor that was constructed after January 1, 2004 was constructed as the same time as the new corrals, for BACT purposes, it will be considered part of the project to increase the herd size at the dairy. For BACT purposes it is assumed that all milk cows will be milked in the new large milking parlor.
- Per the applicant, the eight large corrals for milk cows for which construction commenced after January 1, 2004 will each hold no more than 200 milk cows (Facility Pens # 31-38); the seven smaller corrals for support stock (heifers) for which construction commenced after January 1, 2004 that are in the northernmost row will each hold no more than 130 heifers (Facility Pens # 39-45).
- Feeding animals in accordance with the National Research Council (NRC) guidelines is a feed formulation practice used to improve animal health and productivity. This typically limits the overfeeding of certain nutrients that have the potential of increasing emissions. This mitigation measure has the potential of reducing a significant amount of emissions, however, since there is not much data available, a conservative control efficiency of 5% will be applied to the overall dairy EF.
- Flushing or hosing down the milking parlor immediately prior to, immediately after, or during each milking has the potential of reducing a significant amount of emissions since many of the compounds emitted from the fresh manure, such as alcohols (ethanol and methanol) and many Volatile Fatty Acids (VFAs), are highly soluble in water and the fresh excreted manure is almost immediately flushed out of the milk barn. However, no control efficiency will be evaluated for this practice because it was already being implemented on the dairies that were studied to develop the baseline emission factor.
- Fagundes Dairy will flush or scrape the lanes for mature cows four times a day and will flush or scrape the lanes for heifers once per day. Frequent flushing or scraping of the feed lanes is expected to reduce emissions since manure degradation and decomposition in the feed lanes is reduced. Increasing the frequency of the flush will remove manure, which is a source of VOC emissions. Many of the compounds emitted from the fresh manure, such as alcohols (ethanol and methanol) and many Volatile Fatty Acids (VFAs), are highly soluble in water. The control efficiency for this practice will conservatively be estimated as 10% until better information becomes available. This control efficiency only applies to the manure and does not apply to the enteric emissions generated from the cows themselves.
- An anaerobic treatment lagoon designed in accordance with the NRCS Guideline (359) has the potential of reducing significant amount of emissions, since the system is designed to promote the conversion of Volatile Solids (VS) into methane by methanogenic bacteria. Although VOC emission reductions are expected to be high, to be conservative, a control efficiency of 40% will be applied to this mitigation measure for both the lagoon(s) and land application until better data becomes available.
- Many of the mitigation measures required will also have a reduction in ammonia emissions, however, due to limited data, these reductions will not be quantified in this evaluation.

B. Emission Factors

PM_{10}, VOC, and NH3 Emission Factors for Dairy Permits (C-5502-1, -2, -3, -4, & -6)

The dairy emissions calculation spreadsheet in Appendix E lists the PM_{10}, VOC, and NH_3 emission factors for the animals at the dairy. These emission factors and the control efficiencies for the applicable management practices implemented at this dairy will be will be used to calculate the pre and post-project PM_{10}, VOC, and NH_3 emissions from the animals at the dairy.

The uncontrolled emission factors for PM_{10}, VOC, and NH_3 from the animals at the dairy are also given in the tables below for reference.

Uncontrolled PM_{10} Emission Factors for Cattle at the Dairy		
Type of Cow	Uncontrolled EF (lb-PM_{10}/head-yr)	Source
Milk Cows, Dry Cows, & Bulls in Freestalls	**1.37**	Based on a Summer 2003 study by Texas A&M ASAE at a West Texas Dairy
Milk Cows, Dry Cows, & Bulls in Open Corrals	**5.46**	Based on a Summer 2003 study by Texas A&M ASAE at a West Texas Dairy
Heifers in Open Corrals	**10.55**	Based on a USDA/UC Davis report quantifying dairy and feedlot emissions in Tulare & Kern Counties (April 2001)
Calves	**1.37**	SJVAPCD

Uncontrolled VOC Emissions Factors for Holstein Dairy Cows (lb/hd-yr)				
		Milk Cow	**Dry Cow**	**Support Stock***
Total lb/hd-yr EF for each type of Animal		**15.8**	**8.6**	**6.6**
Milking Parlor	Enteric Emissions in Milking Parlors	0.41	-	-
	Milking Parlor Floor	0.03	-	-
	Milking Parlor Total	**0.44**	-	-
Cow Housing	Enteric Emissions in Cow Housing	3.69	2.23	1.71
	Corrals/Pens	6.6	3.59	2.76
	Bedding	1.0	0.54	0.42
	Lanes	0.8	0.44	0.33
	Cow Housing Total	**12.1**	**6.8**	**5.2**

Uncontrolled VOC Emissions Factors for Holstein Dairy Cows (lb/hd-yr)				
		Milk Cow	**Dry Cow**	**Support Stock***
Liquid Manure Handling	Lagoons/Storage Ponds	1.3	0.71	0.54
	Liquid Manure Land Application	1.4	0.76	0.58
	Liquid Manure Handling Total	**2.7**	**1.5**	**1.1**
Solid Manure Handling	Solid Manure Storage	0.15	0.08	0.06
	Separated Solids Piles	0.06	0.03	0.03
	Solid Manure Land Application	0.33	0.18	0.14
	Solid Manure Handling Total	**0.54**	**0.29**	**0.23**

*In order to conservatively calculate the emissions, the emission factors for large heifers (15 to 24 months) are used for support stock.

Silage and TMR (Total Mixed Ration) VOC Emissions Flux (C-5502-6)	
Type of Feed	**Emissions Flux (lb/ft^2-day)**
Corn Silage*	1.02E-02
Alfalfa Silage*	5.15E-03
Wheat/Oat Silage*	1.29E-02
Total Mixed Ration (TMR)**	3.85E-03

*Assuming that the pile is completely covered except the front face
** Rations fed within 48 hours of grinding/mixing

Uncontrolled NH_3 Emissions Factors for Holstein Dairy Cows (lb/hd-yr)				
		Milk Cow	**Dry Cow**	**Support Stock***
Milking Parlor	Milking Parlor Floor	0.19	-	-
	Milking Parlor Total	**0.19**	-	-
Cow Housing	Corrals/Pens	41.9	21.2	11.0
	Bedding	6.3	3.2	1.7
	Lanes	5.1	2.6	1.3
	Cow Housing Total	**53.3**	**27.0**	**14.0**

Uncontrolled NH_3 Emissions Factors for Holstein Dairy Cows (lb/hd-yr)				
		Milk Cow	**Dry Cow**	**Support Stock***
Liquid Manure Handling	Lagoons/Storage Ponds	8.2	4.2	2.2
	Liquid Manure Land Application	8.9	4.5	2.3
	Liquid Manure Handling Total	**17.1**	**8.7**	**4.5**
Solid Manure Handling	Solid Manure Storage	0.95	0.48	0.25
	Separated Solids Piles	0.38	0.19	0.10
	Solid Manure Land Application	2.09	1.06	0.55
	Solid Manure Handling Total	**1.33**	**0.67**	**0.35**

*In order to conservatively calculate the emissions, the emission factors for large heifers (15 to 24 months) are used for support stock.

Hydrogen Sulfide (H_2S)

Hydrogen Sulfide (H_2S) is produced as a result of the decomposition of sulfur compounds under anaerobic conditions. Therefore, the lagoons and storage ponds will be the primary source of H_2S emissions at a dairy. The H_2S emissions rate from lagoons and storage ponds is strongly influenced by the amount of exposed surface area and environmental conditions (e.g. wind, temperature, pH). For this evaluation, average annual H_2S emissions will be conservatively estimated as 10% of the average annual post-project NH_3 emissions from the storage pond. This is because both nitrogen and sulfur compounds excreted by cattle are primarily ingested as components of amino acids and tend to occur in set ratios. Studies have also indicated that the average ammonia emissions from lagoons and ponds treating or storing liquid manure are generally more than ten times greater than the H_2S emissions.[4] However, because studies have indicated substantial variation in daily H_2S emission rates, in this evaluation the maximum daily H_2S rate will be conservatively estimated at five times the average daily H_2S emission rate.

[4] For examples see: 1.) L. Y. Zhao, M. Darr, X. Wang, R. Manuzon, M. Brugger, E. Imerman, G. Arnold, H. Keener, A. J. Heber, Temporal variations in gas and odor emissions from a dairy manure storage pond, Proceedings of the 6th International Dairy Housing Conference2007St. Joseph, MIASABEASABE Paper No. 701P0507e. 2.) Ron E. Sheffield and Bruce Louks, Diurnal Variations of Ammonia and Hydrogen Sulfide Flux from a Dairy Manure Storage Pond in Idaho. 3) Blunden, J., and V. P. Aneja, 2008, "Characterizing ammonia and hydrogen sulfide emissions from a swine waste treatment lagoon in North Carolina", *Atmospheric Environment*, vol. 42, No. 14, pp. 3277-3290]

C. Calculations

1. Pre-Project Potential to Emit (PE1)

Pre-Project Potential to Emit (PE1) for the dairy will be calculated below based on the maximum design capacity for each type of cow and the emission control practices currently in use at the dairy.

Emission calculations for this project are included in the dairy emissions calculation spreadsheet in Appendix E. A summary of the Pre-Project Potential to Emit is shown in the tables below.

Milking Operation (C-5502-1)

Pre-Project Potential to Emit (PE1) C-5502-1-4		
	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO_X	0	0
SO_X	0	0
PM_{10}	0	0
CO	0	0
VOC	3.5	1,260
NH_3	1.6	570

Cow Housing (C-5502-2)

Pre-Project Potential to Emit (PE1) C-5502-2-3		
	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO_X	0	0
SO_X	0	0
PM_{10}	116.8	42,622
CO	0	0
VOC	119.9	43,770
NH_3	588.8	214,900

Liquid Manure Handling System (C-5502-3: Lagoons, Storage Ponds, & Liquid Manure Land Application)

Lagoon/Storage Pond:

Pre-Project Potential to Emit (PE1) for C-5502-3-3 - Lagoons/Ponds		
	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO_X	0	0
SO_X	0	0
PM_{10}	0	0
CO	0	0
VOC	13.3	4,850
NH_3	91.0	33,200
H_3S	63.7	4,649

Liquid Manure Land Application:

Pre-Project Potential to Emit (PE1) for C-5502-3-3 - Liquid Manure Land Application		
	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO_X	0	0
SO_X	0	0
PM_{10}	0	0
CO	0	0
VOC	16.0	5,825
NH_3	98.1	35,800

Total Pre-Project Emissions from the Liquid Manure Handling System (C-5502-3-3):

Pre-Project Potential to Emit (PE1) C-5502-3-3						
Pollutant	Lagoon Emissions (lb/year)	+	Land Application (lb/year)	=	Total from Liquid Manure Handling	
					Annual Emissions (lb/year)	Daily Emissions (lb/day)
VOC	4,850	+	5,825	=	10,675	29.2
NH_3	33,200	+	35,800	=	69,000	189.0
H_2S	4,649	+	0	=	4,649	63.7

Solid Manure Handling System (C-5502-4)

Solid Manure Storage & Piles:

Pre-Project Potential to Emit (PE1) for C-5502-4-3 - Solid Manure Storage		
	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO_X	0	0
SO_X	0	0
PM_{10}	0	0
CO	0	0
VOC	2.2	813
NH_3	14.7	5,360

Solid Manure Land Application:

Pre-Project Potential to Emit (PE1) for C-5502-4-3 - Solid Manure Land Application		
	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO_X	0	0
SO_X	0	0
PM_{10}	0	0
CO	0	0
VOC	3.8	1,377
NH_3	23.1	8,430

Total Pre-Project Emissions from the Solid Manure Handling System (C-5502-4-3):

Pre-Project Potential to Emit (PE1) C-5502-4-3						
Pollutant	Manure Storage (lb/year)	+	Solid Land Application (lb/year)	=	Total from Solid Manure Handling	
					Annual Emissions (lb/year)	Daily Emissions (lb/day)
VOC	813	+	1,377	=	2,190	6.0
NH_3	5,360	+	8,430	=	13,790	37.8

Feed Storage and Handling (C-5502-6)

Silage Pile Open Face Area:

= [#open face piles] x [height] x
(([width] + ([width]/(0.1667 x ([width]/[height]) + 1.111)))/2)

Corn Silage Pile Area
= 1 x 30 ft x ((150 ft + (150 ft / (0.1667 x 150 ft /30 ft + 1.111))) / 2)
= 3,407.1 ft^2

Alfalfa/Grass/Haylage Silage Pile Area
= 1 x 30 ft x ((150 ft + (150 ft / (0.1667 x 150 ft /30 ft + 1.111))) / 2)
= 3,407.1 ft^2

Wheat/Oat/Winter Grain Silage Pile Area
= 1 x 30 ft x ((150 ft + (150 ft / (0.1667 x 150 ft /30 ft + 1.111))) / 2)
= 3,407.1 ft^2

Corn Silage Pile:
$PE1_{VOC}$ = 3,407.1 ft^2 x 6.22E-03 lb-VOC/ft^2-day x 365 day/year
= 7,738 lb-VOC/year

$PE1_{VOC}$ = 3,407.1 ft^2 x 6.22E-03 lb-VOC/ft^2-day
= 21.2 lb-VOC/day

Alfalfa/Grass/Haylage Silage Pile:
$PE1_{VOC}$ = 3,407.1 ft^2 x 3.14E-03 lb-VOC/ft^2-day x 182.5 day/year
= 1,953 lb-VOC/year

$PE1_{VOC}$ = 3,407.1 ft^2 x 3.14E-03 lb-VOC/ft^2-day
= 10.7 lb-VOC/day

Wheat/Oat/Winter Grain Silage Pile:
$PE1_{VOC}$ = 3,407.1 ft^2 x 7.87E-03 lb-VOC/ft^2-day x 365 day/year
= 9,786 lb-VOC/year

$PE1_{VOC}$ = 3,407.1 ft^2 x 7.87E-03 lb-VOC/ft^2-day
= 26.8 lb-VOC/day

Total Mixed Ration (TMR)
$PE1_{VOC}$ = 6,000 total head x 7.08 ft^2/head x 3.12E-03 lb-VOC/ft^2-day x 365 day/year
= 48,353 lb-VOC/year

$PE1_{VOC}$ = 6,000 total head x 7.08 ft^2/head x 3.12E-03 lb-VOC/ft^2-day
= 132.5 lb-VOC/day

Total Pre-Project Emissions from Feed Storage and Handling Permit (C-5502-6-2):

$PE1_{VOC}$ = 7,738 lb-VOC/year + 1,953 lb-VOC/year + 9,786 lb-VOC/year + 48,353 lb-VOC/year
= 67,830 lb-VOC/year

$PE1_{VOC}$ = (67,830 lb-VOC/year) ÷ (365 day/year)
= 185.8 lb-VOC/day

2. Post Project Potential to Emit (PE2)

Post-Project Potential to Emit (PE2) for the dairy will be calculated below based on the maximum design capacity for each type of cow and the emission control practices that will be used at the dairy.

Emission calculations for this project are included in the dairy emissions calculation spreadsheet in Appendix E. A summary of the Post-Project Potential to Emit is shown in the tables below.

Milking Operation (C-5502-1)

Post-Project Potential to Emit (PE2) C-5502-1-3		
	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO_X	0	0
SO_X	0	0
PM_{10}	0	0
CO	0	0
VOC	5.5	1,995
NH_3	2.5	903

Cow Housing (C-5502-2)

Post-Project Potential to Emit (PE2) C-5502-2-2		
	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO_X	0	0
SO_X	0	0
PM_{10}	122.2	44,619
CO	0	0
VOC	163.0	59,498
NH_3	825.7	301,375

Liquid Manure Handling System (C-5502-3: Lagoons, Storage Ponds, & Liquid Manure Land Application)

Lagoon/Storage Pond:

Post-Project Potential to Emit (PE2) for C-5502-3-2 - Lagoons/Ponds		
	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO_X	0	0
SO_X	0	0
PM_{10}	0	0
CO	0	0
VOC	12.1	4,424
NH_3	127.4	46,490
H_3S	63.7	4,649

Liquid Manure Land Application:

Post-Project Potential to Emit (PE2) for C-5502-3-2 - Liquid Manure Land Application		
	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO_X	0	0
SO_X	0	0
PM_{10}	0	0
CO	0	0
VOC	16.0	4,771
NH_3	98.1	50,245

Total Post-Project Emissions from the Liquid Manure Handling System (C-5502-3-2):

Post-Project Potential to Emit (PE2) C-5502-3-2						
Pollutant	Lagoon Emissions (lb/year)	+	Land Application (lb/year)	=	Total from Liquid Manure Handling	
					Annual Emissions (lb/year)	Daily Emissions (lb/day)
VOC	4,424	+	4,771	=	9,195	25.2
NH_3	46,490	+	50,245	=	96,735	265.0
H_2S	4,649	+	0	=	4,649	63.7

Solid Manure Handling System (C-5502-4)

Solid Manure Storage & Piles:

Post-Project Potential to Emit (PE2) for C-5502-4-2 - Solid Manure Storage		
	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO_X	0	0
SO_X	0	0
PM_{10}	0	0
CO	0	0
VOC	3.0	1,111
NH_3	20.6	7,519

Solid Manure Land Application:

Post-Project Potential to Emit (PE2) for C-5502-4-2 - Solid Manure Land Application		
	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO_X	0	0
SO_X	0	0
PM_{10}	0	0
CO	0	0
VOC	5.1	1,879
NH_3	32.4	11,821

Total Post-Project Emissions from the Solid Manure Handling System (C-5502-4-2):

Post-Project Potential to Emit (PE2) C-5502-4-2						
Pollutant	Manure Storage (lb/year)	+	Solid Land Application (lb/year)	=	Total from Solid Manure Handling	
					Annual Emissions (lb/year)	Daily Emissions (lb/day)
VOC	1,111	+	1,879	=	2,990	8.2
NH_3	7,519	+	11,821	=	19,340	53.0

Feed Storage and Handling (C-5502-6)

Silage Pile Open Face Area:

= [#open face piles] x [height] x
(([width] + ([width]/(0.1667 x ([width]/[height]) + 1.111)))/2)

Corn Silage Pile Area
= 1 x 30 ft x ((150 ft + (150 ft / (0.1667 x 150 ft /30 ft + 1.111))) / 2)
= 3,407.1 ft^2

Alfalfa/Grass/Haylage Silage Pile Area
= 1 x 30 ft x ((150 ft + (150 ft / (0.1667 x 150 ft /30 ft + 1.111))) / 2)
= 3,407.1 ft^2

Wheat/Oat/Winter Grain Silage Pile Area
= 1 x 30 ft x ((150 ft + (150 ft / (0.1667 x 150 ft /30 ft + 1.111))) / 2)
= 3,407.1 ft^2

Corn Silage Pile:
$PE2_{VOC}$ = 3,407.1 ft^2 x 6.22E-03 lb-VOC/ft^2-day x 365 day/year
= 7,738 lb-VOC/year

$PE2_{VOC}$ = 3,407.1 ft^2 x 6.22E-03 lb-VOC/ft^2-day
= 21.2 lb-VOC/day

Alfalfa/Grass/Haylage Silage Pile:
$PE2_{VOC}$ = 3,407.1 ft^2 x 3.14E-03 lb-VOC/ft^2-day x 182.5 day/year
= 1,953 lb-VOC/year

$PE2_{VOC}$ = 3,407.1 ft^2 x 3.14E-03 lb-VOC/ft^2-day
= 10.7 lb-VOC/day

Wheat/Oat/Winter Grain Silage Pile:
$PE2_{VOC}$ = 3,407.1 ft^2 x 7.87E-03 lb-VOC/ft^2-day x 365 day/year
= 9,786 lb-VOC/year

$PE2_{VOC}$ = 3,407.1 ft^2 x 7.87E-03 lb-VOC/ft^2-day
= 26.8 lb-VOC/day

Total Mixed Ration (TMR)
$PE2_{VOC}$ = 7,450 total head x 7.08 ft^2/head x 3.12E-03 lb-VOC/ft^2-day x 365 day/year
= 60,038 lb-VOC/year

$PE2_{VOC}$ = 7,450 total head x 7.08 ft^2/head x 3.12E-03 lb-VOC/ft^2-day
= 164.5 lb-VOC/day

Total Post-Project Emissions from Feed Storage and Handling Permit (C-5502-6-1):

$PE2_{VOC}$ = 7,738 lb-VOC/year + 1,953 lb-VOC/year + 9,786 lb-VOC/year + 60,038 lb-VOC/year
= 79,515 lb-VOC/year

$PE2_{VOC}$ = (79,515 lb-VOC/year) ÷ (365 day/year)
= 217.8 lb-VOC/day

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.

Pre-Project Stationary Source Potential to Emit [SSPE1] (lb/year)							
	NO_X	SO_X	PM_{10}	CO	VOC	NH_3	H_2S
C-5502-1-4 (Milking Operation)	0	0	0	0	1,260	570	0
C-5502-2-3 (Cow Housing)	0	0	42,622	0	43,770	214,900	0
C-5502-3-3 (Liquid Manure Handling)	0	0	0	0	10,675	69,000	4,649
C-5502-4-3 (Solid Manure Handling)	0	0	0	0	2,190	13,790	0
C-5502-5-0 (252 bhp Emergency Engine)	422	0	12	56	39	0	0
C-5502-6-2 (Feed Storage & Handling)	0	0	0	0	67,830	0	0
C-5502-7-0 (287 bhp Emergency Engine)	162	0	6	23	8	0	0
Pre-Project SSPE (SSPE1)	**584**	**0**	**42,640**	**79**	**125,772**	**298,260**	**4,649**

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

Pursuant to Section 4.10 of District Rule 2201, the Post Project Stationary Source Potential to Emit (SSPE2) 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 that have occurred at the source, and which have not been used on-site.

Post-Project Stationary Source Potential to Emit [SSPE2] (lb/year)							
	NO_X	SO_X	PM_{10}	CO	VOC	NH_3	H_2S
ATC C-5502-1-3 (Milking Operation)	0	0	0	0	1,995	903	0
ATC C-5502-2-2 (Cow Housing)	0	0	44,619	0	59,498	301,375	0
ATC C-5502-3-2 (Liquid Manure Handling)	0	0	0	0	9,195	96,735	4,649
ATC C-5502-4-2 (Solid Manure Handling)	0	0	0	0	2,990	19,339	0

Post-Project Stationary Source Potential to Emit [SSPE2] (lb/year)							
	NO_X	SO_X	PM_{10}	CO	VOC	NH_3	H_2S
C-5502-5-0 (252 bhp Emergency Engine)	422	0	12	56	39	0	0
ATC C-5502-6-1 (Feed Storage & Handling)	0	0	0	0	79,515	0	0
C-5502-7-0 (287 bhp Emergency Engine)	162	0	6	23	8	0	0
Post-Project SSPE (SSPE2)	**584**	**0**	**44,637**	**79**	**153,240**	**418,352**	**4,649**

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. transportable IC engines at a particular site at the facility for less than 12 months)
- Fugitive emissions, except for the specific source categories specified in 40 CFR 70.2

As mentioned above and pursuant to District Rule 2201, fugitive emissions are not counted when determining if a facility is a major source unless the facility belongs to one of the specific source categories identified in the major source definition in 40 CFR Part 70.2, or when determining if a stationary source is a major air toxics source. 40 CFR 70.2 (Definitions, Major Source (2)) states the following:

(2) A major stationary source of air pollutants, as defined in section 302 of the Act, that directly emits, or has the potential to emit, 100 tpy or more of any air pollutant subject to regulation (including any major source of fugitive emissions of any such pollutant, as determined by rule by the Administrator). The fugitive emissions of a stationary source shall not be considered in determining whether it is a major stationary source for the purposes of section 302(j) of the Act, unless the source belongs to one of the following categories of stationary source: (i) Coal cleaning plants (with thermal dryers); (ii) Kraft pulp mills; (iii) Portland cement plants; (iv) Primary zinc smelters; (v) Iron and steel mills; (vi) Primary aluminum ore reduction plants; (vii) Primary copper smelters; (viii) Municipal incinerators capable of charging more than 250 tons of refuse per day; (ix) Hydrofluoric, sulfuric, or nitric acid plants; (x) Petroleum refineries; (xi) Lime plants; (xii) Phosphate rock processing plants; (xiii) Coke oven batteries; (xiv) Sulfur recovery plants; (xv) Carbon black plants (furnace process); (xvi) Primary lead smelters; (xvii) Fuel conversion plants; (xviii) Sintering plants; (xix) Secondary metal production plants; (xx) Chemical process plants—The term chemical processing plant shall not include ethanol production facilities that produce ethanol by natural fermentation included in NAICS codes 325193 or 312140; (xxi) Fossil-fuel boilers (or combination

thereof) totaling more than 250 million British thermal units per hour heat input; (xxii) Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels; (xxiii) Taconite ore processing plants; (xxiv) Glass fiber processing plants; (xxv) Charcoal production plants; (xxvi) Fossil-fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input; or (xxvii) Any other stationary source category, which as of August 7, 1980 is being regulated under section 111 or 112 of the Act.

Because agricultural operations do not fall under any of the specific source categories listed above, fugitive emissions are not counted when determining if an agricultural operation is a major source. 40 CFR 70.2 defines fugitive emissions as "those emissions which could not reasonably pass through a stack, chimney, vent, or other functionally-equivalent opening."

Since emissions at the dairy are not actually collected, a determination of whether emissions could be reasonably collected must be made by the permitting authority. The California Air Pollution Control Association (CAPCOA) prepared guidance in 2005 for estimating potential to emit of Volatile Organic Compounds from dairy farms. The guidance states that *"VOC emissions from the milking centers, cow housing areas, corrals, common manure storage areas, and land application of manure are not physically contained and could not reasonably pass through a stack, chimney, vent, or other functionally-equivalent opening. No collection technologies currently exist for VOC emissions from these emissions units. Therefore, the VOC emissions from these sources are considered fugitive."* The guidance also concludes that, because VOC collection technologies do exist for liquid waste systems at dairies, *"... the VOC emissions from waste lagoons and storage ponds are considered non-fugitive."* The District has researched this issue and concurs with the CAPCOA assessment, as discussed in more detail below.

Milking Center

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. Since the holding area is primarily kept open, the District cannot reasonably demonstrate that emissions can pass through a stack, chimney, vent, or other functionally equivalent opening.

Cow Housing

Although there are smaller dairy farms that have partially enclosed freestall barns, these barns are not fully enclosed and none of the barns have been found to vent the exhaust through a collection device. The airflow requirements through dairy barns are extremely high, primarily for herd health purposes. The airflow requirements will be even higher in the San Joaquin valley, where temperatures reach in excess of 110 degrees in the hot summer. Collection and control of the exhaust including the large amounts of airflow have not yet been achieved by any facility. Due to this difficultly, the District cannot reasonably demonstrate that emissions can pass through a stack, chimney, vent, or other functionally equivalent opening.

Manure Storage Areas
Many dairies cover dry manure piles and covering dry manure piles is also a mitigation measure included in District Rule 4570. However, the District was not able to find any facility, which currently captures the emissions from the storage or handling of manure piles. Although many manure piles may be covered, these manure piles are generally only covered with a tarp and the emissions cannot easily be captured. Therefore, the District cannot reasonably demonstrate that these emissions can pass through a stack, chimney, vent, or other functionally equivalent opening. In addition, recent studies have shown that emissions from manure piles are not significant.

Land Application
Emissions generated from the application of manure on land cannot reasonably be captured due to the extremely large areas, in some cases thousands of acres, of cropland at dairies. Therefore, the District cannot reasonably demonstrate that these emissions can pass through a stack, chimney, vent, or other functionally equivalent opening.

Feed Handling and Storage
The majority of dairies store the silage piles underneath a tarp or in an agbag. The entire pile is covered except for the face of the pile. The face of the pile is kept open due to the continual need to extract the silage for feed purposes. The silage pile is disturbed 2-3 times per day. Because of the ongoing disturbance to these piles, it makes it extremely difficult to design a system to capture the emissions from these piles. In fact, as far as the District is aware, no system has been designed to successfully extract the gases from the face of the pile to capture them, and, as important, no study has assessed the potential impacts on silage quality of a continuous air flow across the silage pile, as would be required by such a collection system. Therefore, the District cannot demonstrate that these emissions can be reasonably expected to pass through a stack, chimney, vent, or other functionally equivalent opening.

Therefore, the VOC emissions from these sources are considered fugitive. The District has determined that control technology to capture emissions from lagoons (biogas collection systems, for instance) is in use and these emissions can be reasonably collected and are not fugitive. Therefore, only emissions from the lagoons/storage ponds and emergency IC engine will be used to determine if this facility is a major source.

The post-project emissions from the lagoon/storage pond at this dairy were given in Section VII.C.2 above. The following table shows the non-fugitive Post-Project Stationary Source Potential to Emit for the dairy.

Non-Fugitive Post-Project Stationary Source Potential to Emit [SSPE2] (lb/year)					
	NO_X	SO_X	PM_{10}	CO	VOC
ATC C-5502-1-3 (Milking Operation)	0	0	0	0	0
ATC C-5502-2-2 (Cow Housing)	0	0	0	0	0

Non-Fugitive Post-Project Stationary Source Potential to Emit [SSPE2] (lb/year)					
ATC C-5502-3-2 (Liquid Manure Handling)	0	0	0	0	4,424
ATC C-5502-4-2 (Solid Manure Handling)	0	0	0	0	0
C-5502-5-0 (252 bhp Emergency Engine)	422	0	12	56	39
ATC C-5502-6-1 (Feed Storage & Handling)	0	0	0	0	0
C-5502-7-0 (287 bhp Emergency Engine)	162	0	6	23	8
Non Fugitive SSPE2	**584**	**0**	**18**	**79**	**4,471**

Major Source Determination (lb/year)					
	NO_X	SO_X	PM_{10}	CO	VOC
Non-Fugitive SSPE1	584	0	18	79	4,897
Non-Fugitive SSPE2	584	0	18	79	4,471
Major Source Threshold	20,000	140,000	140,000	200,000	20,000
Major Source?	No	No	No	No	No

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)(i). Therefore the PSD Major Source threshold is 250 ton/year for any regulated NSR pollutant and fugitive emissions are not considered when determining if the operation is a PSD Major Source. Therefore, only emissions from the lagoons/storage ponds and emergency IC engine will be used to determine if this facility is a PSD Major Source.

PSD Major Source Determination (tons/year)						
	NO_2	VOC	SO_2	CO	PM	PM_{10}
Estimated Facility PE before Project Increase	0.292	2.45	0	0.04	0.009	0.009
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 major source for PSD for at least one pollutant. Therefore the facility is not an existing major source for PSD.

6. Baseline Emissions (BE)

The BE calculation (in lb/year) is performed on a pollutant-by-pollutant basis to determine the amount of offsets required, where necessary. However, agricultural operations that are not major sources are exempt from offsets pursuant to Section 4.6.9 of District Rule 2201. Therefore, BE calculations are not required for the dairy permits.

7. SB 288 Major Modification

SB 288 Major Modification is defined in 40 CFR Part 51.165 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 source is not included in the 28 specific source categories specified in 40 CFR 51.165, the, increases in fugitive emissions are not included in the SB 288 Major Modification calculation. 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.

8. 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.

Since this source is not included in the 28 specific source categories specified in 40 CFR 51.165, the increases in fugitive emissions are not included in the Federal Major Modification determination. Since this facility is not a Major Source for any pollutants, this project does not constitute a Federal Major Modification. Additionally, since the facility is not a major source for PM_{10} (140,000 lb/year), it is not a major source for PM2.5 (200,000 lb/year).

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

Rule 2410 applies to pollutants for which the District is in attainment or for unclasssified, pollutants. The pollutants addressed in the PSD applicability determination are listed as follows:

- NO2 (as a primary pollutant)
- SO2 (as a primary pollutant)
- CO
- PM
- PM10
- Greenhouse gases (GHG): CO2, N2O, CH4, HFCs, PFCs, and SF6

The first step of this PSD evaluation consists of determining whether the facility is an existing PSD Major Source or not (See Section VII.C.5 of this document).

In the case the facility is an existing PSD Major Source, the second step of the PSD evaluation is to determine if the project results in a PSD significant increase.

In the case the facility is NOT an existing PSD Major Source but is an existing source, the second step of the PSD evaluation is to determine if the project, by itself, would be a PSD major source.

In the case the facility is new source, the second step of the PSD evaluation is to determine if this new facility will become a new PSD major Source as a result of the project and if so, to determine which pollutant will result in a PSD significant increase.

I. Potential to Emit for New or Modified Emission Units vs PSD Major Source Thresholds

As a screening tool, the project potential to emit from all new and modified units is compared to the PSD major source threshold, and if total project potential to emit from all new and modified units is below this threshold, no futher analysis will be needed.

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). Therefore, the following PSD Major Source thresholds are applicable and fugitive emissions are not considered when determining if the operation is a PSD Major Source.

PSD Major Source Determination: Potential to Emit (tons/year)						
	NO_2	VOC	SO_2	CO	PM	PM_{10}
Total Non-Fugitive PE from New and Modified Units	0	2.24	0	0	0	0
PSD Major Source threshold	250	250	250	250	250	250
New PSD Major Source?	N	N	N	N	N	N

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 the project file.

VIII. Compliance

Rule 1070 Inspections

This rule applies to any source operation, which emits or may emit air contaminants.

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 permit 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.

Rule 2201 New and Modified Stationary Source Review Rule

A. Best Available Control Technology (BACT)

1. BACT Applicability

BACT requirements are triggered on a pollutant-by-pollutant basis and on an emissions unit-by-emissions unit basis for the following*:

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 AIPE exceeding two pounds per day, and/or
d. Any new or modified emissions unit, in a stationary source project, which results in a Title I Modification.

*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

As discussed in Section VII.A above, the permit units at a dairy include the following emissions units: 1) Milking Operation: each milking parlor; 2) Cow Housing: a) each individual freestall barn, b) each individual corral, and c) each calf hutch area; 3)

Liquid Manure Handling: a) lagoon(s)/storage pond(s) and b) liquid manure land application; 4) Solid Manure Handling: a) solid manure storage and b) solid manure land application; 5) Feed Storage and Handling: a) silage piles and b) total mixed ration (TMR).

As discussed above, the large milking parlor and the corrals located on the northern portion of the dairy, north of Latitude 37.09642 N, for which construction commenced after January 1, 2004 are considered new emission units potentially subject to BACT.

New Large Milking Parlor (ATC C-5502-1-3)

As discussed above, because the new large milking parlor was constructed as the same time as the new corrals, for BACT purposes, it is considered part of the project to increase the herd size at the dairy. For BACT purposes it is assumed that all milk cows will be milked in the new large milking parlor. Therefore, the daily post-project PE for the new milking parlor is equal to the daily post-project PE for the milking operation (Permit C-5502-1).

As shown in Section VII.C.2 above, the daily post-project PE for the new large milking parlor is as follows: 5.5 lb-VOC/day and 2.5 lb-NH_3/day. Therefore, BACT is triggered for VOC and NH_3 from the new large milking parlor.

New Open Corrals (ATC C-5502-2-2)

The new corrals that are potentially subject to BACT as new emission units include eight corrals that can hold 200 milk cows each and seven smaller corrals that can hold 130 support stock (heifers) each. The emission factors and Potential to Emit from each of these new corrals is given below.

Each New Corral Holding 200 Milk Cows

Daily Potential to Emit (PE) for New Milk Cow Corrals									
# of Cows	**x**	**Emission Factor (lb-hd/yr)**	**Pollutant**	**PE (lb/yr) ÷**		**365 (day/yr) =**		**PE (lb/day)**	
200	x	3.87	PM_{10}	774	lb-PM_{10}/yr ÷	365	(day/yr) =	**2.1**	lb-PM_{10}/day
200	x	9.87	VOC	1,974	lb-VOC/yr ÷	365	(day/yr) =	**5.4**	lb-VOC/day
200	x	53.3	NH_3	10,660	lb-NH_3/yr ÷	365	(day/yr) =	**29.2**	lb- NH_3/day

As shown above, each of the new corrals for milk cows has a PE greater than 2.0 lb/day for PM_{10}, VOC, and NH_3. Therefore, BACT is triggered for PM_{10}, VOC, and NH_3 for each of the new corrals for milk cows.

Each New Corral Holding 130 Support Stock (Heifers)

Daily Potential to Emit (PE) for New Support Stock									
# of Cows	x	Emission Factor (lb-hd/yr)	Pollutant	PE (lb/yr) ÷		365 (day/yr) =		PE (lb/day)	
130	x	7.4	PM_{10}	962	lb-PM_{10}/yr ÷	365	(day/yr) =	**2.6**	lb-PM_{10}/day
130	x	4.29	VOC	558	lb-VOC/yr ÷	365	(day/yr) =	**1.5**	lb-VOC/day
130	x	14.0	NH_3	1,820	lb-NH_3/yr ÷	365	(day/yr) =	**5.0**	lb- NH_3/day

As shown above and also in the dairy emissions calculation spreadsheet in Appendix E, each of the new corrals for support stock (heifers) has a PE greater than 2.0 lb/day for PM_{10} and NH_3. Therefore, BACT is triggered for PM_{10} and NH_3 for each of the new corrals for support stock (heifers).

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 for relocation of an emissions unit.

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 x (EF2/EF1)

Where,
PE1 = The emissions unit's Potential to Emit 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 x (EF2 / EF1))

HAPE for the dairy emissions units are given in the dairy emissions calculation spreadsheet in Appendix E based on the pre-project annual emissions and the pre-project emission and the post-project emission factors for each type of cow that were used to calculate the Potential to Emit (PE) from the units.

Liquid Manure Handling System (ATC C-5502-3-2: Lagoon/Storage Pond and Liquid Manure Land Application)

AIPE for Lagoon/Storage Pond (See Appendix E)

AIPE for VOC: 3.2 lb-VOC/day

AIPE for NH_3: 36.4 lb-NH_3/day

AIPE for H_2S: 0 lb-H_2S/day

As demonstrated above, the AIPE for the project for the lagoon/storage pond exceeds 2.0 lb/day for VOC and NH_3 but does not exceed 2.0 lb/day for H_2S; therefore, BACT is triggered for VOC and NH_3 from the lagoon/storage pond but BACT is triggered for H_2S from the lagoon/storage pond.

AIPE for Liquid Manure Land Application (See Appendix E)

AIPE for VOC: 3.6 lb-VOC/day

AIPE for NH_3: 39.6 lb-NH_3/day

As demonstrated above, the AIPE for the project for liquid manure land application exceeds 2.0 lb/day for VOC and NH_3; therefore, BACT is triggered for VOC and NH_3 from liquid manure land application.

Solid Manure Handling System (ATC C-5502-4-2: Solid Manure Storage and Handling)

AIPE for Solid Manure Storage and Separated Solid Piles (See Appendix E)

AIPE for VOC: 0.6 lb-VOC/day

AIPE for NH_3: 4.3 lb-NH_3/day

As demonstrated above, the AIPE for the project for solid manure storage and separated solids piles does not exceed 2.0 lb/day for VOC but exceeds 2.0 lb/day for NH_3; therefore, BACT is not triggered for VOC from for solid manure storage and separated solids piles but BACT is triggered for NH_3 from solid manure storage and separated solids piles.

AIPE for Solid Manure Land Application (See Appendix E)

AIPE for VOC: 1.4 lb-VOC/day

AIPE for NH_3: 9.3 lb-NH_3/day

As demonstrated above, the AIPE for the project for solid manure land application does not exceed 2.0 lb/day for VOC but exceeds 2.0 lb/day for NH_3; therefore, BACT

is not triggered for VOC from for solid manure land application but BACT is triggered for NH_3 from solid manure land application.

Feed Storage and Handling Permit Unit (ATC C-5502-6-1: Silage Piles and TMR)

AIPE for Silage Pile(s) (See Appendix E)

AIPE for VOC: 0 lb-VOC/day

As demonstrated above, the AIPE for the project for the silage pile(s) does not exceed 2.0 lb/day for VOC; therefore BACT is not triggered for VOC from the silage pile(s).

AIPE for Total Mixed Ration (TMR) (See Appendix E)

AIPE for VOC: 32.0 lb-VOC/day

As demonstrated above, the AIPE for the project for the Total Mixed Ration (TMR) system exceeds 2.0 lb/day for VOC; therefore BACT is triggered for VOC from the TMR.

d. SB 288/Federal Major Modification

As discussed in Section VII.C.7 above, this project does not constitute an SB 288 or a Federal Major Modification; therefore BACT is not triggered for an SB 288 Major Modification or Federal Major Modification.

2. Top-Down BACT Analysis

Per Permit Services Policies and Procedures for BACT, a Top-Down BACT analysis shall be performed as a part of the application review for each application subject to the BACT requirements pursuant to the District's NSR Rule.

Pursuant to the attached Top-Down BACT Analysis (see Appendix F), BACT for the project has been satisfied with the following:

Milking Parlor (ATC C-5502-1-3)

VOC: Flush/Spray down milking parlor after each group of cows is milked

NH_3: Flush/Spray down milking parlor after each group of cows is milked

Cow Housing (ATC C-5502-2-2)

New Corrals

PM_{10}: 1) Concrete feed lanes and walkways
2) Scraping of exercise pens and open corrals every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions

3) Shade structures in open corrals
4) Feeding heifers near (within 1 hour of) dusk

VOC:
1) Concrete feed lanes and walkways
2) Feed lanes and walkways for mature cows (milk and dry cows) flushed four times per day. Feed lanes and walkways for support stock (heifers) flushed at least once per day
3) All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines
4) Exercise pens and open corrals properly sloped to promote drainage (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 managed to maintain a dry surface (except during periods of rainy weather)
5) Scraping of exercise pens and open corrals every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions

NH_3:
1) Concrete feed lanes and walkways
2) Feed lanes and walkways for mature cows (milk and dry cows) flushed four times per day. Feed lanes and walkways for support stock (heifers) flushed at least once per day
3) All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines
4) Exercise pens and open corrals properly sloped to promote drainage (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 managed to maintain a dry surface (except during periods of rainy weather)
5) Scraping of exercise pens and open corrals every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions

Liquid Manure Handling System (ATC C-5502-3-2)

Lagoons/Storage Ponds

VOC: Anaerobic Treatment Lagoon designed according to NRCS guidelines

NH_3: All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations

Liquid Manure Land Application

VOC: Irrigation of crops using liquid and slurry manure after treatment in an anaerobic treatment lagoon or an anaerobic digester.

NH_3: All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations

Solid Manure Handling System (ATC C-5502-4-2)

Solid Manure Storage and Separated Solids

NH_3: All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations

Solid Manure Land Application

NH_3: All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations

Total Mixed Ration (ATC C-5502-6-1)

VOC: Compliance with District Rule 4570 mitigation measures

Additionally, District Rule 2201 defines BACT as including the most stringent emission limitation or control technique, including process and equipment changes, that has been found by the APCO to be cost effective and technologically feasible for such class or category of source. The District has found that the basic mitigation measures required by District Rule 4570 are cost effective and technologically feasible for confined animal facilities. Therefore, in addition to the BACT requirements listed above, implementation of the mitigation measures that the applicant has selected to comply with Rule 4570 will also be required as part of BACT for VOC and NH_3 emissions from the dairy.

B. Offsets

Pursuant to Section 4.6.9 of District Rule 2201, agricultural sources that are not major sources are exempt from offsets if emissions reductions from that source would not meet the criteria for real, permanent, quantifiable, and enforceable emission reductions. Over time, EPA policies and court determinations have established fairly rigorous definitions and tests for each of these terms.

For agricultural operations and other nontraditional sources of emissions, it is difficult to demonstrate that emission reductions are real, permanent, quantifiable, enforceable, and surplus – *as those terms are defined by EPA and case law.* Under SB 700, the air districts are prohibited from requiring offsets for sources for which the above demonstration cannot be made. These sources may include, for example, crop farm fugitive dust, agricultural burning, and non-equipment operations at CAFs. When it becomes possible to demonstrate that emissions (increases and reductions) are real, permanent, quantifiable, enforceable, and surplus, Emission Reduction Credits (ERCs) may be granted and offsets required. A program to allow this would have to include a regulation that is approved by EPA and incorporated into the State Implementation Plan (SIP). Such regulations specify appropriate quantification methodologies, and other provisions that ensure the reduction meet all the applicable tests, and the regulatory process allows for public review and comment.

To date, EPA has not approved the issuance of ERCs by California air districts for agricultural activities. This has been the case even for reductions from on-the-farm equipment that is similar to traditional stationary sources. Therefore, ERCs will not be granted, nor will offsets be required for agricultural sources until the District has adopted

the needed regulations, and EPA has approved those regulations and incorporated them into the SIP. Therefore, offsets are not required for this project.

C. Public Notification

1. Applicability

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, and/or
d. Any project with an SSIPE of greater than 20,000 lb/year for any pollutant.

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

New Major Sources are new facilities, which are also Major Sources. Since this is not a new facility, public noticing is not required for this project for New Major Source purposes.

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 discussed above, the new large milking parlor and new corrals constructed after January 1, 2004 are considered new emissions units. As shown above and in the dairy emissions calculation spreadsheet in Appendix E, this project does not include a new emissions unit which has daily PE greater than 100 lb/day for any pollutant. Therefore, public noticing is not required for this project for PE from new emissions unit > 100 lb/day.

c. Offset Threshold

The SSPE1 and SSPE2 are compared to the offset thresholds in the following table.

Offset Threshold				
Pollutant	SSPE1 (lb/year)	SSPE2 (lb/year)	Offset Threshold	Public Notice Required?
NO_X	584	584	20,000 lb/year	No
SO_X	0	0	54,750 lb/year	No
PM_{10}	42,640	44,637	29,200 lb/year	No
CO	79	79	200,000 lb/year	No
VOC	125,772	153,240	20,000 lb/year	No

As detailed above, there were no thresholds surpassed with this project; therefore public noticing is not required for surpassing an offset threshold.

e. 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.

Stationary Source Increase in Permitted Emissions [SSIPE] – Public Notice					
Pollutant	SSPE2 (lb/year)	SSPE1 (lb/year)	SSIPE (lb/year)	SSIPE Public Notice Threshold	Public Notice Required?
NO_x	584	584	0	20,000 lb/year	No
SO_x	0	0	0	20,000 lb/year	No
PM_{10}	44,637	42,640	1,997	20,000 lb/year	No
CO	79	79	0	20,000 lb/year	No
VOC	153,240	125,772	27,468	20,000 lb/year	**Yes**
NH_3	418,352	298,260	120,092	20,000 lb/year	**Yes**
H_2S	4,649	4,649	0	20,000 lb/year	No

As demonstrated above, the SSIPEs for VOC and NH_3 are greater than 20,000 lb/year; therefore public noticing for SSIPE purposes is required.

2. Public Notice Action

As discussed above, public noticing is required for this project because the SSIPEs for VOC and NH_3 were greater than 20,000 lb/year. Therefore, public notice documents will be submitted to the California Air Resources Board (CARB) and a public notice will be published in a local newspaper of general circulation in the county of the project prior to the issuance of the ATCs for the dairy.

D. Daily Emission Limits (DELs)

Daily Emissions Limitations (DELs) and other enforceable conditions are required by Section 3.17 to restrict a unit's maximum daily emissions, to a level at or below the emissions associated with the maximum design capacity. Per Sections 3.17.1 and 3.17.2, 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.

For dairies, the DEL is satisfied based on the number and types of cows at the dairy and the required emission controls and mitigation measures. The number and types of cows are listed in the permit equipment description for the Cow Housing (Permit C-5502-2).

Milking Parlor (C-5502-1-3)
For the milking parlor the DEL is satisfied by the number of cows listed in the permit description.

In addition, the following condition will be placed on the ATC:

> Permittee shall flush or hose down milk parlors immediately after or during each milking. [District Rules 2201 & 4570]

Cow Housing (C-5502-2-2)
The following condition will be added to limit the total number of cows housed at the dairy:

> The total number of cattle housed at the dairy at any one time shall not exceed any of the following limits: 4,750 milk cows, not to exceed a combined total of 5,550 mature cows (milk cows and dry cows); and 1,900 total support stock (heifers and bulls). [District Rule 2201]

Additionally, the following conditions will be placed on the ATC to ensure that the DEL requirements for PM_{10} and BACT are met:

> The open corrals at this dairy that are located north of Latitude 37.09642 N (identified by the Facility as Pens # 31-45) shall be equipped with shade structures. [District Rule 2201]

> The open corrals at this dairy that are located north of Latitude 37.09642 N (identified by the Facility as Pens # 31-45) shall be scraped every two weeks using a pull-type scraper in the morning hours, except when this is prevented by wet conditions. [District Rule 2201]

> For heifers housed in open corrals at the dairy that are located north of Latitude 37.09642 N (identified by the Facility as Pens # 31-45), at least one of the feedings of the heifers shall be near dusk (within one hour of dusk). [District Rule 2201]

The following conditions will be placed on the ATC to ensure that the DEL requirements for VOC are met:

> For open corrals at the dairy located north of Latitude 37.09642 N (identified by the Facility as Pens # 31-45), the feed lanes and walkways in the corrals that house milk cows and dry cows shall be flushed at least four times per day and the feed lanes and walkways in the corrals for the support stock (heifers) shall be flushed at least once per day. [District Rule 2201]

> Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 2201]

Liquid Manure Handling System (C-5502-3-2)
Since emissions from the liquid manure handling system depend on the amount of manure handled, the following conditions will be placed on the permit:

> The liquid manure handling system shall handle flush manure from no more than 4,750 milk cows, not to exceed a combined total of 5,550 mature cows (milk cows and dry cows); and 1,900 total support stock (heifers and bulls). [District Rule 2201]

The following conditions will be placed on the ATC to ensure that the DEL requirements for VOC are met:

Liquid manure shall be treated in an anaerobic treatment lagoon system with anaerobic treatment lagoon(s) designed and operated in accordance with National Resource Conservation Service (NRCS) California Field Office Technical Guide Code 359 - Waste Treatment Lagoon. [District Rules 2201 and 4102]

Liquid manure used for irrigation of cropland shall only be taken from the storage pond(s)/secondary lagoon(s) after treatment in an anaerobic treatment lagoon. [District Rules 2201 and 4570]

Solid Manure Handling System (C-5502-4-2)
The following condition will be placed on the ATC:

Solid manure applied to fields shall be incorporated into the soil within two hours after application. [District Rules 2201 and 4570]

Feed Storage and Handling System (C-5502-6-1)
The following condition will be placed on the ATC:

Permittee shall feed all animals according to National Research Council (NRC) guidelines. [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

The following condition will be placed on the permit:

- Clean rainfall runoff shall be diverted around exercise pens to reduce the amount of water that is potentially detained on the corral and pen surfaces. [District Rule 2201]

3. Recordkeeping

Recordkeeping is required to demonstrate compliance with the public notification and daily emission limit requirements of Rule 2201. In general, recordkeeping for the Milking Parlor (C-5502-1), the Liquid Manure Handling System (C-5502-3), and the Solid Manure Handling System (C-5502-4) and the Feed Storage and Handling System (C-5502-6) is satisfied with the records that must be kept to demonstrate compliance with the numbers and types of cows listed in the permit equipment description for the Cow Housing (C-5502-2). Conditions that will be placed on the ATC permits are listed below.

Cow Housing (C-5502-2)
The following conditions will appear on the ATC for the Cow Housing Permit:

- The permittee shall maintain records of: (1) an operating plan with number of times lanes and walkways are flushed per day; (2) the frequency of scraping and manure removal from corral surfaces; and (3) a schedule listing the times when heifers housed in open corrals at the dairy located north of Latitude 37.09642 N are fed near dusk. [District Rules 1070 and 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]
- All records shall be kept and maintained for a minimum of five (5) years and shall be made available to the APCO and EPA upon request. [District Rules 2201 and 4570]

Additional recordkeeping conditions are included under the Rule 4570 compliance section.

Liquid Manure Handling System (C-5502-3)
To ensure that the lagoon system is designed and operating properly, the following conditions will be placed on the ATC for the Liquid Manure Handling System:

- Permittee shall maintain records of design specifications and calculations, including Minimum Treatment Volume (MTV) and Hydraulic Retention Time (HRT), for the Anaerobic Treatment Lagoon system in order to demonstrate that the system has been designed and is operating in accordance with the applicable National Resource Conservation Service (NRCS) technical guide. [District Rule 2201]
- Permittee shall maintain records that only liquid manure treated with an anaerobic treatment lagoon is applied to fields. [District Rule 2201]
- Permittee shall maintain records to demonstrate liquid manure did not stand in the fields for more than twenty-four (24) hours after irrigation. [District Rules 2201 and 4570]
- All records shall be kept and maintained for a minimum of five (5) years and shall be made available to the APCO and EPA upon request. [District Rules 2201 and 4570]

Solid Manure Handling System (C-5502-4)
The following condition will be placed on the ATC for the Solid Manure Handling System:

- Permittee shall maintain records to demonstrate that all solid manure has been incorporated within two hours after land application. [District Rules 2201 and 4570]
- All records shall be kept and maintained for a minimum of five (5) years and shall be made available to the APCO and EPA upon request. [District Rule 4570]

The permit units are also subject to the recordkeeping requirements of District Rule 4570, *Confined Animal Facilities*, which will be discussed under the Rule 4570 section below.

4. Reporting

No reporting is required to demonstrate compliance with Rule 2201.

F. Ambient Air Quality Analysis

Section 4.14 of Rule 2201 requires that an ambient air quality analysis (AAQA) be conducted for the purpose of determining whether a new or modified Stationary Source will cause or make worse a violation of an air quality standard. The District's Technical Services Division conducted the required analysis. Refer to Appendix G of this document for the AAQA summary sheet.

The proposed location is in an attainment area for NO_2, CO, and SO_2. As shown by the AAQA summary sheet the proposed equipment will not cause a violation of an air quality standard for NO_2, CO, or SO_2. The proposed location is in a non-attainment area for the state's PM_{10} standard as well as federal and state $PM_{2.5}$ standards.

District Technical Services also performed an Ambient Air Quality Analysis for Permit Unit C-5502-2 (Cow Housing). The modeling was performed for the PM_{10} using AERMOD. The results from the Pollutant Modeling are given in the following table:

PM_{10} Pollutant Modeling Results (Dairy Cow Housing Unit C-5502-2)		
Averaging Time	**24 hr Avg.**	**Annual**
Calculated Dairy Increase ($\mu g/m^3$)	4.34	1.03
District Interim Significance Level for Fugitive Emissions ($\mu g/m^3$)	10.4[1]	2.08[2]
Result	Pass	Pass

1 The District has decided on an interim basis to use a threshold for fugitive dust sources of 10.4 $\mu g/m^3$ for the 24-hour average concentration.

2 The District has decided on an interim basis to use a threshold for fugitive dust sources of 2.08 $\mu g/m^3$ for the Annual average concentration.

As shown by the Ambient Air Quality Analysis, the ambient air quality impacts at the dairy do not exceed the District's interim 24-hour threshold or interim Annual threshold for fugitive dust sources and the proposed project is not expected to cause or contribute significantly to a violation of the State or National AAQS.

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 2550 Federally Mandated Preconstruction Review for Major Sources of Air Toxics

The provisions of this rule only apply to applications to construct or reconstruct a major air toxics source with Authority to Construct issued on or after June 28, 1998.

Under Section 112(g) of the Clean Air Act, newly constructed facilities or reconstructed units or sources at existing facilities would be subject to 112(g) requirements if they have the potential to emit hazardous air pollutants (air toxics) in "major" amounts (10 tons or more of an individual pollutant or 25 tons or more of a combination of pollutants).[5] Sources or facilities subject to 112(g) would be subject to stringent air pollution control requirements, referred to as "new source MACT (Maximum Achievable Control Technology)."

The federal Clean Air Act lists 189 substances as potential Hazardous Air Pollutants (Clean Air Act Sec. 112(b)(1)). Any pollutant that may be emitted from the project and is on the federal New Source Review List and the federal Clean Air Act list has been evaluated. The following table includes a list of HAPs generated at dairies including the associated emission factor.

Hazardous Air Pollutant (HAP) Emissions		
HAP	lbs-milk/cow-yr	Source
Methanol	1.35	UC Davis - *VOC Emission from Dairy Cows and their Excreta*, 2005
Carbon disulfide	0.027	Dr. Schmidt - *Dairy Emissions using Flux Chambers (Phase I & II)*, 2005
Eythylbenzene	0.003	
o-Xylene	0.005	
1,2-Dibromo-3chloropropane	0.011	
1,2,4-Trichlorobenzene	0.025	
Napthalene	0.012	
Hexachlorobutadiene	0.012	
Formaldehyde	0.005	
Acetaldehyde	0.029	
Chloroform	0.017	California State University Fresno (CSUF) - *Monitoring and Modeling of ROG at California Dairies*, 2005
Styrene	0.01	
Vinyl acetate[6]	0.08	Dr. Schmidt - *Dairy Emissions using Flux Chambers (Phase I & II)* & California State University Fresno (CSUF) - *Monitoring and Modeling of ROG at California Dairies*, 2005
Toluene[7]	0.162	
Cadmium	0.009	Air Resources Board's Profile No. 423, Livestock Operations Dust
Hexavalent Chromium	0.004	
Nickel	0.026	
Arsenic	0.005	
Cobalt	0.003	
Lead	0.033	
Total	**1.828**	

Although, some of the pollutants listed above may have been misidentified as HAPs due to similarities of many compounds consisting of very similar spikes (as measured through the gas Chromatograph Mass Spectroscopy - GCMS), all of these pollutants will be used in calculating

[5] Reconstruction" is defined as a change to a source or facility in which the cost exceeds 50 percent of the cost of constructing an entirely source or facility that is comparable to the one being rebuilt.
[6] 0.01 + 0.07 = 0.08 lbs/hd-yr
[7] 0.012 + 0.15 = 0.162 lbs/hd-yr

the worst-case HAP emissions. Since this dairy is complying with the Best Available Control Technology (BACT) requirements and Rule 4570 mitigation measures, many of the pollutants listed above are expected to be reduced, however, no control is being applied to these factors at this time in order to calculate the worst-case emissions.

The emission calculations are shown below:

HAP Emissions for Fagundes Dairy (Facility C-5502)						
Type of Cow	**Number of cows**		**Emission Factor lbs/hd-yr[8]**		**lbs/yr**	**tons/yr**
Milking Cow	4,750	x	1.828	=	8,683	4.34
Dry Cow	800	x	0.995	=	796	0.40
Support Stock	1,900	x	0.764	=	1,452	0.73
Total				=	**10,931**	**5.47**

As shown above, each individual HAP is expected to be below 10 tons per year and total HAP emissions are expected to be below 25 tons per year. The largest individual HAP would be methanol, at 4.04 tons per year (5.47 tons x (1.35 lbs-methanol/1.828 lbs-HAPs)). Therefore, this facility will not be a major air toxics source and the provisions of District Rule 2550 do not apply. Although the proposed project is not subject to District Rule 2550, the project will be subject to the BACT requirements of District Rule 2201. Because the dairy was subject BACT to reduce VOC emissions and the majority of HAPs emitted from dairies are also VOCs, significant HAP reductions are expected and BACT for VOC emissions would satisfy the MACT requirements if they were applicable.

The current dairy emission factors are based on the best scientific data that were available. As with other emission factors, the dairy emission factors will be periodically updated if new scientific information indicates from recently completed and ongoing research studies indicates that revisions may be necessary.

Rule 4101 Visible Emissions

Section 5.0 stipulates that no person shall discharge into the atmosphere emissions of any air contaminant aggregating more than 3 minutes in any 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 PM10 Prohibitions) are considered to be exempt.

Pursuant to District Rule 8081, Section 4.1, on-field agricultural sources are exempt from the requirements of Regulation VIII.

[8] The emission factor has been adjusted for each type of cow based on the ratio of amount of Volatile Solids generated by each type of cow.

An on-field agricultural source is 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;

The units involved in this project are used solely for the raising of dairy animals. Therefore, these units are exempt from the provisions of this rule.

Rule 4102 Nuisance

Section 4.0 prohibits discharge of air contaminants which could cause injury, detriment, nuisance or annoyance to the public.

This project is proposing BACT and has proposed all mitigation measures required by Rule 4570. Therefore, this dairy is expected to comply with this rule.

California Health and 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.

An HRA is not required for a project with a total facility prioritization score of less than one. According to the Technical Services Memo for this project (Appendix G), the total facility prioritization score including this project was greater than one. Therefore, a health risk assessment was required to determine the short-term acute and long-term chronic exposure from this project.

Risk Management Review (RMR) Summary							
Categories	**Milking Operation (C-5502-1-3)**	**Cow Housing (C-5502-2-2)**	**Liquid Manure (C-5502-3-2)**	**Solid Manure (C-5502-4-2)**	**Feed Handling (C-5502-6-1)**	**Project Totals**	**Facility Totals**
Prioritization Score	0.34	16.64	**13.56**	**0.19**	N/A[2]	30.54	>1
Acute Hazard Index	0.00	0.65	0.14	0.01	N/A[2]	0.8	0.8
Chronic Hazard Index	0.00	0.13	0.02	0.00	N/A[2]	0.15	0.15
Maximum Individual Cancer Risk	2.56E-08	1.21E-06	2.86E-06	N/A[1]	N/A[2]	4.1E-06	4.79E-06
T-BACT Required?	**No**	**No***	**Yes-VOCs**	**No**	**No**		
Special Permit Conditions?	**No**	**No**	**No**	**No**	**No**		

* TBACT is determined on a corral by corral basis. TBACT for the Cow Housing was addressed in the conclusions section of the RMR report.

1 There is no REL value associated with the HAP for this unit (Unit -4-2: solid manure handling)

2 No prioritization or further review was required for Unit -6-1 (feed storage & handling).

Risk Summary for Corrals 1-15 (Cow Housings Unit C-5502-2-2)

Risk Summary for Individual Cow Housing Units in Cow Housing Permit (Unit C-5502-2-2)		
Cow Housing #	**Maximum Cancer Risk**	**T-BACT Required?**
Corral 1	7.55E-08	**No**
Corral 2	6.84E-08	**No**
Corral 3	6.96E-08	**No**
Corral 4	6.36E-08	**No**
Corral 5	5.62E-08	**No**
Corral 6	4.98E-08	**No**
Corral 7	4.75E-08	**No**
Corral 8	1.03E-07	**No**
Corral 9	9.30E-08	**No**
Corral 10	7.64E-08	**No**
Corral 11	6.38E-08	**No**
Corral 12	1.42E-07	**No**
Corral 13	1.17E-07	**No**
Corral 14	9.86E-08	**No**
Corral 15	7.88E-08	**No**
Total	1.17E06	

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 RMR indicates that the risk is above the District's thresholds for triggering T-BACT requirements.

For this project T-BACT is triggered for VOC from the dairy ponds and lagoons. T-BACT is satisfied with BACT for VOC (see Appendix F), which is the use of an Anaerobic Treatment Lagoon designed according to NRCS guidelines; 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 10 in a million). As outlined in the table above and the RMR Summary in Appendix G of this report, the emissions increases for this project was determined to be less than significant.

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 shall implement the applicable CMPs selected pursuant to Section 6.2 for each agricultural operation site.

Pursuant to Section 5.2, an owner/operator shall prepare and submit a CMP application for each agricultural operation site to the APCO for approval.

The facility received District approval for its CMP plan on November 17, 2008. The applicant will be required to update the existing CMP application to incorporate any changes resulting from the project. Continued compliance with the requirements of District Rule 4550 is expected.

Rule 4570 Confined Animal Facilities (CAF)

This rule applies to Confined Animal Facilities (CAF) located within the San Joaquin Valley Air Basin. The purpose of this rule is to limit emissions of Volatile Organic Compounds (VOC) from Confined Animal Facilities (CAF).

As stated above, under ATC Project C-1110850, this facility was issued ATCs to add the mitigation measures that the facility selected to comply with Phase II of District Rule 4570 to the permits for the dairy. These mitigation measures will also be incorporated into the ATCs for expansion of the dairy and compliance is expected.

Section 5.0 Requirements

Pursuant to Section 5.1, owners/operators of any CAF shall submit, for approval by the APCO, a permit application for each Confined Animal Facility.

Pursuant to Section 5.1.2, 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.

This facility has already gone through public notice for compliance with Phase I of District Rule 4570; therefore, public noticing for this project is not required for purposes of complying with District Rule 4570.

Pursuant to Section 5.1.3, owners/operators shall 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.

Pursuant to Section 5.1.4, the Permit-to-Operate or Authority-to-Construct application shall 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.

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

Pursuant to Section 5.3, owners/operators of any CAF shall 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.

The ATC permits issued to this facility under ATC Project C-1110880 for compliance with District Rule 4570 Phase II were issued on January 5, 2012; therefore, implementation of the required mitigation measures must begin no later than January 4, 2013. However, because many of the mitigation measures required by Rule 4570 for the project are also required as BACT, the ATCs authorizing this project will require implementation of these measures upon commencement of operation under the ATCs.

Pursuant to Section 5.4, 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 placed on each permit.

- {4035} If a licensed veterinarian, a certified nutritionist, the California Department of Food and Agriculture (CDFA), or the United States Department of Agriculture (USDA) determines that any VOC mitigation measure (with a Rule 4570 reference) is detrimental to animal health and needs to be suspended, the Permittee 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 2201 and Rule 4570]

Section 7.0 Administrative Requirements

Section 7.2 General Records for CAFs Subject to Section 5.0 Requirements:

- Copies of all of the facility's permits
- Copies of all laboratory tests, calculations, logs, records, and other information required to demonstrate compliance with all applicable requirements of this rule, as determined by the APCO, ARB, EPA.
- Records of the number of animals of each species and production group at the facility on the permit issuance date. Quarterly records of any changes to this information shall also be maintained, (e.g. Dairy Herd Improvement Association records, animal inventories done for financial purposes, etc.)

The following condition will be placed on the cow housing permit:

- 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] N

Specific recordkeeping and monitoring conditions are shown below under the appropriate mitigation measures.

Pursuant to Section 7.9, owners/operators of a CAF subject to the requirements of Section 5.0 shall 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. Therefore, the following condition will be placed on the permits:

- {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 Rule 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 placed on the appropriate permits.

General Conditions

- {4035} If a licensed veterinarian, a certified nutritionist, the California Department of Food and Agriculture (CDFA), or the United States Department of Agriculture (USDA) determines that any VOC mitigation measure (with a Rule 4570 reference) is detrimental to animal health and needs to be suspended, the Permittee 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 2201 and 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 Rule 4570]

Feed Mitigation Measures Required

Required

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]

- {4457} Permittee shall maintain an operating plan/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]

- {4459} Permittee shall maintain an operating plan/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]

Optional

Remove uneaten wet feed from feed bunks within twenty-four (24) hours after the end of a rain event.

- {4464} Permittee shall remove uneaten wet feed from feed bunks within twenty-four (24) hours after the end of a rain event. [District Rules 2201 and 4570]

- {4465} Permittee shall maintain records demonstrating that uneaten wet feed was removed from feed bunks within twenty-four (24) hours after the end of a rain event. [District Rules 2201 and 4570]

Silage

Utilize a sealed feed storage system (e.g., Ag-Bag) for bagged silage.

- {4468} For bagged silage/feedstuff, permittee shall utilize a sealed feed storage system (e.g., ag bag). [District Rule and 4570]

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 ≥ 65% moisture for corn; and ≥ 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 Rule 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 Rule 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 Rule 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 Rule 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 Rule 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 Rule 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 Rule 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 Rule 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 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 Rule 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 Rule 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 Rule 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 Rule 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 Rule 4570]

Milking Parlor

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

- Permittee shall flush or hose down milk parlors immediately after or during each milking. [District Rules 2201 and 4570]

- Permittee shall provide verification that milk parlors are flushed or hosed down immediately after or during each milking. [District Rules 2201 and 4570]

Freestall Barn

Required

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

- Permittee shall pave feedlanes 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]

Optional

Flush or scrape freestall flush lanes at least three times per day.

- {4489} Permittee shall flush or scrape freestall flush lanes at least three (3) times per day. [District Rule 4570]

- {4490} Permittee shall keep records or maintain an operating plan that requires freestall flush lanes to be flushed or scraped at least three times per day. [District Rule 4570]

For a LARGE dairy only (1000 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 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]

- {4493} Permittee shall record the date that manure that is not dry is removed from individual cow freestall beds or raked, harrowed, scraped, or freestall bedding is graded at least once every seven (7) days. [District Rules 2201 and 4570]

Corral

Required

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 feed along the corral side of the feedlane for heifers.

- Permittee shall pave feedlanes 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]

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

Optional

Clean concreted lanes such that the depth of manure does not exceed twelve (12) inches at any point or time.

- {4509} Permittee shall clean concreted lanes such that the depth of manure does not exceed twelve (12) inches at any point or time. [District Rules 2201 and 4570]

- {4510} Permittee shall measure and document the depth of manure on the concrete lanes at least once every ninety (90) days. [District Rules 2201 and 4570]

For facilities with shades, implement one of the following mitigation measures: a) Install shade structures such that they are constructed with a light permeable roofing material; or b) Install all shade structures uphill of any slope in the corral; or c) Clean manure from under corral shades at least once every fourteen (14) days, when weather permits access into the corral; or d) Install shade structure so that the structure has a North/South orientation.

- {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 Rule 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 Rule 4570]

Knockdown fence line manure build-up prior to it exceeding a height of twelve (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.

- {4520} Permittee shall knockdown fence line manure build-up prior to it exceeding a height of twelve (12) inches at any time or point. 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]

- {4521} Permittee shall measure and document the depth of manure at the fence line at least once every ninety (90) days. [District Rules 2201 and 4570]

Solid Manure

Remove dry manure from the facility within seventy-two (72) hours of removal from housing.

Within seventy two (72) hours of solid manure removal from housing, 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.

- {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]

- {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]

Liquid Manure

Maintain lagoon pH between 6.5 and 7.5. (Please note: Testing per Section 7.2 of Rule 4570 will be required.)

- {4539} Permittee shall maintain lagoon pH between 6.5 and 7.5. [District Rule 4570]

- {4540} Permittee shall record and test lagoons for pH no later than six (6) months after the required date for implementation of the measure, and at least once every calendar quarter, with at least 30 days between monitoring tests thereafter unless the APCO, ARB, and EPA determines more frequent testing is required to demonstrate compliance with rule requirements. [District Rule 4570]

Land Application

Solid

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

Although Rule 4570 only requires that solid manure applied to fields be incorporated within 72 hours, the previous ATC for expansion of the dairy required solid manure to be incorporated immediately after application to land and this may be considered a BACT requirement. Therefore, the more stringent requirement from the previous ATC for the dairy expansion will be maintained. The following conditions will be placed on the ATC permit to ensure compliance:

- 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 after land application. [District Rules 2201 and 4570]

Liquid

Allow liquid manure to stand in the fields for no more than twenty-four (24) hours after irrigation.

- {4550} Permittee shall not allow liquid manure to stand in the fields for more than twenty-four (24) hours after irrigation. [District Rules 2201 and 4570]

- {4551} Permittee shall maintain records to demonstrate liquid manure did not stand in the fields for more than twenty-four (24) hours after irrigation. [District Rules 2201 and 4570]

Compliance with the requirements of District Rule 4570 is expected.

California Health and 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 Senate Bill 700 (SB 700)

Fagundes Dairy is an agricultural operation that raises dairy cows for the production of milk for human consumption. Pursuant to Senate Bill (SB) 700, agriculture operations, including Confined Animal Facilities (CAF), with emissions greater than ½ the major source emissions threshold levels (5.0 ton/year of NO_X or VOC), are required to obtain a District permit.

The post-project emissions from the dairy exceed the 5.0 ton-VOC/year permitting threshold and the dairy is also classified as a large CAF by the California Air Resources Board (ARB). The facility previously applied for District permits and has applied for ATC permits for this project; therefore compliance with the requirements of SB 700 is expected.

California Environmental Quality ACT (CEQA)

The California Environmental Quality Act (CEQA) requires each public agency to adopt objectives, criteria, and specific procedures consistent with CEQA Statutes and CEQA Guidelines for administering its responsibilities under CEQA, including the orderly evaluation of projects and preparation of environmental documents. The San Joaquin Valley Unified Air Pollution Control District (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.
- 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.

The proposed project is located in Madera County and is thus, subject to the Madera County Planning Agency approval process. In 2008, Madera County amended their General Plan to include a Dairy Element and Dairy Standards. The Dairy Element and dairy standards provides guidance to Madera County and the dairy industry for the development, expansion, and operation of milk cow dairies while ensuring that permit application are approved through a streamlined process that considers potential impacts to the environment. The Dairy Element and Dairy Standards establishes a process by which subsequent dairy projects involving site-specific operations can be evaluated to determine whether the environmental effects of the operation were covered in the Program Environmental Impact Report (EIR). The Program EIR for the Dairy Element and Dairy Standards (State Clearinghouse (SCH) Number 2006081050) was certified by the Madera County Board of Supervisors on October 27, 2008.

The County of Madera is the public agency having principal responsibility for approving the project. As such, the County of Madera served as the Lead Agency (CCR §15367). Consistent with procedures established within the Program EIR, Madera County prepared and adopted a Mitigated Negative Declaration (MND #2012-11) 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), (CCR §15381) Rule 2010 requires operators of emission sources to obtain an Authority to Construct (ATC) and Permit to Operate (PTO) from the District. Rule 2201 requires that new and modified stationary sources reduce their emissions using Best Available Control Technology (BACT) and for non-agricultural sources offsetting emissions when above certain thresholds (SB 700).

Greenhouse Gas (GHG) Significance Determination

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

As a responsible agency the District complies with CEQA by considering the Mitigated Negative Declaration (MND #2012-11) prepared by the Lead Agency, and by reaching its own conclusion on whether and how to approve the project involved (CCR §15096). The District has reviewed the Mitigated Negative Declaration (MND #2012-11) prepared by the Lead Agency for the project and finds it to be adequate. To reduce project related impacts on air quality, the District has imposed air pollutant emission controls on the project as required by BACT and District Rule 2201. Offsets were considered, but determined not to be a feasible mitigation measure due to legal constraints (Health and Safety Code §42301.18(c)). Thus, the District has adopted all feasible mitigation measures to reduce air impacts associated with the project.

Pursuant to CCR §15096, prior to project approval and issuance of ATCs the District will prepare findings. Upon project approval the District will file a Notice of Determination with the County of Madera.

IX. Recommendation

Compliance with all applicable rules and regulations is expected. Pending a successful Public Noticing period, issue Authorities to Construct C-5502-1-3, -2-2, -3-2, -4-2, & -6-1 subject to the permit conditions on the attached draft Authorities to Construct in Appendix H.

X. Billing Information

Annual Permit Fees			
Permit Number	Fee Schedule	Fee Description	Annual Fee
C-5502-1-3	3020-06	Milking Center - Miscellaneous	$105.00
C-5502-2-2	3020-06	Cow Housing - Miscellaneous	$105.00
C-5502-3-2	3020-06	Liquid Manure Management - Miscellaneous	$105.00
C-5502-4-2	3020-06	Solid Manure Management - Miscellaneous	$105.00
C-5502-6-1	3020-06	Feed Storage and Handling - Miscellaneous	$105.00

Appendixes

A: Current Permits to Operate (C-5502-1-4, -2-3, -3-3, -4-3, & -6-2)
B: Madera County CUP #2012-008 Conditions of Approval
C: Herd Size Allowed at the Site by Madera County CUP #2012-008
D: Anaerobic Lagoon Design Check Spreadsheets
E: Copy of Dairy Emissions Calculation Spreadsheets
F: BACT Analysis
G: Summary of Health Risk Assessment (HRA) and Ambient Air Quality Analysis (AAQA)
H: Draft ATCs (C-5502-1-3, -2-2, -3-2, -4-2, & -6-1)

APPENDIX A

Current Permits to Operate
(C-5502-1-4, -2-3, -3-3, -4-3, & -6-2)

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: C-5502-1-4 **EXPIRATION DATE:** 02/28/2017

EQUIPMENT DESCRIPTION:
3,000 COW MILKING OPERATION WITH ONE DOUBLE 40 PARALLEL (80 STALLS) MILKING PARLOR AND TWO HOSPITAL MILKING BARNS

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. 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 flush or hose milk parlor immediately prior to, immediately after, or during each milking. [District Rule 4570]
6. Permittee shall provide verification that milk parlors are flushed or hosed prior to, immediately after, or during each milking. [District Rule 4570]
7. 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 Rule 4570]

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: C-5502-2-3 **EXPIRATION DATE:** 02/28/2017

EQUIPMENT DESCRIPTION:
COW HOUSING - 3,000 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 4,000 MATURE COWS (MILK AND DRY); 2,000 TOTAL SUPPORT STOCK (HEIFERS, CALVES AND BULLS); AND ONE FREESTALL WITH FLUSH 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. 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 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 Rule 4570]
6. Permittee shall flush or scrape freestall flush lanes at least three (3) times per day. [District Rule 4570]
7. Permittee shall keep records or maintain an operating plan that requires freestall flush lanes to be flushed or scraped at least three times per day. [District Rule 4570]
8. 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 Rule 4570]
9. Permittee shall record the date that manure that is not dry is removed from individual cow freestall beds or raked, harrowed, scraped, or freestall bedding is graded at least once every seven (7) days. [District Rule 4570]
10. Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rule 4570]
11. Permittee shall maintain records demonstrating that water pipes and troughs are inspected and leaks are repaired at least once every seven (7) days. [District Rule 4570]
12. 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 Rule 4570]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

13. 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 Rule 4570]

14. 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 Rule 4570]

15. 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 Rule 4570]

16. Permittee shall clean concreted lanes such that the depth of manure does not exceed twelve (12) inches at any point or time. [District Rule 4570]

17. Permittee shall measure and document the depth of manure on the concrete lanes at least once every ninety (90) days. [District Rule 4570]

18. 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 Rule 4570]

19. 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 Rule 4570]

20. Permittee shall knockdown fence line manure build-up prior to it exceeding a height of twelve (12) inches at any time or point. 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 Rule 4570]

21. Permittee shall measure and document the depth of manure at the fence line at least once every ninety (90) days. [District Rule 4570]

22. 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 Rule 4570]

23. 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 Rule 4570]

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: C-5502-3-3 **EXPIRATION DATE:** 02/28/2017

EQUIPMENT DESCRIPTION:
LIQUID MANURE HANDLING SYSTEM CONSISTING OF ONE STORAGE POND; MANURE IS 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]
4. 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 maintain lagoon pH between 6.5 and 7.5. [District Rule 4570]
6. Permittee shall record and test lagoons for pH no later than six (6) months after the required date for implementation of the measure, and at least once every calendar quarter, with at least 30 days between monitoring tests thereafter unless the APCO, ARB, and EPA determines more frequent testing is required to demonstrate compliance with rule requirements. [District Rule 4570]
7. Permittee shall not allow liquid manure to stand in the fields for more than twenty-four (24) hours after irrigation. [District Rule 4570]
8. Permittee shall maintain records to demonstrate liquid manure did not stand in the fields for more than twenty-four (24) hours after irrigation. [District Rule 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 Rule 4570]

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: C-5502-4-3 **EXPIRATION DATE:** 02/28/2017

EQUIPMENT DESCRIPTION:
SOLID MANURE HANDLING CONSISTING OF OPEN MANURE STOCK PILES; SOLID MANURE APPLICATION TO LAND AND/OR 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]
4. 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. 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 Rule 4570]
6. 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 Rule 4570]
7. 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 Rule 4570]
8. Within seventy two (72) hours of removal of separated solids from the drying process, permittee shall either 1) remove separated solids from the facility, or 2) 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 twenty-four (24) hours per event. [District Rule 4570]
9. 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 Rule 4570]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

10. Permittee shall maintain records, such as manufacturer warranties or other documentation, demonstrating that the weatherproof covering over separated solids 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 Rule 4570]
11. Permittee shall incorporate all solid manure within seventy-two (72) hours of land application. [District Rule 4570]
12. Permittee shall maintain records to demonstrate that all solid manure has been incorporated within seventy-two (72) hours of land application. [District Rule 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 Rule 4570]

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: C-5502-6-2 **EXPIRATION DATE:** 02/28/2017

EQUIPMENT DESCRIPTION:
FEED STORAGE AND HANDLING CONSISTING OF COMMODITY BARNS AND SILAGE PILES

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. 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 Rule 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 Rule 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 Rule 4570]
8. Permittee shall maintain an operating plan/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 Rule 4570]
9. Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rule 4570]
10. Permittee shall maintain an operating plan/record of when feeding of total mixed rations began within two hours of grinding and mixing rations. [District Rule 4570]
11. Permittee shall store grain in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rule 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 Rule 4570]
13. Permittee shall remove uneaten wet feed from feed bunks within twenty-four (24) hours after the end of a rain event. [District Rule 4570]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

14. Permittee shall maintain records demonstrating that uneaten wet feed was removed from feed bunks within twenty-four (24) hours after the end of a rain event. [District Rule 4570]

15. For bagged silage/feedstuff, permittee shall utilize a sealed feed storage system (e.g., ag bag). [District Rule 4570]

16. 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 Rule 4570]

17. 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 Rule 4570]

18. 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 Rule 4570]

19. 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 Rule 4570]

20. 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 Rule 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, 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 Rule 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, records of the average percent moisture of crops harvested for silage shall be maintained. [District Rule 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, 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 Rule 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, 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 Rule 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 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 Rule 4570]

26. 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 Rule 4570]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

27. 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 Rule 4570]
28. 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 Rule 4570]
29. 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 Rule 4570]
30. 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 manufacturers instructions for application of the additive. [District Rule 4570]
31. 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 Rule 4570]

APPENDIX B

Madera County CUP #2012-008 Conditions of Approval

RESOURCE MANAGEMENT AGENCY
PLANNING DEPARTMENT

Norman L. Allinder, AICP
Director

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PLANNING COMMISSION DATE: **August 7, 2012**

AGENDA ITEM: **#3**

CUP	**#2011-005**	**Request to amend CUP #99-34 to increase herd size.**
APN	**#025-190-002, -001, -007; #025-130-004,-005, et al**	**Applicant: Jim Kopshever** **Owner: Fred Fegundes**
CEQA	**MND #2012-11**	**Mitigated Negative Declaration**

REQUEST:

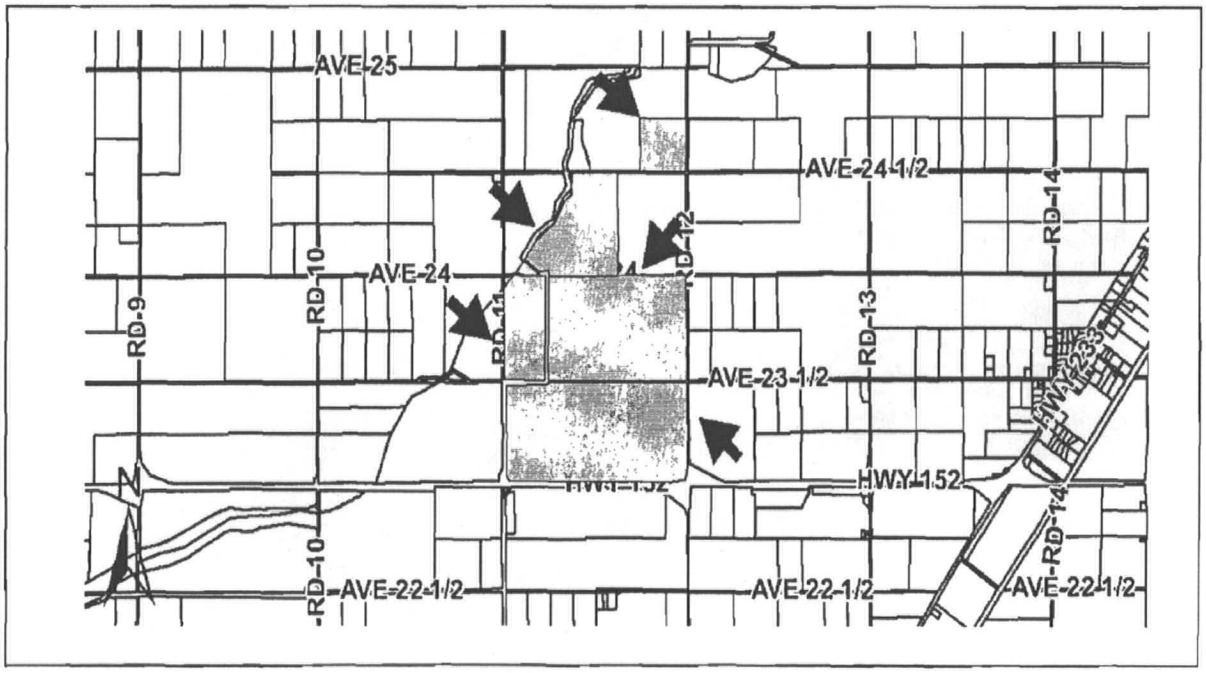
The applicant is requesting to amend Conditional Use Permit #99-54 to allow for an increase in herd size on an existing dairy facility from 5,075 to 7,450 head.

LOCATION:

The main facility of the property is located on the southwest corner of Avenue 24 and Road 12, (23508 Road 12), Chowchilla. Support acreage lays between Avenue 23 ½ and Avenue 24 ½, with one parcel on the north side of Avenue 24 ½. Additional APN's provided on the Nutrient Management Plan and Waste Management Plan.

ENVIRONMENTAL ASSESSMENT:

A Mitigated Negative Declaration (MND #2012-11) (Exhibit O) has been prepared and is subject to approval by the Planning Commission.



RECOMMENDATION: Approval with Conditions

STAFF REPORT
CUP #2012-008

August 7, 2012

GENERAL PLAN DESIGNATION (Exhibit A):

SITE: AE (Agricultural Exclusive) Designation

SURROUNDING: AE (Agricultural Exclusive) Designation

ZONING (Exhibit B):

SITE: ARE-40 (Agricultural Rural Exclusive – 40 acre) District

SURROUNDING: ARE-20 (Agricultural Rural Exclusive – 20 acre) District; ARE-40 (Agricultural Rural Exclusive – 40 acre) District

LAND USE:

SITE: Fagundes Dairy Facility and supporting land

SURROUNDING: Agricultural

SIZE OF PROPERTY: 244.14 acres

ACCESS (Exhibit A): Access to the site is via Road 12

BACKGROUND AND PRIOR ACTIONS:

On February 1, 2000, the Planning Commission approved CUP #99-34, allowing for an expansion of herd size from 1,500 to 2,500 head, bringing the total herd size to 5,075 head.

In February of 1979, Zoning Variance #79-11 was approved to allow for a manufactured home limited to occupancy to a relative or employee. The dwelling represented the third dwelling on the property.

Additional entitlements have been approved for adjacent parcels which make up the entire dairy operation. In May of 1981, Zoning Variance #81-42 was approved for Assessor's Parcel Number 025-190-007 to allow for a manufactured home which was limited in occupancy to a blood relative or an employee of the property owner. This permit represented the fourth residence on the property.

PROJECT DESCRIPTION:

The applicant is requesting to amend Conditional Use Permit #99-14 toa llow for an increase in herd size on an existing dairy facility from 5,075 to 7,450 head.

ORDINANCES/POLICIES:

Section 18.58.010 of the Madera County Zoning Ordinance outlines the permitted uses within the ARE-40 (Agricultural, Rural, Exclusive – 40 Acre) zone.

Section 18.56.010 of the Madera County Zoning Ordinance outlines the permitted uses within the ARE-20 (Agricultural, Rural, Exclusive – 20 Acre) zone.

Chapter 18.92 of the Madera County Zoning Ordinance outlines the procedures for the processing and approval of conditional use permits.

Policy 6.28.040.A of the Madera County Code defines agricultural activities.

Policy 6.28.050.A of the Madera County Code states that no agricultural activity, operation, or facility shall be or become a nuisance, private or public, due to any changed condition in or about the facility.

Policy 5.A.1 of the Madera County General Plan supports the maintenance of agricultural designated land as agriculturally designated land.

Policy 5.A.16 of the Madera County General Plan supports economic development of agriculturally related activities within the county.

Madera County Dairy Standards outlines facility operations pursuant to new and expanding dairies.

ANALYSIS:

The parcel involved with this project is located in a predominately rural portion of Western Madera County. Surrounding parcels average in size from 94 to over 600 acres and are in agriculturally related use with some residential structures. While the dairy has several parcels associated with it, those parcels are largely support acreage providing feed for the herd, as well as areas for manure spreading.

On February 1, 2000, the Planning Commission approved CUP #99-34, allowing for an expansion of herd size from 1,500 to 2,500 head. Prior to CUP #99-34, the facility had 1,500 milk cows with 2,300 support stock. With the increase approved by CUP #99-34, the facility had 2,500 milk cows and 2,575 support stock. The applicant is asking to increase the total combined herd count to 7,450 head. The following chart outlines the changes between the two Conditional Use Permits

Differences between 1999 CUP and 2012 CUP

Animal Type	CUP #99-34	CUP #2012-008	Difference
Milk Cows	2,500	4,750	2,250
Dry Cows	500	800	300
Bred Heifers	525	950	425
Heifers	1,550	950	(600)
Total	5,075	7,450	2,375

Old Animal Units County

Animal Type	Head	Multiplier	EH
Milk	2500	1	2500
Dry	500	0.8	400
Heifer	525	0.8	420
Calves	1500	0.35	525

New Animal Units County

Animal Type	Head	Multiplier	EH
Milk	4750	1	4750
Dry	800	0.8	540
Heifer	950	0.8	760
Calves	950	0.35	332.5

The parcel (APN #025-190-002) is where the main facility of the dairy is located, all other parcels associated with this dairy are considered support acreage for feed production and waste management per the Certified Nutrient Management Plan and Waste Management Plan. The site includes an approximate 394,000 square feet corral and 12,000 square foot cattle shade. The site also has three wastewater ponds which were expanded to have 3,043,872 cubic feet of capacity.

An analysis, based on the Waste Management Plan and Nutrient Management Plan (Exhibit P and Q), shows 108,569 gallons of water per day will be used, of which 91,210 will be utilized for non-herd purposes, and the balance for herd purposes. Manure generation will be approximately 90,385 gallons per day based on the new herd counts.

Dairy wastewater contains several contaminates including elevated levels of salt and nitrogen. Because of the chemical and environmental characteristics of nitrogen, it is used as a chemical marker of assessing the safety and effectiveness of a dairy wastewater management system. For regulatory purposes, if all the nitrogen generated by a dairy is safely and effectively managed, the other lesser wastewater components would also be controlled.

Existing small or medium Confined Animal Feeding Operations (CAFCs) are regulated by the Regional Water Quality Control Board (RWQCB). The facility, like all other dairies within the County, is routinely inspected by the California Regional Water Quality Control Board to ensure compliance with their regulations. The County has received copies of prior reports and actions from the dairy.

The County began regulating dairies through the conditional use permit process in 1993. The amendment to the Madera County Zoning Ordinance required dairies to have a conditional use permit issued before they could either be established or expanded (expansion being defined as relating to the dairy operations and facilities related specifically to the operations themselves).

The Madera County Dairy Standards were adopted in October of 2008 covering new and expanding dairies. While this project is an existing dairy, the Standards are applicable to

the amended Conditional Use Permit. The Standards cover all aspects of dairy operations, from traffic to vector and odor control. Conditions as noted under the Planning Department, Environmental Health and Roads Department incorporate conditions found in the Standards.

The generation and storage of manure, manure-water, animal feed and other organic materials at dairies present the possibility of increased vector activities. Mosquito and fly infestations can be observed at dairies, particularly at manure separation pits and lagoons that have not been properly maintained, and poorly managed feed areas.

The project is located in a sparsely populated area of the County. While odors are commonly generated by dairies, particularly from concentrated wet animal waste, the use of a waste control system in which manure is either allowed to dry prior to removal, or flushed into lagoons will minimize odors associated with standing manure. Odor impacts will be limited overall due to the sparse populations in the area, as well as the adherence to the Dairy Standards and other control measures.

The site does not contain wetland or riparian habitats, and while Ash Slough is in close proximity to the project site, no streams or natural drainages are located within the project area. The project will not significantly interfere with the movement of any native wildlife species or wildlife corridors.

Request for comments were also sent to Caltrans, California Highway Patrol, the Agricultural Commissioner and Department of Fish and Game, amongst others. The San Joaquin Valley Air Pollution Control District and City of Chowchilla commented on this project.

FINDINGS OF FACT:

The following findings of fact must be made by the Planning Commission to make a finding of denial of this conditional use permit application. Staff recommends that the Planning Commission concur with the following in light of the proposed conditions of approval.

1. *The proposed project does not violate the spirit or intent of the zoning ordinance* in that the ARE-40 (Agricultural Rural Exclusive – 40 Acre District) allows for dairies to operate with a Conditional Use Permit. The project structures will comply with setback, parking and use regulations.

2. *The proposed project is not contrary to the public health, safety, or general welfare* in that the request is consistent with the agricultural area in which it is located, and any potential impacts from the operation can be mitigated by applying the conditions of approval and mitigation measures from the attached CEQA determination as well as the Dairy Standards. The facility is also regulated by the Regional Water Quality Control Board and San Joaquin valley Air Pollution Control District.

3. *The proposed project is not hazardous, harmful, noxious, offensive, or a nuisance because of noise, dust, smoke, odor, glare, or similar, factors* in that the applicant must operate according to the conditions set forth by a series of state and local agencies including Madera County Environmental Health Department, the California Regional Water Control Board, and state and county level agencies which specifically monitor agricultural activities including dairies. Additionally, the

operation will be held to comply with the Madera County Dairy Standards and Element.

4. *The proposed project will not, for any reason, cause a substantial, adverse effect upon the property values and general* desirability based upon similar existing land uses within the general vicinity of the portion of this portion of the County, the lack of public opposition expressed in regards to this application, and conditions established for the project that will mitigate potential impacts to adjacent properties from project operations.

WILLIAMSON ACT:

The subject parcel is within the Williamson Act. The increase in herd size will not affect the contract.

GENERAL PLAN CONSISTENCY:

The general plan designates the site as AE (Agricultural Exclusive) which allows for dairies and similar uses. The property is zoned ARE-40 (Agricultural Rural Exclusive – 40 Acre). The proposed project is consistent with both the County's General Plan and Zoning Ordinance.

RECOMMENDATION:

The analysis provided in this report supports approval of CUP #2012-008 and Mitigated Negative Declaration MND #2012-11 as presented.

CONDITIONS:

Engineering Department (Exhibit H)

1. Prior to start of any construction projects, the applicant shall secure a Building Permit from the Engineering Department. All construction shall meet the standards of all applicable Codes. All plans must be prepared by a licensed or registered civil engineer.

Environmental Health Department (Exhibit I)

1. The project will be required to adhere to all requirements of the Madera County Dairy Standards.

2. Alls urface water runoff shall be diverted away from any water well(s) and sewage disposal areas.

3. The owners/operators of the facility must complete and submit a Business Activities Declaration Form with the CUPA Program within this department before onset of construction activities. Other related permit(s) may be required due to the possible storage/handling of reportable quantities of hazardous materials onsite and/or the storage of any amount of hazardous waste onsite at any time prior to facility operation. Contact a CUPA program specialist within the department at 559-675-7821.

4. If any proposed building(s) and/or operations on site that require plumbing to provide drinking water and/or waste water storage/disposal and/or wastewater disposal, then

water well permit(s) and/or sewage disposal system(s) permits must be obtained from the department prior to any construction activities and shall be installed to meet all applicable laws, codes, and/or regulations. Contact a Drinking Water program and/or a Liquid Waste Water Program specialist within this department at 559-675-7823.

5. A Vector, Pest (fly) and Odor Management Plans must be developed by an appropriate professional and submitted to this department prior to onset of onsite facility operations.

6. A Dead Animal Management Plan (DAMP) is required for all animal operations that addresses animal mortality procedures and mitigation. As well as procedures how the owner/operator will handle possible above average volume mortality rate due to special or natural occurrences such as heat wave.

7. A Manure Processing and/or Composting Management Plan(s) must be developed and stored on site to ensure that manure is stored and processed on site to effectively reduce off site: odors, vectors, and/or other possible nuisances, to within acceptable levels as determined by this department.

8. Noise must be kept to below acceptable levels as identified in State law, applicable County Codes, and the County General Plan as determined by this department.

9. Lighting shall be kept to within acceptable levels as to not create a nuisance to surrounding land uses as determined by the RMA.

10. All Madera County required permits must be obtained and all setbacks shall be maintained prior to grading.

11. The owner/operator must obtain all necessary Environmental Health Department permits to any construction activities on site.

Fire Department (Exhibit J)

1. At the time of application for a Building Permit, a more in-depth plan review of the proposed project's compliance with all current fire and life safety codes will be conducted by the Madera County Fire Marshal. (CFC Section 105.2).

Planning Department

1. The project shall operate in accordance with the operational statement and site plan submitted with the application except as modified by the mitigation measures and other conditions of approval required for the project.

2. Operations will continue to adhere to conditions of approval and mitigation measures associated with the Conditional Use Permit #99-34.

3. Application of herbicides, pesticides and related materials shall be in accordance with the laws and regulations set forth by federal, state and local agencies.

4. All lighting associated with this facility is to be hooded and directed away from neighboring parcels and potential species habitats.

5. No development or operation(s) of the dairy facility shall occur within 100 feet of Ash Slough or any tributary.

6. Applicant shall not construct, repair or otherwise alter any levee in the area of the project site so as to create increased flooding upstream.

7. Prior to release of Conditional Use Permit, applicant must provide fees in the amount of $2,151.50 to Madera County to cover the Notice of Determination filing. In lieu of the Department of Fish and Game fees, the applicant may apply for a Fee Waiver directly with the Department of Fish and Game. Should the waiver be granted, the applicant will need to provide a copy of the waiver plus a check for $50 to Madera County to cover the filing of the Notice of Determination. The Clerk fee and the Department of Fish and Game fee (or waiver) must be filed at the Planning Department within five (5) calendar days of approval of the project by the Planning Commission.

8. Prior to release of this Conditional Use Permit, a recent Certified Nutrient Management Plan and Comprehensive Waste Management Plan reflecting the increase in herd size shall be submitted and accepted by the Planning Department.

9. The dairy shall operate in compliance with the Madera County Dairy Standards in their entirety.

Road Department (Exhibit K)

1. Any construction in the County road right-of-way will require an Encroachment Permit through the Road Department.

City of Chowchilla (Exhibit L)

1. None.

San Joaquin Valley Air Pollution Control District (Exhibit M)

1. The applicant will adhere to conditions of approval from the Air District.

ATTACHMENTS:

1. Exhibit A, General Plan Map
2. Exhibit B, Zoning Map
3 Exhibit C, Assessor's Map
4. Exhibit D, Site Plan Map
5. Exhibit E, Aerial Map
6. Exhibit F, Topographical Map
7. Exhibit G, Operational Statement
8. Exhibit H, Environmental Health Department Comments
9. Exhibit I, Engineering and General Services Department Comments
10. Exhibit J, Fire Department Comments
11. Exhibit K, Road Department Comments
12. Exhibit L, City of Chowchilla Comments
13. Exhibit M, San Joaquin Valley Air Pollution Control Comments
14. Exhibit N, CEQA Initial Study
15. Exhibit O, Mitigated Negative Declaration (MND #2012-11)
16. Exhibit P, Waste Management Plan

17. Exhibit Q, Nutrient Management Plan

APPENDIX C

Herd Size Allowed at the Site by Madera County CUP #2012-008

Herd Size Allowed at the Site by Madera County CUP #2012-008

Number of Animals Allowed under CUP 2012-008 for Fagundes Dairy (Facility C-5502)	
Animal Type	**Proposed Herd Composition**
	Number of Animals
Milk Cows	4,750
Dry Cows	800
Bred Heifers	950
Heifers	950
Total	**7,450**

Madera County Animal Unit Conversion Factors	
Type of Bovine	**Multiplier**
Milk Cows	1.0
Dry Cows	0.8
Heifers	0.8
Calves	0.35

Animal Units for Proposed Herd Composition at Fagundes Dairy (Facility C-5502) based on CUP 2012-008				
Type of Bovine	**Head**	**Multiplier**	**Animal Units (AU)**	**Equivalent Head (EH)**
Milk Cows	4,750	1.0	4,750.0	4,750.0
Dry Cows	800	0.8	640.0	640.0
Heifers	950	0.8	760.0	760.0
Calves	950	0.35	332.5	332.5
Total	**7,450**	--	**6,483**	**6,483**

APPENDIX D

Anaerobic Treatment Lagoon Design Check Spreadsheets

Lagoon Design Check in Accordance with NRCS Guideline #359

Volume of Primary Lagoon

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	2,680	ft
Width	101	ft
Depth	18	ft
Slope	1	ft

Volume of Primary Anaerobic Treatment Lagoon	**3,978,972 ft3**

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	Holstein Factor (%)[2]	x	% Manure in Flush[3]	x	(1 - % VS Removed in Separation[4])	=	Net VS Loading (lb/day)
Milk Cows	4,750	x	17	x	100%	x	48%	x	50%	=	**19,380**
Dry Cow	800	x	9.2	x	100%	x	48%	x	50%	=	**1,766**
Heifer (15 to 24 months)/ Support Stock	1,900	x	7.1	x	100%	x	48%	x	50%	=	**3,238**
Heifer (7 to 14 months)	0	x	4.9	x	100%	x	48%	x	50%	=	**0**
Heifer (3 to 6 months)	0	x	2.7	x	100%	x	48%	x	50%	=	**0**
Calf (under 3 months)	0	x	1.0	x	100%	x	100%	x	50%	=	**0**
Bulls	0	x	9.2	x	100%	x	48%	x	50%	=	**0**
Total for Dairy											**24,384**

[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 from 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] No adjustment for Holstein cattle

[3] 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].

[4] 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^3)

TVS = daily Total Volatile solids Loading (lb/day) = 0.010 lb/ft3-day

VSLR = Volatile Solids Loading Rate (lb/1000 ft3-day)

Minimum Treatment Volume in Primary Lagoon					
Breed: Holstein **Type of Cow**	**Net VS Loading (lb/day)**		**VSLR (lb/ft3-day)[1]**		**MTV (ft^3)**
Milk Cows	19,380	÷	0.01	=	**1,938,000**
Dry Cow	1,766	÷	0.01	=	**176,640**
Heifer (15 to 24 months)/ Support Stock	3,238	÷	0.01	=	**323,760**
Heifer (7 to 14 months)	0	÷	0.01	=	**0**
Heifer (3 to 6 months)	0	÷	0.01	=	**0**
Calf (under 3 months)	0	÷	0.01	=	**0**
Bulls	0	÷	0.01	=	**0**
Total for Dairy					**2,438,400**

[1] VSLR for an anaerobic treatment lagoon in San Joaquin Valley would be 6.5 lb VS/1000 ft3-day to 11 lb VS/1000 ft3-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 VS/1000 ft3-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:

SAV = VPL - MTV

Where:

SAV = Sludge Accumulation Volume (ft^3)
TVL = Total Volume of Anaerobic Treatment Lagoon(s) (ft^3)
MTV = Minimum Treatment Volume (ft^3)

SAV =	**TVL**	**-**	**MTV**			
SAV =	**3,978,972**	**-**	**2,438,400**	**=**	**1,540,572**	**(ft3)**

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 = (Total Valume of Lagoon(s))/HFR

where:
HFR = Hydraulic flow rate (1000ft^3/day)
HRT = Hydraulic Retention Time (day)

The Hydraulic Flow Rate is Calculated below

Type	# of cows		Amount of Manure*			HFR	
Milk Cows	4,750	x	2.40	ft^3	=	11,400	ft^3/day
Dry Cows	800	x	1.30	ft^3	=	1,040	ft^3/day
Heifers (15-24 mo)/ Support Stock.	1,900	x	0.78	ft^3	=	1,482	ft^3/day
Heifers (7-14 mo)	0	x	0.78	ft^3	=	-	ft^3/day
Heifers (3-6 mo)	0	x	0.30	ft^3	=	-	ft^3/day
Calves	0	x	0.15	ft^3	=	-	ft^3/day
Bulls	0	x	1.30	ft^3	=	-	ft^3/day
Total	7,450					**13,922**	**ft^3/day**
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	ft3	+	ft3	
Milk Cow*Day	Milk Cows		gallon			day

Total HFR:

⇨

50 gal	4750 milk cows	x	ft3	+	13,922	ft3		
milk cow * day			7.48 gal			day		
				=	**45,673.3**	**ft3/day**		

Formula:

MTV (ft3)	/	(day)	=
		HFR (ft3)	

HRT:

⇨

3,978,972 ft3		day	=		=	**87.118049**	**days**
		45,673.3 ft3					

APPENDIX E

Copy of Dairy Emissions Calculation Spreadsheet

Instructions: Provide the information required in the yellow-shaded cells below. Then go to the "Mitigation Measures" tabsheet and select the Rule 4570 mitigation measures practiced/proposed by the facility. The remaining tabsheets will fill out

Pre-Project Dairy Information

1. Are all cows at this facility Jersey cows? [no]
   Most dairies house Holstein cows unless explicitly stated on the PTO or application.
2. Does the facility have an anaerobic treatment lagoon? [no]
3. Does the facility land apply liquid manure? [yes]
   Answering "yes" assumes worst case.
4. Does the facility land apply solid manure? [yes]
   Answering "yes" assumes worst case.
5. Is any scraped manure sent to a lagoon? [yes]
   Answering "yes" assumes worst case.

All heifers and bulls should be entered together as Support Stock. However, if doing so will result in NSR implications, it may be appropriate to enter each herd size individually and to add a permit condition specifying the maximum herd sizes.

If the current PTO includes calves with the support stock, call the facility or find a previous application or inspection report to determine the maximum number of calves. Calves should be entered separately from support stock.

If unsure whether herd is housed in freestalls or open corrals, assume open corrals to be conservative.

If unsure whether manure is flushed or scraped, assume flushed to be conservative.

Pre-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals	% of Corrals That are Shaded
Milk Cows			3,000		3,000	6.67
Dry Cows			1,000		1,000	15
Support Stock (Heifers and Bulls)			2,000		2,000	
Large Heifers					0	
Medium Heifers					0	
Small Heifers					0	
Bulls					0	

	Calf Hutches				Calf Corrals			
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	Total # of Calves	% of Corrals That are Shaded
Calves							0	

List the total percent of corrals that are shaded. Only enter a number between 0-100, and do not enter "%." For example, if the facility has 15 corrals and 7 are shaded, enter "46.6." If the facility has shade structures but the number of corrals is unknown, assume 50% are shaded. If it is unknown if the facility has any shade structures, enter 0. You may have to refer to a previous application or inspection report to get this info, or call the facility.

Total Herd Summary	
Total Milk Cows	3,000
Total Mature Cows	4,000
Support Stock (Heifers and Bulls)	2,000
Total Calves	0
Total Dairy Head	6,000

Silage info may be found in the Rule 4570 Phase II application or engineering evaluation.

Pre-Project Silage Information

Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	1	30	150
Alfalfa	1	30	150
Wheat	1	30	150

Post-Project Dairy Information

1. Are all cows at this facility Jersey cows? [no]
   Most dairies house Holstein cows unless explicitly stated on the PTO or application.
2. Does the facility have an anaerobic treatment lagoon? [yes]
3. Does the facility land apply liquid manure? [yes]
   Answering "yes" assumes worst case.
4. Does the facility land apply solid manure? [yes]
   Answering "yes" assumes worst case.
5. Is any scraped manure sent to a lagoon? [yes]
   Answering "yes" assumes worst case.
6. Does this project result in any new lagoon/storage pond(s) or an increase in surface area for any existing lagoon/storage pond(s)? [no]

All heifers and bulls should be entered together as Support Stock. However, if doing so will result in NSR implications, it may be appropriate to enter each herd size individually and to add a permit condition specifying the maximum herd sizes.

Calves should be entered separately from support stock.

If unsure whether herd is housed in freestalls or open corrals, assume open corrals to be conservative.

If unsure whether manure is flushed or scraped, assume flushed to be conservative.

Post-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals	% of Corrals That are Shaded
Milk Cows			4,750		4,750	37.89
Dry Cows			800		800	18.75
Support Stock (Heifers and Bulls)			1,900		1,900	47.89
Large Heifers					0	
Medium Heifers					0	
Small Heifers					0	
Bulls					0	

	Calf Hutches				Calf Corrals			
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	Total # of Calves	% of Corrals That are Shaded
Calves							0	

List the total percent of corrals that are shaded. Only enter a number between 0-100, and do not enter "%." For example, if the facility has 15 corrals and 7 are shaded, enter "46.6." If the facility has shade structures but the number of corrals is unknown, assume 50% are shaded. If it is unknown if the facility has any shade structures, enter 0. You may have to refer to a previous application or inspection report to get this info, or call the facility.

Total Herd Summary	
Total Milk Cows	4,750
Total Mature Cows	5,550
Support Stock (Heifers and Bulls)	1,900
Total Calves	0
Total Dairy Head	7,450

7. Is the post-project silage information the same as the pre-project silage information? [yes]

Silage info may be found in the Rule 4570 Phase II application or engineering evaluation.

Post-Project Silage Information

Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	1	30	150
Alfalfa	1	30	150
Wheat	1	30	150

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 permittable 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.

For each mitigation measure, enter "x" if the facility practices or is proposing the corresponding measure. Leave blank if not. This info may be found in the Rule 4570 Phase II application or engineering evaluation.

Milking Parlor				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	VOC Control Efficiency	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Enteric Emissions Mitigations		
x	x	Feed according to NRC guidelines	5%	5%
		Total Control Efficiency	5%	5%
		Milking Parlor Floor Mitigations		
x	x	Feed according to NRC guidelines	5%	5%
x	x	Flush or hose milk parlor immediately prior to, immediately after, or during each milking. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF.	0%	0%
		Total Control Efficiency	5%	5%

Cow Housing				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	VOC Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Enteric Emissions Mitigations		
x	x	Feed according to NRC guidelines	5%	5%
		Total Control Efficiency	5%	5%
		Corrals/Pens Mitigations		
x	x	Feed according to NRC guidelines	5%	5%
x	x	Inspect water pipes and troughs and repair leaks at least once every seven days. Note: If selected for dairies > 999 milk cows, CE is already included in EF.	0%	0%
x	x	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. Note: If selected for dairies > 999 milk cows, CE is already included in EF.	0%	0%
x	x	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.	10%	10%
x	x	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. Note: If selected for dairies > 999 milk cows, CE already included in EF.	0%	0%
x	x	Install shade structures such that they are constructed with a light permeable roofing material. Note: If selected for dairies > 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.	5%	5%
		Install all shade structures uphill of any slope in the corral. Note: If selected for dairies > 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.	0%	0%
		Clean manure from under corral shades at least once every 14 days, when weather permits access into corral. Note: If selected for dairies > 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.	0%	0%
		Install shade structure so that the structure has a North/South orientation. Note: If selected for dairies > 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.	0%	0%
		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. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF.	0%	0%
x	x	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.	10%	10%

		Use lime or a similar absorbent material in the corral according to the manufacturer's recommendation to minimize moisture in the corrals.	0%	0%
		Apply thymol to the corral soil in accordance with the manufacturer's recommendation.	0%	0%
		Total Control Efficiency	26.90%	26.90%
		Bedding Mitigations		
x	x	Feed according to NRC guidelines	5%	5%
		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%
x	x	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 bedding at least once every 7 days.	10%	10%
		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%
		Total Control Efficiency	14.50%	14.50%
		Lanes Mitigations		
x	x	Feed according to NRC guidelines	5%	5%
x	x	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. Note: No control efficiency at this time.	0%	0%
x	x	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.	10%	10%
		Have no animals in exercise pens or corrals at any time.	0%	0%
		Total Control Efficiency	14.50%	14.50%

Liquid Manure Handling				
Measure Proposed?		**Mitigation Measure(s) per Emissions Point**	**VOC Control Efficiency (%)**	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Lagoons/Storage Ponds Mitigations		
x	x	Feed according to NRC guidelines	5%	5%
		Use phototropic lagoon	0%	0%
	x	Use an anaerobic treatment lagoon designed according to NRCS Guideline No. 359	0%	40%
		Remove solids from the waste system with a solid separator system, prior to the waste entering the lagoon. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF.	0%	0%
x		Maintain lagoon pH between 6.5 and 7.5	10%	0%
		Total Control Efficiency	14.50%	43.00%
		Liquid Manure Land Application Mitigations		
x	x	Feed according to NRC guidelines	5%	5%
	x	Only apply liquid manure that has been treated with an anaerobic or aerobic treatment lagoon, aerobic lagoon, or digester system	0%	40%
x	x	Allow liquid manure to stand in the fields for no more than 24 hours after irrigation. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF.	0%	0%
		Apply liquid/slurry manure via injection with drag hose or similar apparatus	0%	0%
		Total Control Efficiency	5.00%	43.00%

Solid Manure Handling				
Measure Proposed?		**Mitigation Measure(s) per Emissions Point**	**VOC Control Efficiency (%)**	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Solid Manure Storage Mitigations		
x	x	Feed according to NRC guidelines	5%	5%
x	x	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.	10%	10%
		Total Control Efficiency	14.50%	14.50%
		Separated Solids Piles Mitigations		
x	x	Feed according to NRC guidelines	5%	5%

		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%
		Total Control Efficiency	5.00%	5.00%
		Solid Manure Land Application Mitigations		
x	x	Feed according to NRC guidelines	5%	5%
x	x	Incorporate all solid manure within 72 hours of land application. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF.	0%	0%
		Only apply solid manure that has been treated with an anaerobic treatment lagoon, aerobic lagoon or digester system.	0%	0%
		Apply no solid manure with a moisture content of more than 50%	0%	0%
		Total Control Efficiency	5.00%	5.00%

Silage and TMR				
Measure Proposed?		**Mitigation Measure(s) per Emissions Point**	**VOC Control Efficiency (%)**	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Corn/Alfalfa/Wheat Silage Mitigations		
x	x	1. Utilize a sealed feed storage system (e.g. Ag-Bag) for bagged silage, or 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: 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, 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, c) harvest silage crop at > or = 65% moisture for corn; and >= 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. Implement two of the following: <u>Manage Exposed Silage</u>. 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. <u>Maintain Silage Working Face</u>. 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 <u>Silage Additive</u>: 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 proprionic 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.	39%	39%
		Total Control Efficiency*	39.00%	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).

		TMR Mitigations		
x	x	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.	10%	10%
x	x	Begin feeding total mixed rations within 2 hrs of grinding and mixing rations. Note: If selected for dairies > 999 milk cows, control efficiency already included in EF.	0%	0%
		Feed steam-flaked, dry rolled, cracked or ground corn or other ground cereal grains.	0%	0%
x	x	Remove uneaten wet feed from feed bunks within 24 hrs after then end of a rain event.	10%	10%

		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%
		Total Control Efficiency	19.00%	19.00%

lb/hd-yr Dairy Emissions Factors

			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		EF1	EF2	Uncontrolled		EF1	EF2	Uncontrolled		EF1	EF2	Uncontrolled		EF1	EF2	Uncontrolled		EF1	EF2	Uncontrolled		EF1	EF2	Uncontrolled		EF1	EF2
			<1000 milk cows	≥1000 milk cows			<1000 milk cows	≥1000 milk cows			<1000 milk cows	≥1000 milk cows			<1000 milk cows	≥1000 milk cows			<1000 milk cows	≥1000 milk cows			<1000 milk cows	≥1000 milk cows			<1000 milk cows	≥1000 milk cows		
Milking Parlor	VOC	Enteric Emissions in Milking Parlors	0.43	0.41	0.39	0.39	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
		Milking Parlor Floor	0.04	0.03	0.03	0.03	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
		Total	0.47	0.44	0.42	0.42	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
	NH3	Total	0.19	0.19	0.19	0.19	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
Cow Housing	VOC	Enteric Emissions in Cow Housing	3.69	3.69	3.51	3.51	2.33	2.23	2.12	2.12	1.81	1.71	1.63	1.63	1.23	1.17	1.11	1.11	0.69	0.65	0.62	0.63	0.32	0.31	0.30	0.30	1.10	1.04	0.99	0.99
		Corrals/Pens	10.00	6.60	4.82	4.82	5.40	3.59	2.63	2.63	4.20	2.76	2.02	2.02	2.85	1.88	1.37	1.37	1.60	1.04	0.76	0.76	0.75	0.50	0.37	0.37	2.55	1.67	1.22	1.22
		Bedding	1.05	1.00	0.86	0.86	0.57	0.54	0.47	0.47	0.44	0.42	0.36	0.36	0.30	0.28	0.24	0.24	0.17	0.16	0.14	0.14	0.08	0.08	0.06	0.06	0.27	0.25	0.21	0.21
		Lanes	0.84	0.80	0.68	0.68	0.45	0.44	0.37	0.37	0.35	0.33	0.29	0.29	0.24	0.23	0.19	0.19	0.13	0.13	0.11	0.11	0.06	0.06	0.05	0.05	0.21	0.20	0.17	0.17
		Total	15.76	12.09	9.87	9.87	8.75	6.80	5.58	5.58	6.81	5.22	4.29	4.29	4.62	3.56	2.92	2.92	2.59	1.98	1.62	1.62	1.22	0.95	0.78	0.78	4.13	3.16	2.59	2.59
	NH3	Total	53.30	53.30	53.30	53.30	27.00	27.00	27.00	27.00	14.00	14.00	14.00	14.00	10.00	10.00	10.00	10.00	7.60	7.60	7.60	7.60	2.20	2.20	2.20	2.20	19.40	19.40	19.40	19.40
Liquid Manure Handling	VOC	Lagoons/Storage Ponds	1.52	1.30	1.11	0.74	0.82	0.71	0.60	0.40	0.64	0.54	0.46	0.31	0.43	0.37	0.32	0.21	0.24	0.21	0.18	0.12	0.11	0.10	0.08	0.06	0.40	0.33	0.28	0.19
		Liquid Manure Land Application	1.64	1.40	1.33	0.80	0.89	0.76	0.72	0.43	0.68	0.58	0.56	0.33	0.47	0.40	0.38	0.23	0.26	0.22	0.21	0.13	0.12	0.11	0.10	0.06	0.42	0.35	0.33	0.20
		Total	3.16	2.70	2.44	1.54	1.71	1.47	1.32	0.83	1.33	1.13	1.02	0.64	0.90	0.77	0.70	0.44	0.51	0.43	0.39	0.24	0.24	0.21	0.18	0.12	0.82	0.68	0.61	0.39
	NH3	Lagoons/Storage Ponds	8.20	8.20	8.20	8.20	4.20	4.20	4.20	4.20	2.20	2.20	2.20	2.20	1.50	1.50	1.50	1.50	1.20	1.20	1.20	1.20	0.35	0.35	0.35	0.35	3.00	3.00	3.00	3.00
		Liquid Manure Land Application	8.90	8.90	8.90	8.90	4.50	4.50	4.50	4.50	2.30	2.30	2.30	2.30	1.70	1.70	1.70	1.70	1.30	1.30	1.30	1.30	0.37	0.37	0.37	0.37	3.23	3.23	3.23	3.23
		Total	17.10	17.10	17.10	17.10	8.70	8.70	8.70	8.70	4.50	4.50	4.50	4.50	3.20	3.20	3.20	3.20	2.50	2.50	2.50	2.50	0.72	0.72	0.72	0.72	6.23	6.23	6.23	6.23
Solid Manure Handling	VOC	Solid Manure Storage	0.16	0.15	0.13	0.13	0.09	0.08	0.07	0.07	0.07	0.06	0.05	0.05	0.05	0.04	0.04	0.04	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.04	0.04	0.03	0.03
		Separated Solids Piles	0.06	0.06	0.06	0.06	0.03	0.03	0.03	0.03	0.03	0.03	0.02	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	0.31	0.31	0.21	0.18	0.17	0.17	0.16	0.14	0.13	0.13	0.11	0.09	0.09	0.09	0.06	0.05	0.05	0.05	0.03	0.03	0.02	0.02	0.10	0.08	0.08	0.08
		Total	0.61	0.54	0.50	0.50	0.33	0.29	0.27	0.27	0.39	0.23	0.21	0.21	0.17	0.15	0.14	0.14	0.10	0.09	0.08	0.08	0.05	0.04	0.04	0.04	0.16	0.14	0.13	0.13
	NH3	Solid Manure Storage	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	2.09	1.06	1.06	1.06	1.06	0.55	0.55	0.55	0.55	0.39	0.39	0.39	0.39	0.30	0.30	0.30	0.30	0.09	0.09	0.09	0.09	0.76	0.76	0.76	0.76
		Total	3.42	3.42	3.42	3.42	1.73	1.73	1.73	1.73	0.90	0.90	0.90	0.90	0.64	0.64	0.64	0.64	0.48	0.48	0.48	0.48	0.15	0.15	0.15	0.15	1.25	1.25	1.25	1.25

Silage and TMR (Total Mixed Ration) Emissions (µg/m^2-min)

		Silage Type	Uncontrolled	EF1	EF2
Feed Storage and Handling	VOC	Corn Silage	34,681	21,155	21,155
		Alfalfa Silage	17,458	10,649	10,649
		Wheat Silage	43,844	26,745	26,745
		TMR	13,056	10,575	10,575

Assumptions: 1) Each silage pile is completely covered except for the front face and 2) Rations are fed within 48 hours

PM_{10} 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 Corrals	5.46	Based on a Summer 2003 study by Texas A&M ASAE at a West Texas Dairy
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)
Calf (under 3 mo.) open corrals	1.37	SJVAPCD
Calf on-ground hutches	0.343	SJVAPCD (75% control efficiency)
Calf above-ground flushed	0.069	SJVAPCD (95% control efficiency)
Calf above-ground scraped	0.206	SJVAPCD (85% control efficiency)

Pre-Project Potential to Emit (PE1)

Pre-Project Herd Size						
Herd	Flushed Housestalls	Scraped Housestalls	Flushed Corrals	Scraped Corrals	Total # of Animals	% of Corrals That are Shaded
Milk Cows	0	0	2,500	0	2,500	87
Dry Cows	0	0	1,000	0	1,000	15
Support Head (mothers and Bulls)	0	0	2,000	0	2,000	0
Large Heifers	0	0	0	0	0	0
Medium Heifers	0	0	0	0	0	0
Small Heifers	0	0	0	0	0	0
Bulls	0	0	0	0	0	0

Calf Nursery					Calf Corrals			
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	Total # of Calves	% of Corrals That are Shaded
Calves	0	0	0	0	0	0	0	0

Silage Information				
Feed Type	Maximum # Open Piles	Maximum Height (ft)	Maximum Width (ft)	Open Face Area (ft^2)
Corn	1	32	150	1,437
Alfalfa	1	32	150	1,437
Wheat	1	30	150	1,437

Milking Parlor				
Cow	VOC		Nox	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	3.3	1,256	1.6	378

Corn Housing						
Cow	VOC		Nox		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	61.1	39,610	118.1	153,900	64.6	78,394
Dry Cows	15.3	5,580	74.8	17,000	11.6	5,727
Support Head (mothers and Bulls)	11.5	6,580	58.7	26,000	57.8	21,100
Large Heifers	0.0	0	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0	0.0	0
Calves	0.0	0	0.0	0	0.0	0
Bulls	0.0	0	0.0	0	0.0	0
Total	118.9	53,770	249.6	216,900	114.0	105,221

Liquid Manure Handling						
Cow	VOC		Nox		H2S*	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	29.1	7,720	148.3	11,300	10.7	3,891
Dry Cows	2.6	1,117	71.8	5,700	0.9	196
Support Head (mothers and Bulls)	3.6	2,011	24.7	6,000	1.1	418
Large Heifers	0.4	0	0.0	0	0.4	0
Medium Heifers	0.0	0	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0	0.0	0
Calves	0.0	0	0.0	0	0.0	0
Bulls	0.0	0	0.0	0	0.0	0
Total	35.2	10,671	249.8	65,000	12.7	4,649

Solid Manure Handling				
Cow	VOC		Nox	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	4.1	1,500	20.1	10,760
Dry Cows	0.2	170	4.7	1,730
Support Head (mothers and Bulls)	1.2	430	4.0	1,800
Large Heifers	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0
Calves	0.0	0	0.0	0
Bulls	0.0	0	0.0	0
Total	5.5	2,100	27.8	13,270

Feed Handling and Storage		
	Corn PM (lb-VOC/ton)	Annual PM (lb-VOC/yr)
Corn Emissions	77.7	7,745
Alfalfa Emissions	5.3	1,949
Wheat Emissions	78.8	9,765
Total	151.8	62,376
Total	151.8	87,348

Calculations for milking parlor:

Annual PE = (# milk cows) x ([X] lb-pollutant/hd-yr)

Daily PE = [Annual PE lb/yr] ÷ [365 days/yr]

Calculations for all other sources:

Annual PE = ([# milk cows] x [X] lb-pollutant/hd-yr]) + ([# dry cows] x [X] lb-pollutant/hd-yr]) + ([# large heifers] x [X] lb-pollutant/hd-yr]) + ([# medium heifers] x [X] lb-pollutant/hd-yr]) + ([# small heifers] x [X] lb-pollutant/hd-yr]) + ([# calves] x [X] lb-pollutant/hd-yr]) + ([# bulls] x [X] lb-pollutant/hd-yr])

Daily PE = [Annual PE lb/yr] ÷ [365 days/yr]

The H2S emission factor is assumed to be 10% of the VOC lagoon/storage pond(s) emission factor, for each respective herd mix.

For milk and dry cows, shade structures for corrals are assumed to provide a PM10 control efficiency of 30.7%. For all other animals, shade structures for corrals are assumed to provide a PM10 control efficiency of 6.3%.

Calculations for silage emissions:

Annual PE = ([X] x [area PE^2 x ([X.XX] x m^2/PE^2) x [X.XX] hr/yr] x [XX mm/hr] x [2.20E-9 lb/kg

Daily PE = [Annual PE lb/yr] ÷ [365 days/yr]

Calculations for TAG emissions:

Annual PE = [# cows] x ([X] x [X.XX m^2] x [325.600 mm/yr] x [2.20E-9 lb/kg]

Daily PE = [Annual PE lb/yr] ÷ [365 days/yr]

Calves are not included in TAG calculations.

Notes:

"Since there will be no change to the lagoons/storage ponds surface area, no change in H2S emissions is expected. Therefore, it will be assumed that PE1 for H2S emissions is equal to PE2 for H2S emissions.

Liquid Manure Handling - Storage Ponds/Lagoons						
Cow	VOC		Nox		H2S*	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	3.1	2,130	37.1	14,600	10.7	3,837
Dry Cows	1.6	600	11.5	4,200	0.1	196
Support Head (mothers and Bulls)	2.2	420	13.2	4,400	1.1	418
Large Heifers	0.0	0	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0	0.0	0
Calves	0.0	0	0.0	0	0.0	0
Bulls	0.0	0	0.0	0	0.0	0
Total	11.1	4,150	81.8	33,700	12.7	4,649

Liquid Manure Handling - Land Application				
Cow	VOC		Nox	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	10.8	7,990	22.2	16,700
Dry Cows	2.0	724	12.2	4,500
Support Head (mothers and Bulls)	9.8	6,111	11.6	4,600
Large Heifers	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0
Calves	0.0	0	0.0	0
Bulls	0.0	0	0.0	0
Total	16.6	14,825	46.1	25,800

Solid Manure Handling - Manure Storage & Piles				
Cow	VOC		Nox	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	1.1	156	10.9	1,990
Dry Cows	0.1	141	1.9	1,191
Support Head (mothers and Bulls)	0.4	157	1.9	700
Large Heifers	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0
Calves	1.0	0	0.0	0
Bulls	0.0	0	0.0	0
Total	2.2	811	14.2	3,240

Solid Manure Handling - Land Application				
Cow	VOC		Nox	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	2.6	941	17.2	6,270
Dry Cows	0.3	171	2.9	1,040
Support Head (mothers and Bulls)	0.7	262	5.0	1,200
Large Heifers	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0
Calves	0.0	0	0.0	0
Bulls	0.0	0	0.0	0
Total	3.5	1,373	25.1	8,430

Total Daily Pre-Project Potential to Emit (lb/day)							
Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0.0	0.0	0.0	0.0	3.3	1.6	4.0
Cow Housing	0.0	0.0	190.0	0.0	119.9	540.0	0.0
Liquid Manure	0.0	0.0	0.0	0.0	79.2	389.0	63.2
Solid Manure	0.0	0.0	0.0	0.0	0.0	17.0	0.0
Feed Handling	0.0	0.0	0.0	0.0	150.0	0.0	0.0
Total	0.0	0.0	110.0	0.0	344.1	917.2	67.7

Major Source Emissions (lb/yr)						
Permit	NOx	SOx	PM10	CO	VOC	NH3
MAP Plants*	0	0	0	0	0	0
Cow Housing	0	0	0	0	0	0
Liquid Manure	0	0	0	0	0-850	0
Solid Manure	0	0	0	0	0	0
Feed Handling	0	0	0	0	0	0
Total	0	0	0	0	0-850	0

Total Annual Pre-Project Potential to Emit (lb/yr)							
Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	1,200	570	0
Cow Housing	0	0	43,021	0	41,770	214,800	0
Liquid Manure	0	0	0	0	10,875	89,000	4,645
Solid Manure	0	0	0	0	2,190	13,790	0
Feed Handling	0	0	0	0	87,756	0	0
Total	0	0	43,021	0	154,043	298,190	4,645

Post-Project Potential to Emit (PE2)

Post-Project Herd Size						
Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals	% of Corrals That are Shaded
Milk Cows	0	0	4,750	0	4,750	37.8%
Dry Cows	0	0	600	0	600	18.7%
Support Stock (Heifers and Bulls)	0	0	1,900	0	1,900	47.8%
Large Heifers	0	0	0	0	0	0
Medium Heifers	0	0	0	0	0	0
Small Heifers	0	0	0	0	0	0
Bulls	0	0	0	0	0	0

	Calf Hutches				Calf Corrals			
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	Total # of Calves	% of Corrals That are Shaded
Calves	0	0	0	0	0	0	0	0

Silage Information				
Feed Type	Maximum # Open Piles	Maximum Height (ft)	Maximum Width (ft)	Open Face Area (ft^2)
Corn	1	30	150	1,437
Alfalfa	1	30	150	1,437
Wheat	1	30	150	1,437

Milking Parlor				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	5.5	1,995	2.5	903

Cow Housing						
Cow	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	126.4	46,133	695.8	253,975	66.6	24,294
Dry Cows	12.2	4,464	59.2	21,600	11.8	4,311
Support Stock (Heifers and Bulls)	22.3	8,141	71.0	26,600	52.7	19,246
Large Heifers	0.0	0	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0	0.0	0
Calves	0.0	0	0.0	0	0.0	0
Bulls	0.0	0	0.0	0	0.0	0
Total	163.0	59,498	825.7	301,375	130.9	47,773

Liquid Manure Handling						
Cow	VOC		NH3		H2S	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	20.0	7,306	222.0	81,338	10.5	3,898
Dry Cows	1.8	667	19.1	6,960	0.6	236
Support Stock (Heifers and Bulls)	3.5	1,233	23.4	8,550	1.1	410
Large Heifers	0.0	0	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0	0.0	0
Calves	0.0	0	0.0	0	0.0	0
Bulls	0.0	0	0.0	0	0.0	0
Total	25.2	9,195	265.0	96,735	12.7	4,640

Solid Manure Handling				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	6.4	2,375	44.6	16,241
Dry Cows	0.6	210	3.8	1,384
Support Stock (Heifers and Bulls)	1.2	399	4.7	1,710
Large Heifers	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0
Calves	0.0	0	0.0	0
Bulls	0.0	0	0.0	0
Total	8.2	2,990	53.0	19,339

Feed Handling and Storage		
	Daily PE (lb VOC/day)	Annual PE (lb VOC/yr)
Corn Emissions	21.2	7,743
Alfalfa Emissions	5.3	1,940
Wheat Emissions	26.6	9,769
TMR	164.2	59,945
Total	217.3	79,326

Total Daily Post-Project Potential to Emit (lb/day)							
Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0.0	0.0	0.0	0.0	5.5	2.5	0.0
Cow Housing	0.0	0.0	130.9	0.0	163.0	825.7	0.0
Liquid Manure	0.0	0.0	0.0	0.0	25.2	265.0	12.7
Solid Manure	0.0	0.0	0.0	0.0	8.2	53.0	0.0
Feed Handling	0.0	0.0	0.0	0.0	217.3	0.0	0.0
Total	0.0	0.0	130.9	0.0	419.2	1,146.2	12.7

Total Annual Post-Project Potential to Emit (lb/yr)							
Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	1,995	903	0
Cow Housing	0	0	47,773	0	59,498	301,278	0
Liquid Manure	0	0	0	0	9,195	96,735	4,640
Solid Manure	0	0	0	0	2,990	19,339	0
Feed Handling	0	0	0	0	79,326	0	0
Total	0	0	47,773	0	153,004	418,255	4,640

Calculations for milking parlor:

Annual PE = (# milk cows) x (EF2 lb-pollutant/hd-yr)

Daily PE = (Annual PE lb/yr) ÷ (365 day/yr)

Calculations for all other permits:

Annual PE = [(# milk cows) x (EF2 lb-pollutant/hd-yr)] + [(# dry cows) x (EF2 lb-pollutant/hd-yr)] + [(# large heifers) x (EF2 lb-pollutant/hd-yr)] + [(# medium heifers) x (EF2 lb-pollutant/hd-yr)] + [(# small heifers) x (EF2 lb-pollutant/hd-yr)] + [(# calves) x (EF2 lb-pollutant/hd-yr)] + [(# bulls) x (EF2 lb-pollutant/hd-yr)]

Daily PE = (Annual PE lb/yr) ÷ (365 day/yr)

The H2S emission factor is assumed to be 10% of the NH3 lagoon/storage pond(s) emission factor, for each respective herd size.

For milk and dry cows, shade structures for corrals are assumed to provide a PM10 control efficiency of 16.7%. For all other animals, shade structures for corrals are assumed to provide a PM10 control efficiency of 8.3%.

Calculations for silage emissions:

Annual PE = (EF2) x (area ft^2) x (0.0929 m^2/ft^2) x (8,760 hr/yr) x (60 min/hr) x 2.205E-6 lb/μg

Daily PE = (Annual PE lb/yr) ÷ (365 day/yr)

Calculations for TMR emissions:

Annual PE = (# cows) x (EF2) x (0.658 m^2) x (525,600 min/yr) x (2.205E-6 lb/μg)

Daily PE = (Annual PE lb/yr) ÷ (365 day/yr)

Calves are not included in TMR calculation.

Liquid Manure Handling - Storage Ponds/Lagoons						
Cow	VOC		NH3		H2S*	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	6.3	2,315	106.7	38,950	10.7	3,895
Dry Cows	0.4	150	6.5	2,360	0.6	234
Support Stock (Heifers and Bulls)	1.6	588	11.5	4,180	1.1	414
Large Heifers	0.0	0	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0	0.0	0
Calves	0.0	0	0.0	0	0.0	0
Bulls	0.0	0	0.0	0	0.0	0
Total	12.1	4,424	127.4	46,490	12.7	4,640

Liquid Manure Handling - Land Application				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	10.3	3,741	116.4	42,375
Dry Cows	1.4	517	5.9	6,600
Support Stock (Heifers and Bulls)	2.2	811	11.9	4,370
Large Heifers	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0
Calves	0.0	0	0.0	0
Bulls	0.0	0	0.0	0
Total	13.1	4,771	137.2	50,245

Solid Manure Handling - Manure Storage & Piles				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	2.3	840	17.3	6,318
Dry Cows	0.1	41	1.6	584
Support Stock (Heifers and Bulls)	0.3	143	1.6	608
Large Heifers	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0
Calves	0.0	0	0.0	0
Bulls	0.0	0	0.0	0
Total	2.8	1,109	20.6	7,519

Solid Manure Handling - Land Application				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	4.1	1,489	27.2	9,924
Dry Cows	0.4	156	4.3	848
Support Stock (Heifers and Bulls)	0.7	240	7.9	2,045
Large Heifers	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0
Calves	0.0	0	0.0	0
Bulls	0.0	0	0.0	0
Total	5.1	1,874	32.4	11,821

Major Source Emissions (lb/yr)						
Permit	NOx	SOx	PM10	CO	VOC	NH3
Milking Parlor	0	0	0	0	0	0
Cow Housing	0	0	0	0	0	0
Liquid Manure	0	0	0	0	4,474	0
Solid Manure	0	0	0	0	0	0
Feed Handling	0	0	0	0	0	0
Total	0	0	0	0	4,454	0

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.

Using the values in Sections VII.C.1 and VII.C.2 in the evaluation above, quarterly PE1 and quarterly PE2 can be calculated as follows:

(Delete tables as necessary for units not part of project.)

Milking Parlor					
	PE2 (lb/yr)	PE2 (lb/qtr)	PE1 (lb/yr)	PE1 (lb/qtr)	QNEC (lb/qtr)
NOx	0	0.0	0	0.0	0.0
SOx	0	0.0	0	0.0	0.0
PM10	0	0.0	0	0.0	0.0
CO	0	0.0	0	0.0	0.0
VOC	1,995	498.8	1,260	315.0	183.8
NH3	903	225.6	570	142.5	83.1

Cow Housing					
	PE2 (lb/yr)	PE2 (lb/qtr)	PE1 (lb/yr)	PE1 (lb/qtr)	QNEC (lb/qtr)
NOx	0	0.0	0	0.0	0.0
SOx	0	0.0	0	0.0	0.0
PM10	47,773	11943.3	42,621	10655.2	1288.2
CO	0	0.0	0	0.0	0.0
VOC	59,498	14874.4	43,770	10942.5	3931.9
NH3	301,375	75343.8	214,900	53725.0	21818.8

Liquid Manure					
	PE2 (lb/yr)	PE2 (lb/qtr)	PE1 (lb/yr)	PE1 (lb/qtr)	QNEC (lb/qtr)
NOx	0	0.0	0	0.0	0.0
SOx	0	0.0	0	0.0	0.0
PM10	0	0.0	0	0.0	0.0
CO	0	0.0	0	0.0	0.0
VOC	9,195	2298.8	10,675	2668.8	-369.9
NH3	96,735	24183.8	69,000	17250.0	6933.8
H2S	4,649	1162.3	4,649	1162.3	0.0

Solid Manure					
	PE2 (lb/yr)	PE2 (lb/qtr)	PE1 (lb/yr)	PE1 (lb/qtr)	QNEC (lb/qtr)
NOx	0	0.0	0	0.0	0.0
SOx	0	0.0	0	0.0	0.0
PM10	0	0.0	0	0.0	0.0
CO	0	0.0	0	0.0	0.0
VOC	2,990	747.5	2,190	547.5	200.0
NH3	19,339	4834.8	13,790	3447.5	1387.3

Feed Storage and Handling					
	PE2 (lb/yr)	PE2 (lb/qtr)	PE1 (lb/yr)	PE1 (lb/qtr)	QNEC (lb/qtr)
NOx	0	0.0	0	0.0	0.0
SOx	0	0.0	0	0.0	0.0
PM10	0	0.0	0	0.0	0.0
CO	0	0.0	0	0.0	0.0
VOC	79,426	19856.4	67,758	16939.6	2916.6
NH3	0	0.0	0	0.0	0.0

Adjusted Increase in Permitted Emissions

Milking Parlor

VOC Emissions

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	5.5	3.5	0.42	0.42	2.0
				Total	2.0

NH3 Emissions

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	2.5	1.6	0.19	0.19	0.9
				Total	0.9

Cow Housing

VOC Emissions

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	128.4	81.1	9.87	9.87	47.3
Dry Cows	12.2	15.3	5.58	5.58	-3.1
Support Stock (heifers and Bulls)	22.3	23.5	4.29	4.29	-1.2
Large Heifers	0.0	0.0	4.29	4.29	0.0
Medium Heifers	0.0	0.0	2.92	2.92	0.0
Small Heifers	0.0	0.0	1.62	1.62	0.0
Calves	0.0	0.0	0.76	0.76	0.0
Bulls	0.0	0.0	2.59	2.59	0.0
				Total	43.0

NH3 Emissions

NH3	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	683.8	436.1	53.30	53.30	255.5
Dry Cows	59.2	74.0	27.00	27.00	-14.8
Support Stock (heifers and Bulls)	72.9	76.7	14.00	14.00	-3.8
Large Heifers	0.0	0.0	14.00	14.00	0.0
Medium Heifers	0.0	0.0	10.00	10.00	0.0
Small Heifers	0.0	0.0	7.60	7.60	0.0
Calves	0.0	0.0	2.20	2.20	0.0
Bulls	0.0	0.0	19.40	19.40	0.0
				Total	236.9

PM10 Emissions

PM10	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows (Freestalls)	0.0	0.0	1.37	1.37	0.0
Milk Cows (Shaded Corrals)	22.4	2.5	4.55	4.55	16.6
Milk Cows (Unshaded Corrals)	44.1	41.9	5.46	5.46	2.2
Dry Cows (Freestalls)	0.0	0.0	1.37	1.37	0.0
Dry Cows (Shaded Corrals)	1.8	1.8	4.55	4.55	0.0
Dry Cows (Unshaded Corrals)	9.7	12.7	5.46	5.46	-3.0
Support Stock (Freestalls)	0.0	0.0	1.37	1.37	0.0
Support Stock (Shaded Corrals)	24.1	0.0	9.67	9.67	24.1
Support Stock (Unshaded Corrals)	28.6	57.8	10.55	10.55	-29.2
Large Heifers (Freestalls)	0.0	0.0	1.37	1.37	0.0
Large Heifers (Shaded Corrals)	0.0	0.0	9.67	9.67	0.0
Large Heifers (Unshaded Corrals)	0.0	0.0	10.55	10.55	0.0
Medium Heifers (Freestalls)	0.0	0.0	1.37	1.37	0.0
Medium Heifers (Shaded Corrals)	0.0	0.0	9.67	9.67	0.0
Medium Heifers (Unshaded Corrals)	0.0	0.0	10.55	10.55	0.0
Small Heifers (Freestalls)	0.0	0.0	1.37	1.37	0.0
Small Heifers (Shaded Corrals)	0.0	0.0	9.67	9.67	0.0
Small Heifers (Unshaded Corrals)	0.0	0.0	10.55	10.55	0.0
Calves (Shaded Corrals)	0.0	0.0	1.26	1.26	0.0
Calves (Unshaded Corrals)	0.0	0.0	1.37	1.37	0.0
Calves (0-3 Hutches)	0.0	0.0	0.343	0.343	0.0
Calves (A-G Flushed)	0.0	0.0	0.069	0.069	0.0
Calves (A-G Scraped)	0.0	0.0	0.206	0.206	0.0
Bulls (Freestalls)	0.0	0.0	1.37	1.37	0.0
Bulls (Shaded Corrals)	0.0	0.0	9.67	9.67	0.0
Bulls (Unshaded Corrals)	0.0	0.0	10.55	10.55	0.0
				Total	14.0

Liquid Manure Handling

VOC Emissions - Lagoon/Storage Pond(s)

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	0.6	0.1	0.74	1.11	3.5
Dry Cows	0.0	1.6	0.40	0.60	-0.2
Support Stock (heifers and Bulls)	1.6	2.5	0.31	0.46	-0.1
Large Heifers	0.0	0.6	0.31	0.46	0.0
Medium Heifers	0.0	0.0	0.21	0.32	0.0
Small Heifers	0.0	0.0	0.12	0.18	0.0
Calves	0.0	0.0	0.06	0.06	0.0
Bulls	0.0	0.0	0.19	0.28	0.0
				Total	3.2

VOC Emissions - Land Application

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	16.4	10.9	0.60	1.33	3.8
Dry Cows	1.9	2.9	6.43	0.72	-0.2
Support Stock (heifers and Bulls)	1.7	3.0	0.33	0.56	-0.1
Large Heifers	0.0	0.0	6.33	0.56	0.0
Medium Heifers	0.0	0.0	0.23	0.38	0.0
Small Heifers	0.0	0.0	0.13	0.21	0.0
Calves	0.0	0.0	0.06	0.10	0.0
Bulls	0.0	0.0	0.20	0.33	0.0
				Total	3.9

NH3 Emissions - Lagoon/Storage Pond(s)

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	106.7	67.4	8.20	8.20	39.3
Dry Cows	9.2	11.5	4.20	4.20	-2.3
Support Stock (heifers and Bulls)	11.5	12.1	2.20	2.20	-0.9
Large Heifers	0.0	0.0	2.20	2.20	0.0
Medium Heifers	0.0	0.0	1.50	1.50	0.0
Small Heifers	0.0	0.0	1.20	1.20	0.0
Calves	0.0	0.0	0.35	0.35	0.0
Bulls	0.0	0.0	3.00	3.00	0.0
				Total	39.4

NH3 Emissions - Land Application

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	115.8	73.2	8.90	8.90	42.6
Dry Cows	8.9	12.3	4.50	4.50	-2.4
Support Stock (heifers and Bulls)	12.0	12.8	2.30	2.30	-0.9
Large Heifers	0.0	0.0	2.30	2.30	0.0
Medium Heifers	0.0	0.0	1.70	1.70	0.0
Small Heifers	0.0	0.0	1.30	1.30	0.0
Calves	0.0	0.0	0.37	0.37	0.0
Bulls	0.0	0.0	3.23	3.23	0.0
				Total	39.9

H2S Emissions - Lagoon/Storage Pond(s)

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	10.7	10.7	0.82	0.82	0.0
Dry Cows	0.9	0.9	0.42	0.42	0.0
Support Stock (heifers and Bulls)	1.1	1.1	0.22	0.22	0.0
Large Heifers	0.0	0.0	0.22	0.22	0.0
Medium Heifers	0.0	0.0	0.15	0.15	0.0
Small Heifers	0.0	0.0	0.12	0.12	0.0
Calves	0.0	0.0	0.04	0.04	0.0
Bulls	0.0	0.0	0.30	0.30	0.0
				Total	0.0

Solid Manure Handling

VOC Emissions - Solid Manure Storage

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	1.7	1.1	0.13	0.13	0.6
Dry Cows	0.2	0.2	0.07	0.07	0.0
Support Stock (heifers and Bulls)	0.3	0.3	0.05	0.05	0.0
Large Heifers	0.0	0.0	0.05	0.05	0.0
Medium Heifers	0.0	0.0	0.04	0.04	0.0
Small Heifers	0.0	0.0	0.02	0.02	0.0
Calves	0.0	0.0	0.01	0.01	0.0
Bulls	0.0	0.0	0.03	0.03	0.0
				Total	0.8

VOC Emissions - Separated Solids Piles

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	0.7	0.5	0.06	0.06	0.2
Dry Cows	0.1	0.1	0.03	0.03	0.0
Support Stock (heifers and Bulls)	0.1	0.1	0.02	0.02	0.0
Large Heifers	0.0	0.0	0.02	0.02	0.0
Medium Heifers	0.0	0.0	0.02	0.02	0.0
Small Heifers	0.0	0.0	0.01	0.01	0.0
Calves	0.0	0.0	0.00	0.00	0.0
Bulls	0.0	0.0	0.02	0.02	0.0
				Total	0.2

VOC Emissions - Land Application

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	4.1	2.6	0.31	0.31	1.5
Dry Cows	0.4	0.5	0.17	0.17	-0.1
Support Stock (heifers and Bulls)	0.7	0.7	0.13	0.13	0.0
Large Heifers	0.0	0.0	0.13	0.13	0.0
Medium Heifers	0.0	0.0	0.09	0.09	0.0
Small Heifers	0.0	0.0	0.09	0.09	0.0
Calves	0.0	0.0	0.02	0.02	0.0
Bulls	0.0	0.0	0.08	0.08	0.0
				Total	1.4

NH3 Emissions - Solid Manure Storage

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	12.4	7.8	1.0	1.9	4.6
Dry Cows	1.1	1.3	0.5	0.5	-0.2
Support Stock (heifers and Bulls)	1.3	1.4	0.3	0.3	-0.1
Large Heifers	0.0	0.0	0.3	0.3	0.0
Medium Heifers	0.0	0.0	0.2	0.2	0.0
Small Heifers	0.0	0.0	0.1	0.1	0.0
Calves	0.0	0.0	0.0	0.0	0.0
Bulls	0.0	0.0	0.4	0.4	0.0
				Total	4.3

NH3 Emissions - Separated Solids Piles

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	4.9	3.1	0.4	0.4	1.8
Dry Cows	0.4	0.5	0.2	0.2	-0.1
Support Stock (heifers and Bulls)	0.5	0.5	0.1	0.1	0.0
Large Heifers	0.0	0.0	0.1	0.1	0.0
Medium Heifers	0.0	0.0	0.1	0.1	0.0
Small Heifers	0.0	0.0	0.1	0.1	0.0
Calves	0.0	0.0	0.0	0.0	0.0
Bulls	0.0	0.0	0.1	0.1	0.0
				Total	1.7

NH3 Emissions - Land Application

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	27.2	17.2	2.1	2.1	10.9
Dry Cows	2.3	2.9	1.1	1.1	-0.6
Support Stock (heifers and Bulls)	2.9	3.0	0.6	0.6	-0.1
Large Heifers	0.0	0.0	0.6	0.6	0.0
Medium Heifers	0.0	0.0	0.4	0.4	0.0
Small Heifers	0.0	0.0	0.3	0.3	0.0
Calves	0.0	0.0	0.1	0.1	0.0
Bulls	0.0	0.0	0.6	0.6	0.0
				Total	9.3

Feed Storage and Handling

VOC Emissions - Silage

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Corn Silage	21.2	21.2	21,155	21,155	0.0
Alfalfa Silage	5.3	5.3	10,649	10,649	0.0
Wheat Silage	26.6	26.6	26,745	26,745	0.0
				Total	0.0

VOC Emissions - TMR

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
TMR	184.2	132.3	10,575	10,575	32.0
				Total	32.0

Total Change in Emissions

Total Daily Change in Emissions (lb/day)

	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0.0	0.0	0.0	0.0	2.0	0.9	0.0
Cow Housing	0.0	0.0	14.1	0.0	43.1	236.9	0.0
Liquid Manure	0.0	0.0	0.0	0.0	-4.9	76.0	0.0
Solid Manure	0.0	0.0	0.0	0.0	2.2	15.2	0.0
Feed Handling	0.0	0.0	0.0	0.0	32.9	0.0	0.0
Total	0.0	0.0	14.1	0.0	76.3	329.0	0.0

Total Annual Change in Emissions (lb/yr)

	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	735	333	0
Cow Housing	0	0	5,153	0	15,728	86,475	0
Liquid Manure	0	0	0	0	-1,480	27,735	0
Solid Manure	0	0	0	0	800	5,549	0
Feed Handling	0	0	0	0	11,667	0	0
Total	0	0	5,153	0	27,450	120,092	0

Total Annual Change in Non-Fugitive Emissions (Major Source Emissions) (lb/yr)

	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	-426	0	0
Solid Manure	0	0	0	0	0	0	0
Feed Handling	0	0	0	0	0	0	0
Total	0	0	0	0	-426	0	0

Assumptions

- 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."
- The NH3 emission factors for milk cows are based on an internal document entitled "Breakdown of Dairy VOC Emission Factor into Permit Units." The NH3 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.
- 16.7% PM10 control efficiency applied for milk cows and dry cows housed in shaded corrals
- 8.3% PM10 control efficiency applied for support stock (heifers, calves, and bulls) housed in shaded corrals
- Unless calculated separately, H2S emissions are assumed to be 10% of the lagoon/storage pond(s) NH3 emissions
- When applying PM10 control efficiency from shade structures, it is assumed the number of cows housed in each corral is equally distributed. E.g., if there are 1,000 support stock and 10 corrals, it is assumed each corral houses 100 support stock.
- Jersey cows are assumed to generate 71% of the amount of VOC and NH3 emissions as a Holstein cow
- Calculations for Support Stock (heifers and bulls) use emission factors for large heifers
- If no scraped manure is flushed to a lagoon, then emissions from the scraped manure are excluded from the liquid manure handling permit calculations
- Of the permit units addressed in this spreadsheet, only emissions from the lagoon/storage pond(s) are used for major source calculations since these emissions are considered to be the only non-fugitive emissions
- All mitigation measures are expected to result in VOC emission reductions. A conservative 10% control efficiency will be applied to all mitigation measures unless specifically noted.
- An anaerobic treatment lagoon designed in accordance with the NRCS Guideline (359) has the potential of reducing significant amount of emissions. Although VOC emission reductions are expected to be high, to be conservative, a control efficiency of 40% will be applied to this mitigation measure for both the lagoon(s) and land application until better data becomes available.
- The mitigation measures chosen will also have a reduction in ammonia emissions. However, due to limited data, these reductions will not be quantified at this time.
- Unless otherwise indicated, no scraped manure is sent to the lagoon(s).
- Fugitive greenhouse gas emissions are excluded in calculations for PSD purposes.

APPENDIX F

BACT Analysis for Dairy Permits

Fagundes Dairy (C-5502, Project # C-1101179)

TOP-DOWN BACT ANALYSIS

Pursuant to Section 5.2 of the Settlement Agreement between the District and the Western United Dairyman and the Alliance of Western Milk Producers Inc, signed September 20, 2004, "*... the District will not make any Achieved in Practice BACT determinations for individual dairy permits or for the dairy BACT guidance until the final BACT guidance has been adopted by the APCO....*".[9] Therefore, a cost effectiveness analysis will be performed for all the technologies, which have not been proposed by the applicant.

The U.S. Environmental Protection Agency (USEPA) RACT/BACT/LAER Clearinghouse, the California Air Pollution Control Officers Association (CAPCOA) BACT Clearinghouse, the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) BACT Clearinghouse, the Bay Area Air Quality Management District (BAAQMD), and the South Coast Air Quality Management District (SCAQMD) BACT Guidelines were reviewed to determine potential control technologies for this class and category of operation. No BACT guidelines were found for this class and category of source.

I. Pollutants Emitted from Dairies

1. PM_{10} Emissions from Dairies

The National Ambient Air Quality Standards currently regulate concentrations of particulate matter with an aerodynamic diameter of 10 micrometers or less (PM_{10}) and particulate matter with an aerodynamic diameter of 2.5 micrometers or less ($PM_{2.5}$). Studies have shown that particles in the smaller size fractions contribute most to human health effects. The $PM_{2.5}$ standard was published in 1997, but is only recently beginning to be implemented because of the time that was required to resolve litigation regarding the standard. On April 5, 2005, EPA finalized classification of areas for the $PM_{2.5}$ standard. On April 21, 2011 District Rule 2201 – New and Modified Stationary Source Review Rule was amended to incorporate PM2.5 new and modified source review requirements.

All animal confinement facilities are sources of particulate matter emissions. However, the composition of these emissions will vary. Dust emissions from unpaved surfaces, dry manure storage sites, and land application sites are potential particulate matter emission sources. Sources of particulate matter emissions at a dairy include feed, bedding materials, dry manure, animal dander, and unpaved soil surfaces such as corrals.

The mass of particulate matter emitted from totally or partially enclosed confinement facilities, as well as the particle size distribution, depend on type of ventilation and ventilation rate. Particulate matter emissions from naturally ventilated buildings will be lower than those from mechanically ventilated buildings.

[9] Settlement Agreement. Western United Dairymen, Alliance of Western Milk Producers v. San Joaquin Valley Air Pollution Control District, settled in the Fresno Superior Court September 2004 (http://www.valleyair.org/busind/pto/dpag/settlement.pdf

2. VOC Formation and Emissions from Manure:

Volatile Organic Compounds (VOCs) result from ruminant digestive processes and are formed as intermediate metabolites when organic matter manure decomposes. Under aerobic conditions, any VOCs formed in the manure are rapidly oxidized to carbon dioxide and water. Under anaerobic conditions, complex organic compounds are microbially decomposed to volatile organic acids and other volatile organic compounds, which in turn are mostly converted to methane and carbon dioxide by methanogenic bacteria. When the activity of the methanogenic bacteria is not inhibited, virtually all of the VOCs are metabolized to simpler compounds, and the potential for VOC emissions is minimized. However, the inhibition of methane formation results in a buildup of VOCs in the manure and ultimately to volatilization to the air. Inhibition of methane formation typically is caused by low temperatures or excessive loading rates, which both create an imbalance between the populations of microorganisms responsible for the formation of VOC and methane. VOC emissions will vary with temperature because the rate of VOC formation, reduction to methane, and volatilization and the solubility of individual compounds vary with temperature.[10] VOC emissions from manure and the associated field application site can be minimized by a properly designed and operated stabilization process (such as an anaerobic treatment lagoon). In contrast, VOC emissions will be higher from storage tanks, ponds, overloaded anaerobic lagoons, and the land application sites associated with these systems.

3. Emissions from Silage and Total Mixed ration (TMR):

Volatile Organic Compounds (VOCs) are created during the process that is used to create silage, which is preserved, fermented plant matter that is fed to cattle. The purpose of silage production is to move the ensiled plant material from an aerobic phase to an anaerobic phase as quickly as possible and achieve a rapid drop in pH that will hinder further microbial decomposition in order to preserve the nutritive value of the forage. The rapid drop in pH is primarily caused by conversion of soluble carbohydrates to nonvolatile lactic acid. In addition to lactic acid, alcohols (primarily ethanol), volatile fatty acids (primarily acetic acid), and other VOC compounds (primarily oxygenated VOCs) are also formed during the process. These VOCs largely remain trapped in the silage piles until the silage is exposed to the surrounding atmosphere at the open face of the silage pile from where silage is removed, during mixing, or when placed in feed lanes for the cattle to consume as a Total Mixed Ration (TMR). Once exposed to the surrounding air much of the VOCs contained in the silage and TMR will begin to be rapidly emitted to the atmosphere and the concentration of the VOCs in the silage and TMR will decrease. Loss of VOCs from the silage and TMR can be reduced by minimizing the area exposed to the atmosphere and good silage management practices that will reduce the formation of these VOCs in the silage reduce aerobic deterioration, which leads to heating of the open faces of silage piles and of the TMR placed in the feed lanes.

4. Ammonia Emissions from Dairies

When sulfur dioxide and nitrogen oxides are present, ammonia is a precursor for the secondary formation of $PM_{2.5}$ in the atmosphere. Ammonia reacts with sulfuric and nitric

[10] EPA Document "Emissions from Animal Feeding Operations" (Draft, August 15, 2001), pg. 2-10

acids, which are produced from sulfur dioxide and nitrogen oxides in the ambient air, to form ammonium sulfate, ammonium nitrate, and other fine particulates.[11] Exposure to high levels of ammonia can cause irritation to the skin, throat, lungs, and eyes.

Ammonia volatilization is the result of the microbial decomposition of nitrogenous compounds in manure. The primary nitrogenous compound in dairy manure is urea, but nitrogenous compounds also occur in the form of undigested organic nitrogen in animal feces. Whenever urea comes in contact with the enzyme urease, which is excreted in animal feces, the urea will hydrolyze rapidly to form ammonia and this ammonia will be emitted soon after. The formation of ammonia will continue more slowly (over a period of months or years) with the microbial breakdown of organic nitrogen in the manure. Because ammonia is highly soluble in water, ammonia will accumulate in manure handled as liquids and semi-solids or slurries, but will volatize rapidly with drying from manure handled as solids.

The potential for ammonia volatilization exists wherever manure is present, and ammonia will be emitted from confinement buildings, open lots, stockpiles, anaerobic lagoons, and land application from both wet and dry handling systems. The rate of ammonia volatilization is influenced by a number of factors including the concentrations of nitrogenous compounds in the manure, temperature, air velocity, surface area, moisture, and pH. Because of its high solubility in water, the loss of ammonia to the atmosphere will be more rapid when drying of manure occurs. However, there the difference in total ammonia emissions between solid and liquid manure handling systems may not be great if liquid manure is stored over extended periods of time prior to land application.[12]

5. Hydrogen Sulfide Emissions from Dairies

Hydrogen Sulfide (H_2S) is produced from the anaerobic decomposition of organic sulfur compounds. In the absence of oxygen, sulfur reducing bacteria in the lagoons and storage ponds reduce sulfate ions in the manure into sulfide. Aqueous sulfide exists in three different forms: molecular (un-dissociated) hydrogen sulfide (H_2S) and the bisulfide (HS^-) and sulfide (S^{2-}) ions. In aqueous solutions molecular H_2S exists in equilibrium with the bisulfide (HS^-) and sulfide (S^{2-}) ions but only molecular H_2S, not the ionized forms, can be transferred across the gas-liquid interface and emitted to the atmosphere. The fractional amount of the form of sulfide present in a solution is a function of temperature and pH. Under acidic conditions (pH < 7) greater amounts of sulfide will be in the form of molecular H_2S and the potential for H_2S emissions will increase. As the pH increases, a greater proportion of sulfide will be in the ionic form and the potential for H_2S emissions will decrease.

In a dairy, the conditions for the production of hydrogen sulfide exist in small amounts such as wet indentions in corrals, manure piles, and separated solids piles. However, the most significant sources are the liquid manure lagoons and storage ponds.

[11] Workshop Review Draft for EPA Regional Priority AFO Science Question Synthesis Document - Air Emission Characterization and Management, pg. 2

[12] Emissions From Animal Feeding Operations – Draft, US EPA – Emissions Standards Division, August 15, 2001, pgs. 2-6 and 2-7

II. Top Down BACT Analysis for the Milking Parlor (Permit C-5502-1)

1. BACT Analysis for VOC Emissions from the Milking Parlor:

a. Step 1 - Identify all control technologies

Since, specific VOC emissions control efficiencies have not been identified in the literature for dairy milking parlors, the control efficiencies listed are based on the control efficiencies of similar processes and engineering judgment.

1) Enclosed Milking Barn and Parlor(s) and Venting Emissions to a Control Device (e.g. incinerator, biofilter, e.g) (≈64-72%; 80% Capture and 80-90% Control of emissions from cow housing and total mixed ration (TMR) feed placed in the cow housing unit)
2) Flush/spray down milking parlors after each group of cows is milked (≥10% of manure emissions from the milking parlor)

Description of Control Technologies

1) Milking Parlor vented to an incinerator capable of achieving 98% control

Milk parlors can be either naturally or mechanically ventilated. Mechanical ventilation can be easily applied to all areas of the milking parlors, except the holding area. The mechanical ventilation system for the milking parlor can be utilized to capture the gases emitted from the milking parlor; 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 California facility that currently encloses the holding area could be identified because cows are continuously going in and out of the barn throughout the day. The capital cost 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 the analysis below. If it is possible to overcome the significant obstacles to properly capturing the gases, it may be possible to vent them to a control device.

Because the same control device could be used to control VOC emissions from the milk parlors and the cow housing, cost of the VOC emission reductions for an enclosed milk parlor was evaluated below in conjunction with the cost of VOC emissions from enclosed cow housing vented to a control device. Since the emission factor from the milking parlors is much lower than the emission factor from the cow housing, this reduces the cost of emission reductions for venting the milking parlors to a control device. The use of a biofilter as the control device for VOCs is expected to result in much lower costs than other control options, such as incineration; therefore, this option will be analyzed below to determine the minimum cost of the emission reductions that could be achieved by venting an enclosed milk parlor and enclosed barns vented to a control device. Details of this analysis are given below.

Description of Control Technology

A biofilter is a device for removing contaminants from a gas in which the gas is passed through a media (e.g., soil, compost, wood chips) that supports microbial activity by which pollutants are degraded by biological oxidation. During biofiltration microorganisms use the contaminants as nutrients and oxidize the gaseous organic contaminants, ammonia, and sulfur compounds in the exhaust air resulting in carbon dioxide, nitrogen, water, salt, and biomass. Since biofilters rely on living organisms to function, the temperature, moisture content, and pH of the filter media should be monitored to ensure optimum operating conditions. The filter media also needs to be replaced periodically because of deterioration. Additional information on biofiltration is given below in the analysis for enclosed animal housing vented to a control device.

It is assumed that 95% of the gases emitted from the milking parlor will be captured by the mechanical ventilation system and that a properly functioning biofilter will eliminate 80% of the captured VOCs[13]; therefore, the total control for VOCs from the milking parlor = 0.95 x 0.80 = 76%.

2) Milking Parlor Flushed/Sprayed down after each Group of Cows is milked

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 a source of VOC emissions, is removed from the milking parlor 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 parlor. 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 parlor after 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. .

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

After eliminating the technologically infeasible options, the remaining options are ranked according to their control efficiency.

[13] According to the SCAQMD Rule 1133.2 final staff report (page 18) "Technology Assessment Report states a well-designed, well-operated, and well-maintained biofilter is capable of achieving 80% destruction efficiency for VOC and NH_3."

1) Enclose, capture, and vent to a control device (≈76% of VOC emissions from the milking parlor)
2) Flush/spray after each group of cows is milked (≈10% of VOC emissions from the manure in the milking parlor)

d. Step 4 - Cost Effectiveness Analysis

Biofiltration:

Biofiltration can control both VOC and ammonia emissions. Although, this technology can control both pollutants, a cost effective 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 effective analysis for VOC and ammonia will not be performed.

The analysis below for enclosed milk parlors and enclosed barns vented to a biofilter demonstrates that the cost of the VOC reductions exceeds the $17,500/ton-VOC cost effectiveness threshold of the District BACT policy. There are additional costs related to increased electricity use, and regulatory compliance and testing that have not been quantified for this analysis. Even without these costs, it is clear that the cost of the VOC emission reductions achieved far exceeds the District cost effective threshold for VOC. Therefore, this option is not cost effective and is being removed from consideration at this time.

Flushing/Spraying down Milking Parlor after each Group of Cows is Milked:

The applicant has proposed this option; therefore a cost-effective analysis is not required.

e. Step 5 - Select BACT

The facility is proposing to flush or spray down the milking parlor after each group of cows is milked, which satisfies the BACT requirements.

2. BACT Analysis for NH_3 Emissions from the Milking Parlor:

a. Step 1 - Identify all control technologies

A cost effectiveness threshold has not been established for ammonia. Therefore, only options that meet the District's definition of Achieved-in-Practice controls will be evaluated in this project. However, for purposes of the Dairy BACT Guideline, the District will not deem any control options Achieved-in-Practice until after the final Dairy BACT Guideline has been established.

Flushing or spraying down the milk parlor after milking each group of cows has been identified as a possible control for the NH_3 emissions from the milking parlor. No other control technologies that meet the definition of Achieved-in-Practice have been identified for NH_3 emissions from the milking parlors.

1) Flush/spray after each group of cows is milked

Description of Control Technology

1) Milking Parlor Flushed/Sprayed down after each Group of Cows is milked

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 a source of NH_3 emissions, is removed from the milking parlor many times a day by flushing after each milking. Ammonia has a high affinity for water and is highly soluble in water. Therefore, a large proportion of ammonia will dissolve in the flush water and will not be emitted from the milking parlors.

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

After eliminating the technologically infeasible options, the remaining options are ranked according to their control efficiency.

1) Flush/spray down milking parlor after each group of cows is milked

d. Step 4 - Cost Effectiveness Analysis

The applicant has proposed the only option listed; therefore a cost analysis is not required.

e. Step 5 - Select BACT

The facility is proposing to flush or spray down the milking parlor after each group of cows is milked, which satisfies the BACT requirements.

III. Top Down BACT Analysis for the Cow Housing Permit Unit (C-5502-2)

1. BACT Analysis for PM_{10} Emissions from Dairy Open Corrals:

a. Step 1 - Identify all control technologies

The following control options were identified for PM_{10} emissions from dairy freestall barns and open corrals.

Open Corrals

1) Design and Management Practices

- Concrete feed lanes and walkways
- Scraping of open corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions
- Shade structures in open corrals
- Feeding heifers in corrals near dusk (within 1 hour of dusk)
- Windbreaks controlling dust from corrals (when feasible and there is adequate space at existing facilities)
- Sprinklers for dust control in corrals

Description of Control Technologies

Concrete Feedlanes and Walkways

Dairy animals are typically housed in freestall barns or open corrals. In a freestall barn, the milk and dry cows are grouped in large pens with free access to feed bunks, water, and stalls for resting, and exercise corral areas. An open corral is a large open area where cows are confined with unlimited access to feed and water.

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_{10} emissions. Additionally, the manure that is deposited in the lanes and walkways will be flushed, which will prevent PM_{10} emissions from drying manure.

Scraping of Exercise Pens and Open Corrals with a Pull-Type Scraper

As stated above, dairy animals are typically housed in freestall barns or open corrals. The surface of the corrals and freestall 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 corral surfaces will reduce the amount of dry manure on the corral surfaces that may be pulverized by the cows' hooves and emitted as PM_{10}.

Increasing the frequency that corrals are scraped is expected to reduce emissions of gaseous pollutants from the corral surface and PM that results from the cattle hooves acting on the surface of the corrals; however, requiring an excessively high frequency may negate these emission reductions because of the NO_X and PM emitted from combustion of fuel for the tractor and PM emissions resulting from use of the tractor on the corral surface.

Shade Structures in Open Corrals

Installing shade structures in corral areas helps to decrease PM_{10} emissions. Dairy animals are easily susceptible to heat stress and will tend to seek out shade to reduce the effects of heat, particularly in the warmer months when higher PM_{10} emissions are expected because of drier conditions. PM_{10} emissions are reduced because the cows will spend less time walking on the dry corral surface.

Feeding Heifers in Corrals Near Dusk (within 1 hour of dusk)

Feeding the heifers near dusk will reduce their activity during this time, which is the time when the corral surface is the driest and there is greater chance for particulate matter from the corral to be entrained into the atmosphere.

Shelterbelts/Windbreaks Controlling Dust from Corrals

A windbreak, or shelterbelt, is composed of one or more rows of trees or shrubs, which are planted in a manner that breaks up wind and reduces the force of wind on downwind of the windbreak. Windbreaks can be used to prevent soil erosion, improve air quality by intercepting dust, chemicals, and odors, to protect crops, and to provide habitat for wildlife. The District has worked with NRCS to establish guidelines for windbreaks used for dust control around dairies. In general, the guidelines require that a downwind shelterbelt with three rows be installed, the first row consisting of shrubs, second row consisting of a medium size tree and the last row consisting of an evergreen (larger tree). NRCS also requires that an irrigation system be maintained so that there is greater survivability and rapid growth of the trees and shrubs. A windbreak will reduce the amount of particulate matter entrained into the atmosphere.

There may be instances where windbreaks are not practical or feasible for a particular operation such as existing dairy facilities that is expanding but lacks adequate space for a windbreak or when there is insufficient water for establishment of a windbreak. Windbreaks will not be required if an operation demonstrates satisfactorily that they are infeasible or impractical for the particular operation.

Sprinklers in Corrals

A sprinkler system can reduce dust by maintaining adequate moisture in the layer of manure and earth on the corral surface. Studies have shown that increasing the moisture of the corral surface greatly reduces the entrainment of PM_{10} into the atmosphere as a result of animal movement. Installation of a sprinkler system for dust control is an effective mitigation measure that reduces PM_{10} emissions. However, because of concerns for animal health and welfare, water application is not commonly used. Excess moisture from sprinkling systems can potentially accumulate in shaded areas where the cows lie down, which will lead to a breeding ground for pathogens and vermin, which will increase nuisance conditions and instances of disease. Excessive moisture also increases the chances of mastitis. For these reasons, sprinkler systems are not commonly used to control dust at dairies.

b. Step 2 - Eliminate technologically infeasible options

Shelterbelts/Windbreaks Controlling Dust from Corrals

The existing dairy does not have sufficient space for the installation of windbreaks downwind of the corrals. Because the roots of the trees in a vegetative windbreak would not have sufficient space for optimum establishment of the vegetative windbreak, this option will not required for this particular existing dairy facility.

Sprinklers in Corrals

As stated above, excess moisture from sprinkling systems can lead to a breeding ground for pathogens and vermin, which will increase nuisance conditions and instances of disease. Excessive moisture also increases the chances of mastitis. For these reasons, sprinkler systems for dust control will not be required at this time.

c. Step 3 - Rank remaining options by control effectiveness

After eliminating the technologically infeasible options, the remaining options are ranked according to their control efficiency.

Open Corrals

1) Design and Management Practices
   - Concrete feed lanes and walkways
   - Scraping of open corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions
   - Shade structures in open corrals
   - Feeding heifers in corrals near dusk (within 1 hour of dusk)

d. Step 4 - Cost Effectiveness Analysis

Open Corrals

1. Design and Management Practices
   - Concrete feed lanes and walkways
   - Scraping of open corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions
   - Shade structures in open corrals
   - Feeding heifers in corrals near dusk (within 1 hour of dusk)
   - Windbreaks controlling dust from corrals (when feasible and there is adequate space at existing facilities)

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

e. Step 5 - Select BACT

BACT for PM_{10} from open corrals is satisfied with:
1) Concrete feed lanes and walkways
2) Scraping of open corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions
3) Shade structures in open corrals
4) Feeding heifers in corrals near dusk (within 1 hour of dusk)

2. BACT Analysis for VOC Emissions from the Cow Housing Permit Unit:

a. Step 1 - Identify all control technologies

Since specific VOC emissions control efficiencies have not been identified in the literature for dairy cow housing areas, the control efficiencies will be estimated based on the control efficiencies of similar processes and engineering judgment. Unless specifically noted, for practices required to reduce VOC emissions, a 10% control efficiency will be assumed for the specific portion of the emission source or process affected by the measure.

The following options were identified as possible controls for VOC emissions from the cow housing (cow housing permit unit):

1) Confining Animals in Enclosed Buildings and Venting Emissions to a Control Device (e.g. incinerator, biofilter, e.g) (≈64-72%; 80% Capture and 80-90% Control of emissions from cow housing and total mixed ration (TMR) feed placed in the cow housing unit)
2) Feed and Manure Management Practices
   - Concrete feed lanes and walkways
   - Frequent Cleaning of feed lanes and walkways
     1. Feed lanes and walkways for mature cows (milk and dry cows) flushed four times per day. Feed lanes and walkways for support stock (heifers) flushed at least once per day; or
     2. Feed lanes and walkways for mature cows (milk and dry cows) scraped four times per day with an automatic or electric scraper. Feed lanes and walkways for support stock (heifers) cleaned at least once per day; or
     3. Feed lanes and walkways for mature cows (milk and dry cows) scraped four times per day with a tractor/skid steer. Feed lanes and walkways for support stock (heifers) cleaned at least once per day; or
     4. Feed lanes and walkways for mature cows (milk and dry cows) vacuumed four times per day. Feed lanes and walkways for support stock (heifers) cleaned at least once per day;
   - All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines
   - Exercise pens and open corrals properly sloped to promote drainage (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 managed to maintain a dry surface (except during periods of rainy weather)
   - Scraping of exercise pens and open corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions
   - VOC mitigation measures required by District Rule 4570

Description of Control Technologies

1) Enclosed Freestall Barns vented to a Control Device

Description of Dairy Housing

In a freestall barn, cows are grouped in large pens with free access to feed bunks, water, and stalls for resting. In the mild climate of the San Joaquin Valley, the typical freestall barn is an open structure (roof but no sides). The primary freestall design consists of a roof that provides shade with all sides open to allow air to flow through, which keeps the cows cool. The open freestall barns take advantage of natural summer winds in the San Joaquin Valley that are generally greater than four mph. The natural winds result in an excellent summer ventilation rate that is equivalent to 1,000 cfm per cow, which is why open dairy barns are generally recommended in the San Joaquin Valley. In colder climates enclosed or partially enclosed barns may be utilized to protect cows from winter extremes. However, no completely enclosed freestall barns that were installed at a California dairy were identified.

Although the potential to enclose cows in a barn may exist, the feasibility of reasonably collecting the gas through a stack, chimney, or vent remains in question considering the extremely large amounts of airflow going through the barns needed to keep the cows cool. The airflow requirements would be even higher in the San Joaquin valley, where temperatures can exceed 110° F in the hot summer. If the barn exhaust can be properly captured it may be possible to vent it to a VOC control device. It is estimated that up to 80% of the gases emitted from enclosed freestall barns can be captured by the mechanical ventilation system and sent to a control device, such as an incinerator or biofilter.

Thermal incineration is a well-established VOC control technique. During combustion, gaseous hydrocarbons are oxidized to form CO_2 and water. In addition to the difficulty of capturing all of the gases in a freestall barn, a disadvantage of thermal incineration is that when concentrations of combustible VOCs in the gas stream are very low, very large amounts of supplemental fuel must be used to sufficiently increase the temperature of all of the ventilation air in order to incinerate these VOCs. This generally renders incineration cost prohibitive for large flows of dilute VOCs, such as in the ventilation air from a freestall barn. Because of this, biofilters have generally been found to be more cost-effective for handling dilute streams of biodegradable VOCs. 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 microorganisms oxidize the gaseous organic contaminants, ammonia, and sulfur compounds in the exhaust air resulting in carbon dioxide, nitrogen, water, salt, and biomass. Additional information on biofiltration is given below in the analysis for enclosed freestall barns vented to a control device. One of the disadvantages related to the use of a biofilter to control emissions from enclosed livestock barns is the large space requirement for the traditional biofilter design. To illustrate this, a low-cost natural bed biofilter designed to treat the VOC emissions from 1,000 milk cows and 180 dry cows with no support stock would cover more than 5.4 acres and would need to be maintained free of pests and approved by the appropriate permitting agencies. To avoid such expansive land requirements, the dairy would likely need to use much more expensive bio-trickling filters or bio-scrubbers.

Although many questions remain about the feasibility of requiring animals to be confined in buildings and capturing the exhaust gas and venting it to a control device, it will be considered for purposes of this analysis.

2) Feed and Manure Management Practices

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). Although concrete feed lanes and walkways are necessary for an effective manure removal system, they do not individually reduce emissions of gaseous pollutants; therefore, no VOC control efficiency is assigned for this practice.

Frequent Cleaning of Feed Lanes and Walkways

Many dairy operations use flush or scrape systems to remove manure from the corral and freestall feed 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 corrals or freestalls, 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. A smaller number of dairies may also use vacuum trucks to remove manure from the cow housing areas. Manure vacuumed from the lanes can be applied to adjacent cropland, transported offsite, or placed in a digester. The freestall and corral 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 corral and freestall feed lanes and walkways, the flush, scrape, and vacuum 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, scrape, or vacuum system. Flush systems also reduce PM_{10} 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 feed 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.

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.[14] 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.

Scraping of Exercise Pens and Open Corrals with a Pull-Type Scraper

Many dairies use equipment pulled by tractors to periodically scrape the surfaces of corrals. Frequent scraping the freestall exercise pens and corrals will reduce the amount of manure on the corral surfaces, which will reduce VOC and ammonia emissions resulting from decomposition of this manure. This practice will also provide a

[14] "Emissions of Volatile Organic Compounds Originating from UK Livestock Agriculture", Hobbs, P.J. 2004 – Journal of the Science of Food and Agriculture

uniform surface, reducing anaerobic conditions on the corral surface, which will reduce gaseous pollutants from this area. The frequency that corrals are scraped at dairies can vary from as little as once a year to every week.

Increasing the frequency that corrals are scraped is expected to reduce emissions of gaseous pollutants from the corral surface and PM that results from the cattle hooves acting on the surface of the corrals; however, requiring an excessively high frequency may negate these emission reductions because of the NO_X and PM emitted from combustion of fuel for the tractor and PM emissions resulting from use of the tractor on the corral surface.

b. Step 2 - Eliminate Options

There are no technologically infeasible options to eliminate from step 1. However, the following options will be eliminated from consideration because the emissions from increased use of tractors are expected to offset the benefits of any VOC reductions from these practices.

a) Feed lanes and walkways for mature cows (milk and dry cows) scraped four times per day with a tractor/skid steer. Feed lanes and walkways for support stock (heifers) cleaned at least once per day;
b) Feed lanes and walkways for mature cows (milk and dry cows) vacuumed four times per day. Feed lanes and walkways for support stock (heifers) cleaned at least once per day

c. Step 3 - Rank remaining options by control effectiveness

After eliminating infeasible and impractical options, the remaining options are ranked according to their control efficiency.

1) Confining Animals in Enclosed Buildings and Venting Emissions to a Control Device (e.g. incinerator, biofilter, e.g) (≈64-72%; 80% Capture and 80-90% Control of emissions from cow housing and total mixed ration (TMR) feed placed in the cow housing unit)
2) Feed and Manure Management Practices
   - Concrete feed lanes and walkways
   - Frequent cleaning of feed lanes and walkways
     Flushing is generally the most effective method of using frequent cleaning of the lanes to reduce emissions; however, because some dairies may be unable to flush at increased frequencies because of water constraints, use of automatic scarping system will be allowed when dairies demonstrate that they are unable to flush at increased frequencies.
     1. Feed lanes and walkways for mature cows (milk and dry cows) flushed four times per day. Feed lanes and walkways for support stock (heifers) flushed at least once per day; or
     2. For dairies that are not able to use a flush system, Feed lanes and walkways for mature cows (milk and dry cows) scraped four times per day with an automatic scraper (or equivalent). Feed lanes and walkways for support stock (heifers) cleaned at least once per day

- All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines
- Exercise pens and open corrals properly sloped to promote drainage (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 managed to maintain a dry surface (except during periods of rainy weather)
- Scraping of exercise pens and open corrals every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions
- VOC mitigation measures required by District Rule 4570

d. Step 4 - Cost Effectiveness Analysis

Confining Animals in Enclosed Buildings and Venting Emissions to a Control Device (Biofilter)

The analysis below is based on the Analysis for Confining Livestock in Enclosed Buildings and Venting Emissions to a Control Device contained in the District document Final Staff Report – Revised Proposed Amendments to Rule 4570 (Confined Animal Facilities), Appendix E – Analysis of Class Two Mitigation Measures for Revised Proposed Amendments to Rule 4570 (Confined Animal Facilities) dated October 21, 2010. Additional details regarding the cost analysis can be found in the referenced report for the amendments to District Rule 4570.

This analysis does not quantify all of the costs or examine all of the potential issues that make requiring this option infeasible but it is intended to more accurately reflect the actual costs to implement this measure. The use of a biofilter as a control device for VOCs is expected to result in much lower costs than other control options, such as incineration. The U.S. Environmental Protection Agency (US EPA), Clean Air Technology Center (CATC) document "Using Bioreactors to Control Air Pollution" states, "*The capital cost of a bioreaction installation is usually just a fraction of the cost of a traditional control device installation. Operating costs are usually considerably less than the costs of traditional technology, too.*"[15] Therefore, this analysis will evaluate the use of a biofilter to determine the minimum cost of the emission reductions that would be achieved by venting enclosed animal housing to a control device.

The following analysis is based on the cost of emission reductions for confining the entire herd in enclosed freestall buildings vented to a biofilter and venting the milking parlor to the same biofilter.

Description of Control Technology

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

[15] 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

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 minimize 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 a 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.

Advantages and Disadvantages of Using a Biofilter to Control Emissions

Some of the general advantages related to the use of biofilters include: low installation costs for traditional biofilter designs; generally low operating costs in comparison to other control technologies; high control efficiencies for some compounds such as aldehydes, organic acids, hydrogen sulfide, and certain water-soluble organic compounds.

Some of the general disadvantages of the use of biofilters include: large land requirements for traditional biofilter designs; difficulty in determining the control efficiency for traditional open biofilter designs; for biofilters that use inexpensive natural bed media, the filter bed media must be replaced every 2 to 5 years; biofilters usually require some time to reach optimum control efficiency after initial startup and after periods of nonuse because of the need to establish or re-establish the microbial population; and biofilters can also be a source of nitrous oxide emissions due to denitrification.

Additional disadvantages specifically related to the use of biofilters to control emissions from livestock include: facilities that currently use natural ventilation would incur additional costs because of the need to convert to mechanical ventilation; facilities that currently use mechanical ventilation systems may need to upgrade these systems to overcome the increased pressure drop across the biofiltration system; greater energy usage for all facilities to push air through the biofilter; few reported cases where a biofilter has been shown to be economically viable when applied to animal feeding

operations[16]; a very large biofilter system must be used to handle these huge flow rates while maintaining adequate contact time for treatment of emissions. Finally, because of the extremely large airflow rates needed to provide adequate ventilation for livestock it is not practical to treat all of the ventilation air from large confined animal housing units.

Biofilter VOC Control Efficiency

It is assumed that 80% 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 85% of the captured VOC emissions[17]; therefore, the total control for VOCs from the enclosed animal housing = 0.80 x 0.85 = 68%.

Cost Estimates for Enclosed Freestall Barns for this Analysis

Based on the information contained in the District Staff Report for the Revised Proposed Amendments to Rule 4570 (Confined Animal Facilities) dated October 21, 2010, the following cost estimates for enclosed freestall barns will be used in this analysis.

Capital Cost for Enclosed Freestall Barn (2010): $1,700-2,700/cow
Estimated Adjusted Capital Cost: $1,275-2,025/cow (capital cost estimate was reduced by 25% because it may be possible to use the existing concrete work and some of the existing freestall infrastructure with the new building shell)

Capitol cost estimate: **$1,275-2,025/cow**

Increased Operating Costs[18]: **$74- 98/cow more**

Capital Cost for Freestall Barn Enclosure for Entire Herd (7,450 total head)

Low capital cost estimate: $1,275/cow x 7,450 cows = $9,498,750
High capital cost estimate: $2,025/cow x 7,450 cows = $15,086,250

Increased Operating Costs for Enclosed Freestall Barns for Entire Herd (7,450 total head)

Low operating cost estimate: $74/cow-yr x 7,450 cows = $551,300/yr
High operating cost estimate: $98/cow-yr x 7,450 cows = $730,100/yr

Cost Estimate for Biofilters

Several reference documents were consulted to determine the expected capital and operating costs of using a biofilter to control VOC emissions from enclosed animal

[16] U.S. Environmental Protection Agency, "Emissions from Animal Feeding Operations" (Draft), EPA Contract No. 68-D6-0011, August 15, 2001, pg. 9-20, http://www.epa.gov/ttn/chief/ap42/ch09/draft/draftanimalfeed.pdf
[17] 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/rules/doc/r1133/r1133_staffreport.pdf
[18] Increased operating costs were based on information from following document, adjusted to 2010 dollars assuming 3% annual inflation: Dhuyvetter, Kevin C., Harner, Joe P., Smith, John F., & Bradford, Barry J., Kansas State University Department of Agricultural Economics, "Economic Considerations of Low-Profile Cross-Ventilated Freestall Barns", Presented at Dairy Housing of the Future, Sioux Falls, South Dakota. September 10-11, 2008, http://www.agmanager.info/Faculty/dhuyvetter/presentations/2008/LPCV%20Conference(Sep2008).pdf

housing for evaluation of the Class Two Mitigation Measures contained in the District Staff Report for the Revised Proposed Amendments to Rule 4570 (Confined Animal Facilities) dated October 21, 2010. Several companies that specialize in building and supplying biofilters and bio-scrubbers for the control of VOC emissions were also contacted to request capital cost estimates for biofilter systems specifically for the treatment of VOC emissions from dairy cows housed in enclosed barns. The resulting cost estimates from the District staff report are summarized below. Based on the information reviewed, it was also determined that there would not be any additional cost reduction benefit related to economy of scale for biofilters handling the large flow rates from freestall barns. For purposes of this analysis, the following biofilter cost estimates will be used.

Capital Cost (2010): **$3-35/cfm**
Operating Costs (2010): **$2.12-20/cfm**

The cost is largely dependent on the airflow rate that the biofilter must handle. Biofilters used to treat exhaust air should be sized to treat the maximum ventilation rate, which is typically the warm weather rate. The higher cost estimate is representative of a biotrickling filter, which may be necessary to handle the high air flow rates from the barns.

Required Airflow Rate of the Freestall Barns

In order to calculate the costs of this control option, the airflow rate required for the freestall barns must be determined. The University of Minnesota's publication "Improving Mechanical Ventilation in Dairy Barns" [19], gives minimum ventilation rates for dairy cattle, which are listed in the table below.

Minimum Ventilation Rates for Dairy Cows (cfm/cow)			
Age	Winter	Mild Weather	Summer
Baby Calf	15	50	100
Heifer (2-12 months)	20	60	130
Heifer (12-24 months)	30	80	180
Mature Cow	50	170	500 – 1,000

The minimum summer ventilation rate listed for mature cows is 500 cfm per cow. However, according to the University of Minnesota publication and Cornell University's publication "Natural or Tunnel Ventilation of Freestall Structures: What is Right for Your Dairy Facility?" [20], the minimum required airflow rate in the summer increases to 1,000 cfm per cow if tunnel ventilation is used to provide additional cooling.

[19] "Improving Mechanical Ventilation in Dairy Barns", J.P. Chastain, http://www.milkproduction.com/Library/Articles/Improving_mechanical_ventilation.htm
[20] Natural or Tunnel Ventilation of Freestall Structures: What is Right for Your Dairy Facility?, C.A. Gooch, http://www.ansci.cornell.edu/pdfs/nattunnel.pdf

The climate in the San Joaquin Valley is characterized by mild winters and hot summers. Because of the warmer climate, it is expected that tunnel ventilation or a similar system would need to be employed in an enclosed freestall barn to prevent excessive heat stress. Additionally, tunnel ventilation systems are more representative of the types of systems that would be required to capture and control emissions.

Minimum Summer Air Requirements for Freestall Barns Vented to a Biofilter for Entire Herd (7,450 total head)

The minimum required summer airflow rate for housing 4,750 milk cows, 800 dry cows, and 1,900 support stock (assumed to be large heifers) is calculated below:

Low Summer Ventilation Rate: 4,750 milk cows x 500 cfm/cow + 800 dry cows x 500 cfm/cow + 1,900 large heifers x 180 cfm/cow = 3,117,000 cfm

High Summer Ventilation Rate: 4,750 milk cows x 1,000 cfm/cow + 800 dry cows x 1,000 cfm/cow + 1,900 large heifers x 180 cfm/cow = 5,892,000 cfm

Capital Cost of a Biofilter for Entire Herd (7,450 total head)

The lower cost estimate does not include installation of the required ductwork. As stated above, the estimated capital costs for a biofilter range of between $3.00 per cfm and $35.00 per cfm. The capital cost estimates of a biofilter for enclosed freestall barns housing the entire herd:

Low capital cost estimate: $3.00/cfm x 3,117,000 cfm = $9,351,000
High capital cost estimate: $35.00/cfm x 5,892,000 cfm = $206,220,000

Operating Costs for a Biofilter for Entire Herd (7,450 total head)

Low operating cost estimate: $2.12/cfm-yr x 3,117,000 cfm = $6,608,040/yr
High operating cost estimate: $20.00/cfm-yr x 5,892,000 cfm = $117,840,000/yr

Annualized Capital Costs for Biofilter for Entire Herd (7,450 total head)

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 expected life of the entire system (fans, media, plenum, etc) will be estimated at 10 years. A 10% 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.

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

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

Low Annualized Capital Cost Estimate =
$[(\$9,498,750 + \$9,351,000) \times 0.1(1.1)^{10}]/[(1.1)^{10}-1] = \$3,067,710$/year

High Annualized Capital Cost Estimate =
[($15,086,250 + $206,220,000) x $0.1(1.1)^{10}$]/[$(1.1)^{10}$-1] = $36,016,573/year

Total Annual Cost Estimates

The total annualized capital costs and operating costs for a freestall enclosure vented to a biofilter are given below. For the least expensive biofilters, the biofilter media (e.g., soil, compost, wood chips) must be replaced after 3-5 years in order to remain effective. This may be an additional cost because it may not have been included in the least expensive operating cost estimates provided above.

Total annual cost estimate = (total annualized capital cost) + (increased operating cost for an enclosed freestall barn) + (biofilter operating cost)

Low total annual cost estimate = ($3,067,710/yr) + ($551,300/yr) + ($6,608,040/yr)
= $10,227,050/year

High total annual cost estimate = ($36,016,573/yr) + ($730,100/yr) + ($117,840,000/yr)
= $154,586,673/year

Potential Income from Increased Milk Production

Cooling milk cows in enclosed freestall barns may reduce heat stress and result in increased milk production. Because dairy cows in California already have some of the highest milk production rates in the nation, it is questionable regarding whether enclosing the milk cows will result in any significant increases in milk production. This is because heat stress is related to both temperature and humidity and it is likely that the increased temperatures in California relative to other states are mitigated by the much lower humidity. Although questions remain about the potential to increase milk production in the San Joaquin Valley by reducing heat stress, this potential benefit will be quantified for this analysis.

Potential Increased Daily Milk Production: 4-6 lb/cow-day (District 4570 Staff Report, June 2006)

Potential Increased Annual Milk Production: 1,460-2,190 lb/cow-yr
Base Pool Price of milk[21] for July 2014: $20.83/cwt
Income from increased milk production: $304.12-456.18/cow-yr

Max Income from increased milk production for 4,750 milk cows:
4,750 milk cows x $456.18/cow-yr = $2,166,855/yr

Low total annual cost estimate – income from increased milk production =
($10,227,050/yr) - ($2,166,855/yr) = $8,060,195/year

[21] http://www.cdfa.ca.gov/dairy/pdf/Prices_Grid.pdf; Base Pool Price of milk price was used for this analysis because dairy industry representatives state that increased production is purchased at a lower price. Additionally, sufficient increased production will cause the price to fall

VOC Emission Reductions for Entire Herd (7,450 total head)

The annual VOC Emission reductions for enclosed freestall barns 4,750 milk cows, 800 dry cows, and 1,900 support stock (assumed to be large heifers):

VOC Emissions from Cows (Enteric) and Manure:
[Number of cows] x [Uncontrolled Cow Housing VOC EF (lb/cow-year)] x [Capture Efficiency] x [Biofilter Control Efficiency]

VOC Reductions from Holstein Cows Housed in Enclosed Freestall Barns Vented to a Biofilter (Cows, Stalls, & Lanes)									
Type of Cow	**# of cows**	**x**	**Housing EF* (lb/cow-yr)**	**x**	**Capture (%)**	**x**	**Control (%)**	**=**	**lb-VOC/yr**
Milk Cow	4,750	x	5.93	x	80%	x	85%	=	19,154
Dry Cow	800	x	3.21	x	80%	x	85%	=	1,746
Support Stock/ Large Heifer	1,900	x	2.46	x	80%	x	85%	=	3,178
							Total (lb-VOC/yr)		**24,078**

*For milk cows, emissions in the milk parlor(s) are included in the cow housing emission factor

VOC Emissions from TMR:
[Number of cows] x [Area of TMR (ft^2/cow)] x [Uncontrolled TMR Flux Rate (lb-VOC/ft^2-day)] x [365/day/year)]x [Capture Efficiency] x [Biofilter Control Efficiency]

VOC Reductions from TMR (Feed) for Cows Housed in Enclosed Freestall Barns Vented to a Biofilter													
Type of Cow	**# of cows**	**x**	**TMR Area* (ft^2/cow)**	**x**	**TMR Flux (lb/ft^2-day)**	**x**	**365 day/yr**	**x**	**Capture (%)**	**x**	**Control (%)**	**=**	**lb-VOC/yr**
Milk Cow	4,750	x	7.08	x	3.85E-03	x	365	x	80%	x	85%	=	32,136
Dry Cow	800	x	7.08	x	3.85E-03	x	365	x	80%	x	85%	=	5,412
Support Stock	1,900	x	7.08	x	3.85E-03	x	365	x	80%	x	85%	=	12,854
											Total (lb-VOC/yr)		**50,402**

Total VOC Emission Reductions from Milk Parlor, Cow Housing, and TMR = 24,078 lb-VOC/yr + 50,402 lb-VOC/yr = 74,480 lb-VOC/yr

Cost of VOC Emission Reductions

Low Estimate[22] = ($8,060,195/year)/[(74,480 lb-VOC/year)(1 ton/2000 lb)]
= **$216,439/ton of VOC reduced**

High Estimate = ($154,586,673/year)/[(74,480 lb-VOC/year)(1 ton/2000 lb)]
= **$4,151,092/ton of VOC reduced**

[22] Includes reduction in overall annual costs because of potential additional revenue from maximum supposed increase in milk production.

As shown above, the costs for a freestall enclosure and biofilter would cause the cost of the VOC reductions to be at least $216,439/ton. There are additional costs related to increased electricity use, and regulatory compliance and testing that have not been quantified in this analysis. Even without these costs, it is clear that the cost of the VOC emission reductions achieved would be far greater than the $17,500/ton-VOC cost effectiveness threshold of the District BACT policy. The equipment is therefore not cost effective and is being removed from consideration at this time.

Feed and Manure Management Practices:

- Concrete feed lanes and walkways
- Feed lanes and walkways for mature cows (milk and dry cows) flushed four times per day and Feed lanes and walkways for support stock (heifers) flushed at least once per day; or for dairies that are not able to use a flush system, Feed lanes and walkways for mature cows scraped four times per day with an automatic scraper (or equivalent) and Feed lanes and walkways for support stock (heifers) cleaned at least once per day
- All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines
- Exercise pens and open corrals properly sloped to promote drainage (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 managed to maintain a dry surface (except during periods of rainy weather)
- Scraping of exercise pens and open corrals every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions
- VOC mitigation measures required by District Rule 4570

e. Step 5 - Select BACT

The facility is proposing concrete feed lanes and walkways; to flush the feed lanes and walkways for the milk and dry cows four times per day and to flush feed lanes and walkways for the remaining animals once per day; to feed all animals in accordance with National Research Council (NRC) or other District-approved guidelines, to properly slope corrals or manage corrals to maintain a dry surface, and to scrape exercise pens every two weeks with a pull-type scraper except during wet conditions, which satisfies the BACT requirements.

Additionally, District Rule 2201 defines BACT as including the most stringent emission limitation or control technique, including process and equipment changes, that have been found by the APCO to be cost effective and technologically feasible for such class or category of sources or for a specific source. The District has found that the basic mitigation measures required by District Rule 4570 are cost effective and technologically feasible for confined animal facilities and the applicant has proposed these options. Therefore, in addition to the BACT requirements determined in the Top-Down BACT Analysis above, implementation of the mitigation measures that the facility has selected to comply with Rule 4570 will also be required as part of BACT for VOC emissions from the open corrals.

2. BACT Analysis for NH_3 Emissions from Dairy Freestall Barns and Open Corrals:

a. Step 1 - Identify all control technologies

A cost effectiveness threshold has not been established for ammonia. Therefore, only options that meet the District's definition of Achieved-in-Practice controls will be evaluated.

The following management practices have been identified as possible control options for the NH_3 emissions from the cow housing permit unit:

1) Feed and Manure Management Practices
   - Concrete feed lanes and walkways
   - Frequent Cleaning of feed lanes and walkways
     1. Feed lanes and walkways for mature cows (milk and dry cows) flushed four times per day. Feed lanes and walkways for support stock (heifers) flushed at least once per day; or
     2. Feed lanes and walkways for mature cows (milk and dry cows) scraped four times per day with an automatic scraper. Feed lanes and walkways for support stock (heifers) cleaned at least once per day; or
     3. Feed lanes and walkways for mature cows (milk and dry cows) scraped four times per day with a tractor/skid steer. Feed lanes and walkways for support stock (heifers) cleaned at least once per day; or
     4. Feed lanes and walkways for mature cows (milk and dry cows) vacuumed four times per day. Feed lanes and walkways for support stock (heifers) cleaned at least once per day;
   - All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines
   - Exercise pens and open corrals properly sloped to promote drainage (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 managed to maintain a dry surface (except during periods of rainy weather)
   - Scraping of exercise pens and open corrals every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions

Description of Control Technologies

1) Feed and Manure Management Practices

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).

Frequent Cleaning of Feed Lanes and Walkways

Many dairy operations use flush or scrape systems to remove manure from the corral and freestall feed 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 corrals or freestalls, 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. A smaller number of dairies may also use vacuum trucks to remove manure from the cow housing areas. Manure vacuumed from the lanes can be applied to adjacent cropland, transported offsite, or placed in a digester. The freestall and corral 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 corral and freestall feed lanes and walkways, the flush, scrape, and vacuum systems also serve as an emission control for reducing emissions. The manure deposited in the lanes, which is a source of NH_3 emissions, is removed from the cow housing area by the flush, scrape, or vacuum 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.

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.

Scraping of Exercise Pens and Open Corrals with a Pull-Type Scraper

Frequent scraping the freestall exercise pens and corrals will reduce the amount of manure on the corral 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 corral surface, which will reduce gaseous pollutants from this area.

Increasing the frequency that corrals are scraped is expected to reduce emissions of gaseous pollutants from the corral surface and PM that results from the cattle hooves acting on the surface of the corrals; however, requiring an excessively high frequency may negate these emission reductions because of the NO_X and PM emitted from combustion of fuel for the tractor and PM emissions resulting from use of the tractor on the corral surface.

b. Step 2 - Eliminate options

There are no technologically infeasible options to eliminate from step 1. However, the following options will be eliminated from consideration because the emissions from increased use of tractors are expected to offset the benefits of any NH_3 reductions from these practices.

a) Feed lanes and walkways for mature cows (milk and dry cows) scraped four times per day with a tractor/skid steer. Feed lanes and walkways for support stock (heifers) cleaned at least once per day; or
b) Feed lanes and walkways for mature cows (milk and dry cows) vacuumed four times per day. Feed lanes and walkways for support stock (heifers) cleaned at least once per day

c. Step 3 - Rank remaining options by control effectiveness

After eliminating the technologically infeasible and impractical options, the remaining options are ranked according to their control efficiency.

1) Feed and Manure Management Practices
   - Concrete feed lanes and walkways
   - Frequent cleaning of feed lanes and walkways
     Cleaning lanes by frequent flushing is much more effective at reducing ammonia emissions than frequent scraping; however, because some dairies may be unable to flush at increased frequencies because of water constraints, use of automatic scarping system will be allowed when dairies demonstrate that they are unable to flush at increased frequencies.
     1. Feed lanes and walkways for mature cows (milk and dry cows) flushed four times per day. Feed lanes and walkways for support stock (heifers) flushed at least once per day; or
     2. For dairies that are not able to use a flush system, Feed lanes and walkways for mature cows (milk and dry cows) scraped four times per day with an automatic scraper (or equivalent). Feed lanes and walkways for support stock (heifers) cleaned at least once per day

- All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines
- Exercise pens and open corrals properly sloped to promote drainage (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 managed to maintain a dry surface (except during periods of rainy weather)
- Scraping of exercise pens and open corrals every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions

d. Step 4 - Cost Effectiveness Analysis

The applicant has proposed the only option listed; therefore a cost analysis is not required.

e. Step 5 - Select BACT

The facility is proposing concrete feed lanes and walkways; to flush the feed lanes and walkways for the milk and dry cows four times per day and to flush feed lanes and walkways for the remaining animals one time per day; and to feed all animals in accordance with National Research Council (NRC) or other District-approved guidelines, to properly slope corrals or manage corrals to maintain a dry surface, and to scrape exercise pens every two weeks with a pull-type scraper except during wet conditions, which satisfies the BACT requirements.

IV. Top Down BACT Analysis for the Liquid Manure Handling System – Lagoon/Storage Pond (C-5502-3)

1. BACT Analysis for VOC Emissions from the Lagoon/Storage Pond:

a. Step 1 - Identify all control technologies

Since, specific control efficiencies have not been identified in the literature for VOC emissions from dairy lagoons and storage ponds, the control efficiencies listed are based on the control efficiencies of similar processes and engineering judgment.

The following options were identified as possible controls for VOC emissions from the Lagoon/Storage Pond:

1) Aerobic Treatment Lagoon – mechanical aeration to achieve a dissolved oxygen concentration of 2.0 mg/L (≈95%; based information provided by Dr. Ruihong Zhang of UC Davis)
2) Anaerobic Digester with biogas collected and vented to a destruction device such as an internal combustion engine or flare, and treated waste discharged into a secondary lagoon or storage pond. (≈75%) (Note: not required unless required by the final Dairy BACT Guideline)

3) Anaerobic Treatment Lagoon designed to meet Natural Resources Conservation Service (NRCS) standards (≈40%)

Description of Control Technologies

1) Aerobic Treatment Lagoon – mechanical aeration to achieve a dissolved oxygen concentration of 2.0 mg/L

An aerobic treatment 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.

Sufficient oxygen must be provided to sustain the aerobic microorganisms in completely aerated lagoons. Lagoons can be considered completely aerobic if sufficient oxygen is provided to achieve a dissolved oxygen (DO) content of 2.0 mg/L or more. Oxygen is typically provided by mechanical aerators. These aerators 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) content of the liquid manure is 2.0 mg/L or more. A major disadvantage of completely aerated lagoons is the enormous cost of the energy required to run the aerators continuously. Because of this, it has been determined that completely aerated lagoons are not cost effective options for dairy facilities at the present time.

2) Anaerobic Digester

Pursuant to Section 5.3 of the Settlement Agreement (9/20/2004) between the District and the Western United Dairyman and the Alliance of Western Milk Producers Inc, installation of an anaerobic digester will only be required if this technology is proven effective in reducing emissions and is required by the final Dairy BACT Guideline.[9] If an anaerobic digester is required by the final Dairy BACT Guideline, the applicant will be required to submit the details of the proposed anaerobic digester system and combustion device to the District and shall install the system in accordance with the timeframes and procedures established by the APCO in the Dairy BACT Guideline.

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_4), carbon dioxide (CO_2), 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_2), Oxygen (O_2), Hydrogen Sulfide (H_2S),

and Ammonia (NH_3). 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_2S 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 digester can be captured and then sent to a suitable combustion device. Combustion (thermal incineration) is a generally accepted, well-established VOC control technique. During combustion, gaseous hydrocarbons are oxidized to form CO_2 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 as fugitive emissions. The overall control efficiency is assumed to be 75% of the emissions that would have been emitted from the lagoon.

3) 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_4), carbon dioxide (CO_2), and water rather than intermediate metabolites (VOCs). The National Resource Conservation Service (NRCS) California Field Office Technical Guide Code 359 - Waste Treatment Lagoon specifies criteria for the design of anaerobic treatment lagoons. 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.

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

After eliminating the technologically infeasible options, the remaining options are ranked according to their control efficiency.

1) Aerobic Treatment Lagoon – mechanical aeration to achieve a dissolved oxygen concentration of 2.0 mg/L (≈95%)

2) Anaerobic Digester with biogas collected and vented to a destruction device such as an internal combustion engine or flare, and treated waste discharged into a secondary lagoon or storage pond. (≈75%)

3) Anaerobic Treatment Lagoon designed to meet Natural Resources Conservation Service (NRCS) standards (≈40%)

d. Step 4 - Cost Effectiveness Analysis

Aerobic Treatment Lagoon:

The following cost analysis demonstrates that the energy costs alone, not including any capital costs, causes complete aeration to exceed the District VOC cost effective threshold.

Energy Requirement for Complete Aeration

In order to effectively calculate the costs of this control option, the energy requirement for complete aeration must be determined. 1.5 to 2.5 pounds of oxygen is required to digest 1 pound of Biological Oxygen Demand (BOD_5) with additional oxygen required for conversion of ammonia to nitrate (nitrification).[23] It is generally accepted that at least twice the BOD should be provided for complete aeration.[24] According to Dr. Ruihong Zhang of the University of California, Davis, 2.4 lbs (1.1 kg) of oxygen (O_2) per cow must be provided each day for removal of BOD and an additional 3 lbs (1.4 kg) for oxidation of 70% of the nitrogen.[25] Based on the data gathered in a UC Davis study on aerator performance for wastewater lagoons, aeration efficiencies for mechanical aerators range from 0.10 to 0.68 kg of oxygen provided per kW-hr of energy utilized.[26] For this analysis it will be assumed that twice the BOD is required for complete aeration and that mechanical aerators will provide 1.0 kg of oxygen per kW-hr. This efficiency is very conservative since it is greater than the efficiency of the most efficient aerator tested in the UC Davis study (0.68 kg-O_2/kW-hr) and more than twice the efficiency of the most efficient aerator tested that had been installed in dairy lagoons (0.49 kg-O_2/kW-hr). Additionally, the efficiency tests were performed in clean water and lower aeration efficiencies are expected in liquid dairy manure that contains a significant amount of solids. The yearly energy requirement per cow is calculated as follows:

2 x (1.1 kg/cow-day) ÷ (1.0 kg/kW-hr) x (365 day/year) = 803 kW/cow-year

The total yearly energy requirement is calculated below. Based on animal units (AU), it is assumed that the BOD loading (and the energy requirement) for the dry cows will be 80% of that of the milk cows, the BOD loading from the support stock/large heifers will

[23] An Assessment of Technologies for Management and Treatment of Dairy Manure in California's San Joaquin Valley, December 2005, page 34 (http://www.arb.ca.gov/ag/caf/dairypnl/dmtfaprprt.pdf)
[24] See http://www.extension.org/faq/27574 and http://www.omafra.gov.on.ca/english/engineer/facts/04-033.htm
[25] An Assessment of Technologies for Management and Treatment of Dairy Manure in California's San Joaquin Valley, December 2005, page 35 (http://www.arb.ca.gov/ag/caf/dairypnl/dmtfaprprt.pdf)
[26] Aerator Performance for Wastewater Lagoon Application, September 2007, UC Davis, R.H. Zhang (http://asae.frymulti.com/abstract.asp?aid=23832&t=2)

be 73% of milk cows, and the BOD loading from the baby calves will be 21% of milk cows.[27]

The amount of electricity required for complete aeration of the lagoon system is calculated below.

Electricity Requirement for Complete Aeration of Lagoon System							
Type of Cow	**# of cows**	**x**	**kW-hr/mlk cow-yr**	**x**	**BOD Loading Factor**	**=**	**kW-hr/yr**
Milk Cow	4,750	x	803	x	1.0	=	3,814,250
Dry Cow	800	x	803	x	0.8	=	513,920
Support Stock/Large Heifers	1,900	x	803	x	0.73	=	1,113,761
Baby Calf (0- 3 months)	0	x	803	x	0.21	=	0
					Total (kW-hr/yr)		**5,441,931**

Cost of Electricity for Complete Aeration:

The cost for electricity will be based upon the average price for industrial electricity in California for June 2014, as taken from the Energy Information Administration (EIA) Website:
(http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_06_b).

Average Cost for electricity = $0.1103/kW-hr

The electricity costs for complete aeration are calculated as follows:

5,441,931 kW-hr/year x $0.1103/kW-hr = **$600,245/year**

VOC Emission Reductions for Complete Aeration

In addition to controlling 95% of the emissions from the lagoon/storage pond, complete aeration will also control 95% of the emissions from liquid manure land application as well. Therefore, these emissions reductions will also be included in the cost analysis.

The annual VOC Emission Reductions for the lagoon/storage pond and liquid manure land application unit are calculated as follows and shown in the tables below:

{[Number of cows] x [Uncontrolled Lagoon/Storage Pond VOC EF (lb/cow-year)] x [Complete Aeration Control Efficiency for Lagoon/Storage Pond]} + {[Number of cows] x [Uncontrolled Land application VOC EF (lb/cow-year)] x [Complete Aeration Control Efficiency for Land Application]}

[27] Animal Unit (AU) factors are taken from the California Regional Water Quality Control Board Central Valley Region Annual Report for Dairies Subject to Monitoring and Reporting (http://www.waterboards.ca.gov/centralvalley/available_documents/dairies/genorderwdrform.pdf)

Lagoon/Storage Pond VOC Reductions for Complete Aeration							
Type of Cow	**# of cows**	**x**	**Lagoon EF (lb/cow-yr)**	**x**	**Control (%)**	**=**	**lb-VOC/yr**
Milk Cow	4,750	x	1.3	x	95%	=	5,866
Dry Cow	800	x	0.71	x	95%	=	540
Support Stock/Large Heifers	1,900	x	0.54	x	95%	=	975
Baby Calf (0- 3 months)	0	x	0.10	x	95%	=	0
					Total (lb-VOC/yr)		**7,381**

Land Application VOC Reductions for Complete Aeration							
Type of Cow	**# of cows**	**x**	**Lagoon EF (lb/cow-yr)**	**x**	**Control (%)**	**=**	**lb-VOC/yr**
Milk Cow	4,750	x	1.4	x	95%	=	6,318
Dry Cow	800	x	0.76	x	95%	=	578
Support Stock/Large Heifers	1,900	x	0.58	x	95%	=	1,047
Baby Calf (0- 3 months)	0	x	0.11	x	95%	=	0
					Total (lb-VOC/yr)		**7,943**

Total VOC reductions from the lagoon/storage pond and land application for complete aeration = 7,381 lb-VOC/year + 7,943 lb-VOC/year = **15,324 lb-VOC/year**

Cost of VOC Emission Reductions

Cost of reductions = ($600,245/year)/[(15,324 lb-VOC/year)(1 ton/2000 lb)]
= **$78,341/ton of VOC reduced**

As shown above, the electricity cost alone for complete aeration of the proposed lagoon system would cause the cost of the VOC reductions to be greater than the $17,500/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. Therefore, this option is not cost effective and is being removed from consideration at this time.

Anaerobic Digester:

Pursuant to Section 5.3 of the Settlement Agreement (9/20/2004) between the District and the Western United Dairyman and the Alliance of Western Milk Producers Inc, installation of an anaerobic digester will only be required if this technology is proven effective in reducing emissions and is required by the final Dairy BACT Guideline.[9]

The applicant will be required to install an anaerobic digester if this technology is proven effective in reducing emissions and is required by the final Dairy BACT Guideline. Since, this option will be required if determined to be cost effective in accordance with the Settlement Agreement, a cost-effective analysis is not required. If an anaerobic digester is required in the final Dairy BACT Guideline, the applicant will be required to install the system in accordance with the timeframes and procedures established by the APCO in the final Dairy BACT Guideline.

Anaerobic Treatment Lagoon:

The applicant has proposed this option; therefore a cost-effective analysis is not required.

e. Step 5 - Select BACT

The facility is proposing a single-cell Anaerobic Treatment Lagoon designed according to National Resource Conservation Service (NRCS) Guidelines. Therefore, the BACT requirements are satisfied.

Additionally, District Rule 2201 defines BACT as including the most stringent emission limitation or control technique, including process and equipment changes, that have been found by the APCO to be cost effective and technologically feasible for such class or category of sources or for a specific source. The District has found that the basic mitigation measures required by District Rule 4570 are cost effective and technologically feasible for confined animal facilities and the applicant has proposed these options. Therefore, in addition to the BACT requirements determined in the Top-Down BACT Analysis above, implementation of the mitigation measures that the facility has selected to comply with Rule 4570 will also be required as part of BACT for VOC emissions from the lagoons/storage ponds.

2. BACT Analysis for NH_3 Emissions from the Lagoon/Storage Pond

a. Step 1 - Identify all control technologies

A cost effectiveness threshold has not been established for ammonia. Therefore, only options that meet the District's definition of Achieved-in-Practice controls will be considered for ammonia at this time. (Although these options must meet the District definition of Achieved-in-Practice, pursuant to the Settlement Agreement (9/20/2004) between the District and Western United Dairyman and Alliance of Western Milk Producers Inc[9], the District will not deem any control options Achieved-in-Practice until after the Dairy BACT Guideline has been established.)

The following practice has been identified as a possible control option for the NH_3 emissions from the lagoon/storage pond. No other control technologies that meet the definition of Achieved-in-Practice have been identified for the lagoon/storage pond.

1) Animals fed in accordance with National Research Council (NRC) or other District-approved guidelines

Description of Control Technologies

1) Animals fed in accordance with National Research Council (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, which will reduce ammonia emissions from the liquid manure in the lagoon/storage pond.

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

After eliminating the technologically infeasible options, the remaining options are ranked according to their control efficiency.

1) Animals fed in accordance with National Research Council (NRC) or other District-approved guidelines.

d. Step 4 - Cost Effectiveness Analysis

The applicant has proposed the only option listed; therefore a cost analysis is not required.

e. Step 5 - Select BACT

The facility is proposing to feed all animals in accordance with National Research Council (NRC) or other District-approved guidelines, which satisfies the BACT requirements.

V. Top-Down BACT Analysis for the Liquid Manure Handling System – Liquid Manure Land Application (C-5502-3)

1. BACT Analysis for VOC Emissions from Liquid Manure Land Application:

a. Step 1 - Identify all control technologies

Since, specific control efficiencies have not been identified in the literature for VOC emissions from dairy lagoons and storage ponds, the control efficiencies listed are based on the control efficiencies of similar processes and engineering judgment.

The following options were identified as possible controls for VOC emissions from the Lagoon/Storage Pond:

1) Aerobic Treatment Lagoon – mechanical aeration to achieve a dissolved oxygen concentration of 2.0 mg/L (≈95%)
2) Anaerobic Treatment Lagoon designed to meet Natural Resources Conservation Service (NRCS) standards (≈40%)
3) Injection of Liquid and Slurry Manure (≈50%)

Description of Control Technologies

1) Aerobic Treatment Lagoon – mechanical aeration to achieve a dissolved oxygen concentration of 2.0 mg/L

An aerobic treatment 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. Because these compounds would be removed from the liquid manure, emissions from liquid manure land application would also be eliminated.

Sufficient oxygen must be provided to sustain the aerobic microorganisms in completely aerated lagoons. Lagoons can be considered completely aerobic if sufficient oxygen is provided to achieve a dissolved oxygen (DO) content of 2.0 mg/L or more. Oxygen is typically provided by mechanical aerators. These aerators 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) content of the liquid manure is 2.0 mg/L or more. A major disadvantage of completely aerated lagoons is the enormous cost of the energy required to run the aerators continuously. Because of this, it has been determined that completely aerated lagoons are not cost effective options for dairy facilities at the present time.

2) 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_4), carbon dioxide (CO_2), and water rather than intermediate metabolites (VOCs). The National Resource Conservation Service (NRCS) California Field Office Technical Guide Code 359 - Waste Treatment Lagoon specifies criteria for the design of anaerobic treatment lagoons. 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.

3) Injection of Liquid and Slurry Manure

Liquid and slurry manure is used to irrigate crops on land farmed by dairies. Manure can either be injected into the soil or left on the surface of the soil and allowed to soak in. Because the liquid and slurry manure is high in Nitrogen, Phosphorus, and Potassium (N-P-K), it supplies nutrients needed by crops. Dairies have nutrient management programs to regulate the amount of liquid and slurry manure applied to cropland. This program is used to balance the specific nutrients applied to the crops, such as nitrogen, with the amount of nutrients that the crops can utilize. Balancing the needs of the crop with what is supplied helps to minimize contamination of ground water. During the process of liquid and slurry manure application to the crops VOC and NH_3 are emitted. Injecting manure hinders volatilization and speeds the uptake of nutrients that would degrade into gaseous pollutants. It is estimated that injection of manure will reduce VOC emissions from land application of manure by 50%.

The manure can only be injected during the time when the crop is not fully mature. This is because a tractor must be used to pull a cultivator with the liquid and slurry manure shanks. Once the crop is planted and grown to a certain height, it is no longer feasible for the tractor to get into the field due to the potential of damaging the crop. Ron Prong of Till-Tech Systems states that his company's liquid and slurry manure injection system can be used up to four weeks after planting of the crops without causing damage. Therefore, injection of slurry manure can only be required until the crops become so tall that damage will occur.

b. Step 2 - Eliminate technologically infeasible options

Option 3 - Injection of Liquid and Slurry Manure

The Dairy Permitting Advisory Group (DPAG) found that injection of flushed manure was not be a feasible BACT option in their report of BACT options for dairies in the San Joaquin Valley.[28]

Injection is typically restricted to slurry manure that has been vacuumed from the cow housing or that has been removed from settling basins and/or weeping walls. Injection of flushed liquid manure from the lagoons is not considered feasible because the additional water from flushing increases the amount of liquid that must be transported by the trucks or honeywagons, which will generate more emissions from the trucks, which may be older models with higher emissions. Because of the added time and expense, injection is not used for flushed liquid manure; therefore, this option will be removed from consideration at this time.

c. Step 3 - Rank remaining options by control effectiveness

After eliminating the technologically infeasible options, the remaining options are ranked according to their control efficiency.

1) Aerobic Treatment Lagoon – mechanical aeration to achieve a dissolved oxygen concentration of 2.0 mg/L (≈95%)
2) Anaerobic Treatment Lagoon designed to meet Natural Resources Conservation Service (NRCS) standards (≈40%)

d. Step 4 - Cost Effectiveness Analysis

Aerobic Treatment Lagoon:

The preceding cost analysis performed for the BACT analysis for VOC emissions from the lagoon/storage pond demonstrated that the energy costs alone, not including any capital costs, caused complete aeration to exceed the District VOC cost effective threshold. This analysis included VOC reductions from liquid manure land application as well as the lagoon/storage pond since complete aeration reduces emissions from both emissions units. Therefore, no further cost analysis is required for complete aeration.

Anaerobic Treatment Lagoon:

The applicant has proposed this option; therefore a cost-effective analysis is not required.

[28] Page 150 of the Final DPAG Report - "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)

e. Step 5 - Select BACT

The facility is proposing a single-cell Anaerobic Treatment Lagoon designed according to National Resource Conservation Service (NRCS) Guidelines. Therefore, the BACT requirements are satisfied.

Additionally, District Rule 2201 defines BACT as including the most stringent emission limitation or control technique, including process and equipment changes, that have been found by the APCO to be cost effective and technologically feasible for such class or category of sources or for a specific source. The District has found that the basic mitigation measures required by District Rule 4570 are cost effective and technologically feasible for confined animal facilities and the applicant has proposed these options. Therefore, in addition to the BACT requirements determined in the Top-Down BACT Analysis above, implementation of the mitigation measures that the facility has selected to comply with Rule 4570 will also be required as part of BACT for VOC emissions from liquid manure land application.

2. BACT Analysis for NH_3 Emissions from the Liquid Manure Land Application

a. Step 1 - Identify all control technologies

A cost effectiveness threshold has not been established for ammonia. Therefore, only options that meet the District's definition of Achieved-in-Practice controls will be considered for ammonia at this time. (Although these options must meet the District definition of Achieved-in-Practice, pursuant to the Settlement Agreement (9/20/2004) between the District and Western United Dairyman and Alliance of Western Milk Producers Inc[9], the District will not deem any control options Achieved-in-Practice until after the Dairy BACT Guideline has been established.)

The following practice has been identified as a possible control option for the NH_3 emissions from the liquid manure land application. No other control technologies that meet the definition of Achieved-in-Practice have been identified for liquid manure land application.

1) Animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.

Description of Control Technologies

1) Animals fed in accordance with National Research Council (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, 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

After eliminating the technologically infeasible options, the remaining options are ranked according to their control efficiency.

1) Animals fed in accordance with National Research Council (NRC) or other District-approved guidelines.

d. Step 4 - Cost Effectiveness Analysis

The applicant has proposed the only option listed; therefore a cost analysis is not required.

e. Step 5 - Select BACT

The facility is proposing to feed all animals in accordance with National Research Council (NRC) or other District-approved guidelines.

VI. Top Down BACT Analysis for the Feed Storage and Handling System – Total Mixed Ration (TMR) (C-5502-6)

1. BACT Analysis for VOC Emissions

a. Step 1 - Identify all control technologies

Since specific VOC emissions control efficiencies have not been identified in the literature for dairy TMR, the control efficiencies will be estimated based on the control efficiencies of similar processes and engineering judgment.

The following options were identified as possible controls for VOC emissions from the Total Mixed Ration (TMR) (Feed Handling and Storage permit)

1) Enclosed Buildings for Animals and TMR with Emissions Vented to a Control Device (e.g. incinerator, biofilter, e.g) (≈64-72%; 80% Capture and 80-90% Control of emissions from cow housing and total mixed ration (TMR) feed placed in the cow housing unit)

2) Rule 4570 Management Practices for TMR

Description of Control Technologies

1) Enclosed Buildings for Animals and TMR with Emissions Vented to a Control Device

Total Mixed Ration (TMR) refers to feed (primarily silage with grains, oils, minerals, and other additives) that has been mixed to meet the nutritional needs of dairy animals and placed in the feeding areas of the cow housing unit for consumption by the cattle. Because the TMR is placed in the cow housing areas, if emissions from enclosed freestall barns could be captured and vented to a control device, emissions from the TMR could also be controlled.

Description of Dairy Housing

In a freestall barn, cows are grouped in large pens with free access to feed bunks, water, and stalls for resting. In the mild climate of the San Joaquin Valley, the typical freestall barn is an open structure (roof but no sides). The primary freestall design consists of a roof that provides shade with all sides open to allow air to flow through, which keeps the cows cool. The open freestall barns take advantage of natural summer winds in the San Joaquin Valley that are generally greater than four mph. The natural winds result in an excellent summer ventilation rate that is equivalent to 1,000 cfm per cow more, which is why open dairy barns are generally recommended in the San Joaquin Valley. In colder climates enclosed or partially enclosed barns may be utilized to protect cows from winter extremes. However, no completely enclosed freestall barns that were installed at a California dairy were identified.

Although the potential to enclose cows and TMR in a barn may exist, the feasibility of reasonably collecting the gas through a stack, chimney, or vent remains in question considering the extremely large amounts of airflow going through the barns needed to keep the cows cool. The airflow requirements would be even higher in the San Joaquin valley, where temperatures can exceed 110° F in the hot summer. If the barn exhaust can be properly captured it may be possible to vent it to a VOC control device. It is estimated that up to 80% of the gases emitted from enclosed freestall barns can be captured by the mechanical ventilation system and sent to a control device, such as an incinerator or biofilter.

Thermal incineration is a well-established VOC control technique. During combustion, gaseous hydrocarbons are oxidized to form CO_2 and water. In addition to the difficulty of capturing all of the gases in a freestall barn, a disadvantage of thermal incineration is that when concentrations of combustible VOCs in the gas stream are very low very large amounts of supplemental fuel must be used to sufficiently increase the temperature of all of the ventilation air in order to incinerate these VOCs. This generally renders incineration cost prohibitive for large flows of dilute VOCs, such as in the ventilation air from a freestall barn. Because of this biofilters have generally been found to be more cost-effective for handling dilute streams of biodegradable VOCs. 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 microorganisms oxidize the gaseous organic contaminants, ammonia, and sulfur compounds in the exhaust air resulting in carbon dioxide, nitrogen, water, salt, and biomass. Additional information on biofiltration is given above in the analysis for the cow housing permit unit for enclosed freestall barns vented to a control device. One of the disadvantages related to the use of a biofilter to control emissions from enclosed livestock barns is the large space requirement for the traditional biofilter design. To illustrate this, a low-cost natural bed biofilter designed to treat the VOC emissions from 1,000 milk cows and 180 dry cows with no support stock would cover more than 5.4 acres and would need to be maintained free of pests and approved by the appropriate permitting agencies. To avoid such expansive land requirements, the dairy would likely need to use much more expensive bio-trickling filters or bio-scrubbers.

Although many questions remain about the feasibility of requiring animals and TMR to be confined in buildings and capturing the exhaust gas and venting it to a control device, it will be considered for purposes of this analysis.

2) Rule 4570 Management Practices for 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 mooisture content, which reduces VOCs since most of the compounds emitted are higly soluable in water. More details about these management practices are included in the District document Final Staff Report – Revised Proposed Amendments to Rule 4570 (Confined Animal Facilities), dated October 21, 2010.

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

After eliminating the technologically infeasible options, the remaining options are ranked according to their control efficiency.

1) Enclosed Buildings for Animals and TMR with Emissions Vented to a Control Device (e.g. incinerator, biofilter, e.g) (≈64-72%; 80% Capture and 80-90% Control of emissions from cow housing and total mixed ration (TMR) feed placed in the cow housing unit)

2) Rule 4570 Management Practices for TMR

d. Step 4 - Cost Effectiveness Analysis

Enclosed Freestall Barns Vented to a Control Device (Biofilter)

The preceding cost analysis performed for the BACT analysis for VOC emissions from the cow housing permit demonstrated that this option exceeded the District VOC cost effective threshold by a significant amount. This analysis included VOC reductions from Total Mixed Ration (TMR) as well as the cow housing since enclosed freestall barns vented to a control device would control emissions from both sources because the TMR is placed in the cow housing areas to feed the cows. Therefore, no further cost analysis is required for enclosed freestall barns to control emissions from TMR.

Rule 4570 Management Practices for TMR:

This option is achieved in practice; therefore a cost analysis is not required.

e. Step 5 - Select BACT

The facility is proposing to implement the management practices required by District Rule 4570 to reduce VOC emissions from the TMR, which satisfies the BACT requirements.

APPENDIX G

Summary of Health Risk Assessment (HRA) and Ambient Air Quality Analysis (AAQA)

San Joaquin Valley Air Pollution Control District
Risk Management Review

To:	Ramon Norman – Permit Services
From:	Kyle Melching – Technical Services
Date:	August 28, 2014
Facility Name:	Fagundes Dairy
Location:	23732 Rd. 12, Chowchilla
Application #(s):	C-5502-1-3, 2-2, 3-2, & 4-2
Project #:	C-1101179

A. RMR SUMMARY

RMR Summary						
Categories	**Dairy Milking Parlor (Unit 1-3)**	**Dairy Cow Housing (Unit 2-2)**	**Dairy Lagoons (Unit 3-2)**	**Solid Manure (Unit 4-2)**	**Project Totals**	**Facility Totals**
Prioritization Score	0.34	16.64	**13.56**	**0.19**	30.54	>1
Acute Hazard Index	0.00	0.65	0.14	0.01	0.8	0.8
Chronic Hazard Index	0.00	0.13	0.02	0.00	0.15	0.15
Maximum Individual Cancer Risk	**2.56E-08**	**1.21E-06**	**2.86E-06**	**N/A[1]**	4.1E-06	4.79E-06
T-BACT Required?	**No**	**Yes/No***	**Yes-VOCs**	**No**		
Special Permit Conditions?	**No**	**No**	**No**	**No**		

*TBACT is determined on a corral by corral basis. TBACT will be addressed in the Conclusions section of this report.
[1]The is no REL value associated with the HAP for this unit.

B. RMR REPORT

I. Project Description

Technical Services performed a Risk Management Review (RMR) and Ambient Air Quality Analysis (AAQA)for modifications to an existing dairy which is proposing to install new corrals. The new corrals will accommodate 2,510 total head. The table in Section II: Analysis, identifies the emission increases reviewed for the proposed project.

II. Analysis

Technical Services performed prioritizations using the District's HEARTs database. Emissions calculated using District-developed spreadsheets for dairies were input into the HEARTs database. In accordance with the District's *Risk Management Policy for Permitting New and Modified Sources* (APR 1905-1, March 2, 2001), risks from the proposed project were prioritized using the procedures in the 1990 CAPCOA Facility Prioritization Guidelines and incorporated in the District's HEART's database. The facility's prioritization score was above one; therefore, a refined health risk assessment was required and performed for each

unit. AERMOD was used, with area source parameters and meteorological data from Stockton to determine maximum dispersion factors at the nearest on-site residential and off-site business receptors. These dispersion factors were input into the HARP model to calculate the chronic and acute hazard indices and the carcinogenic risk for each unit.

Post-Project Emissions (Modeled Increases)

		PM10		NH3	
Emissions Unit		lb/hr	lb/yr	lb/hr	lb/yr
Milk barns	1,750*	0.000	0	0.038	333
Liquid manure storage	2,510*	0.000	0	1.52	13,284
Land application	0	0.000	0	5.05	44,230
Solid manure storage	0	0.000	0	0.25	2,159
Cow Housing & TMR	**# of Cows**				
Corral 1 thru 7 (Each)	130*	0.11	962	0.21	1,820
Corral 8 thru 15 (Each)	200*	0.09	774	1.22	10,660

*Used to calculate VOC emissions

Technical Services also performed Ambient Air Quality Analysis for Unit 2-2 (Cow Housing). The modeling was performed for the criteria pollutants PM_{10} using AERMOD. The emission rate used was 1,998 lb PM_{10}/year. The results from the Criteria Pollutant Modeling are as follows:

PM_{10} Pollutant Modeling Results
Values are in $\mu g/m^3$

Category PM_{10}	24 Hours	Annual
Proposed Dairy Increase	4.34	1.03
Interim Significance Level	10.4[1]	2.08[2]
Result	Pass	Pass

[1]The District has decided on an interim basis to use a threshold for fugitive dust sources of 10.4 $\mu g/m^3$ for the 24-hour average concentration.
[21]The District has decided on an interim basis to use a threshold for fugitive dust sources of 2.08 $\mu g/m^3$ for the Annual average concentration.

III. Conclusions

The ambient air quality impacts at the dairy do not exceed the District's 24-hour or Annual interim threshold for fugitive dust sources or cause/contribute significantly to a violation of the State or National AAQS.

Unit 1-3

The acute and chronic indices are below 1.0; and the maximum individual cancer risk associated with the unit is **2.56E-08**, which is less than the 1 in a million threshold. In accordance with the District's Risk Management Policy, the unit is approved **without** Toxic Best Available Control Technology (T-BACT).

Unit 2-2

Cow Housing #	***Cancer Risk***	***T-BACT***
1	7.55E-08	No
2	6.84E-08	No
3	6.96E-08	No
4	6.36E-08	No
5	5.62E-08	No
6	4.98E-08	No
7	4.75E-08	No
8	1.03E-07	No
9	9.30E-08	No
10	7.64E-08	No
11	6.38E-08	No
12	1.42E-07	No
13	1.17E-07	No
14	9.86E-08	No
15	7.88E-08	No
Total	1.17E06	

Cow Housings 1-15

The acute and chronic indices are below 1.0; and the maximum individual cancer risk associated with each corral is below 1 in a million. In accordance with the District's Risk Management Policy, each corral is approved **without** Toxic Best Available Control Technology (T-BACT).

Unit 3-1

The acute and chronic indices are below 1.0; and the maximum individual cancer risk associated with the unit is **2.86E-07**, which is greater than the 1 in a million threshold. In accordance with the District's Risk Management Policy, the unit is approved **with** Toxic Best Available Control Technology (T-BACT) for VOC's.

Unit 4-1

The acute and chronic indices are below 1.0; and there is no maximum individual cancer risk associated with the unit. In accordance with the District's Risk Management Policy, the unit is approved **without** Toxic Best Available Control Technology (T-BACT).

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.

IV. Attachments

A. RMR request from the project engineer
B. Additional information from the applicant/project engineer
C. Dairy Spreadsheets
D. Prioritization score w toxic emissions summary
E. HARP Risk Report
F. Facility Summary
G. AAQA Summary

APPENDIX H
Draft ATCs (C-5502-1-3, -2-2, -3-2, -4-2, & -6-1)

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: C-5502-1-3 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: FAGUNDES DAIRY
MAILING ADDRESS: 11158 AVENUE 24
CHOWCHILLA, CA 93610

LOCATION: 23732 ROAD 12
CHOWCHILLA, CA 93610

EQUIPMENT DESCRIPTION:
MODIFICATION OF 3000 COW MILKING OPERATION WITH ONE DOUBLE-40 PARALLEL (80 STALLS) MILKING BARN AND ONE DOUBLE-16 (32 STALLS) PARALLEL HOSPITAL MILKING PARLOR: INCREASE MILK COWS TO 4,750

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. {4035} If a licensed veterinarian, a certified nutritionist, the California Department of Food and Agriculture (CDFA), or the United States Department of Agriculture (USDA) determines that any VOC mitigation measure (with a Rule 4570 reference) is detrimental to animal health and needs to be suspended, the Permittee 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 2201 and Rule 4570]
4. Permittee shall flush or hose down milk parlors immediately after or during each milking. [District Rules 2201 and 4570]
5. Permittee shall provide verification that milk parlors are flushed or hosed down immediately after or during each milking. [District Rules 2201 and 4570]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (559) 230-5950 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.

Seyed Sadredin, Executive Director / APCO

DRAFT

Arnaud Marjollet, Director of Permit Services
C-5502-1-3 : Sep 12 2014 11:16AM -- NORMANR : Joint Inspection NOT Required

6. {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 Rule 4570]

7. {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]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: C-5502-2-2 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: FAGUNDES DAIRY
MAILING ADDRESS: 11158 AVENUE 24
CHOWCHILLA, CA 93610

LOCATION: 23732 ROAD 12
CHOWCHILLA, CA 93610

EQUIPMENT DESCRIPTION:
MODIFICATION OF COW HOUSING - 3,000 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 4,000 MATURE COWS (MILK AND DRY); 2,000 TOTAL SUPPORT STOCK (HEIFERS, CALVES AND BULLS); AND ONE FREESTALL WITH FLUSH SYSTEM: INCREASE DAIRY HERD TO 4,750 MILK COWS, NOT TO EXCEED A COMBINED TOTAL OF 5,550 MATURE COWS (MILK AND DRY); AND 1,900 SUPPORT STOCK

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. {4035} If a licensed veterinarian, a certified nutritionist, the California Department of Food and Agriculture (CDFA), or the United States Department of Agriculture (USDA) determines that any VOC mitigation measure (with a Rule 4570 reference) is detrimental to animal health and needs to be suspended, the Permittee 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 2201 and Rule 4570]
4. The total number of cattle housed at the dairy at any one time shall not exceed any of the following limits: 4,750 milk cows, not to exceed a combined total of 5,550 mature cows (milk cows and dry cows); and 1,900 total support stock (heifers and bulls). [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (559) 230-5950 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.

Seyed Sadredin, Executive Director / APCO

DRAFT

Arnaud Marjollet, Director of Permit Services
C-5502-2-2 : Sep 12 2014 11:18AM -- NORMANR : Joint Inspection NOT Required

5. This dairy may house calves onsite provided that the total combined number of support stock and calves does not exceed the limit for support stock given in this permit and there is no increase in the number or area of the corrals or calf hutches. [District Rule 2201]
6. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 2201]
7. 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 Rule 2201]
8. Permittee shall pave feedlanes 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]
9. {4489} Permittee shall flush or scrape freestall flush lanes at least three (3) times per day. [District Rule 4570]
10. {4490} Permittee shall keep records or maintain an operating plan that requires freestall flush lanes to be flushed or scraped at least three times per day. [District Rule 4570]
11. {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 Rule 4570]
12. {4493} Permittee shall record the date that manure that is not dry is removed from individual cow freestall beds or raked, harrowed, scraped, or freestall bedding is graded at least once every seven (7) days. [District Rule 4570]
13. For open corrals at the dairy located north of Latitude 37.09642 N (identified by the Facility as Pens # 31-45), the feed lanes and walkways in the corrals that house milk cows and dry cows shall be flushed at least four times per day and the feed lanes and walkways in the corrals for the support stock (heifers) shall be flushed at least once per day. [District Rule 2201]
14. Permittee shall maintain records sufficient to demonstrate that for open corrals at the dairy located north of Latitude 37.09642 N (identified by the Facility as Pens # 31-45), the feed lanes and walkways in the corrals that house milk cows and dry cows are flushed at least four times per day and that the feed lanes and walkways for the support stock (heifers) are flushed at least once per day. [District Rule 2201]
15. Permittee shall clean concreted lanes such that the depth of manure does not exceed twelve (12) inches at any point or time. [District Rules 2201 and 4570]
16. Permittee shall measure and document the depth of manure on the concrete lanes at least once every ninety (90) days. [District Rules 2201 and 4570]
17. The open corrals at this dairy that are located north of Latitude 37.09642 N (identified by the Facility as Pens # 31-45) shall be equipped with shade structures. [District Rule 2201]
18. {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 Rule 4570]
19. {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 Rule 4570]
20. The open corrals at this dairy that are located north of Latitude 37.09642 N (identified by the Facility as Pens # 31-45) shall be scraped every two weeks using a pull-type scraper in the morning hours, except when this is prevented by wet conditions. [District Rule 2201]
21. For heifers housed in open corrals at the dairy that are located north of Latitude 37.09642 N (identified by the Facility as Pens # 31-45), at least one of the feedings of the heifers shall be near dusk (within one hour of dusk). [District Rule2201]

CONDITIONS CONTINUE ON NEXT PAGE

22. 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]

23. Permittee shall record the date that manure 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]

24. 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]

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

26. Clean rainfall runoff shall be diverted around exercise pens to reduce the amount of water that is potentially detained on the corral and exercise pen surfaces. [District Rule 2201]

27. Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rules 2201 and 4570]

28. 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]

29. Permittee shall knockdown fence line manure build-up prior to it exceeding a height of twelve (12) inches at any time or point. 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]

30. Permittee shall measure and document the depth of manure at the fence line at least once every ninety (90) days. [District Rules 2201 and 4570]

31. The permittee shall maintain records of: (1) an operating plan with the number of times lanes and walkways are flushed per day; (2) the frequency of scraping and manure removal from corral surfaces; and (3) a schedule listing the times when heifers housed in open corrals at the dairy located north of Latitude 37.09642 N are fed near dusk. [District Rules 1070 and 2201]

32. 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]

33. {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 Rule 4570]

34. {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]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: C-5502-3-2 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: FAGUNDES DAIRY
MAILING ADDRESS: 11158 AVENUE 24
CHOWCHILLA, CA 93610

LOCATION: 23732 ROAD 12
CHOWCHILLA, CA 93610

EQUIPMENT DESCRIPTION:
MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF 4 STORAGE PONDS (530'X150'X18', 530'X150'X18', 530'X150'X18', 900'X150'X18'). MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION: INCREASE HERD SIZE TO 4,750 MILK COWS, 800 DRY COWS, AND 1,900 SUPPORT STOCK

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. {4035} If a licensed veterinarian, a certified nutritionist, the California Department of Food and Agriculture (CDFA), or the United States Department of Agriculture (USDA) determines that any VOC mitigation measure (with a Rule 4570 reference) is detrimental to animal health and needs to be suspended, the Permittee 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 2201 and Rule 4570]
4. The liquid manure handling system shall handle flush manure from no more than 4,750 milk cows, not to exceed a combined total of 5,550 mature cows (milk cows and dry cows); and 1,900 total support stock (heifers and bulls). [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (559) 230-5950 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.

Seyed Sadredin, Executive Director / APCO

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5. Liquid manure shall be treated in an anaerobic treatment lagoon system with anaerobic treatment lagoon(s) designed and operated in accordance with National Resource Conservation Service (NRCS) California Field Office Technical Guide Code 359 - Waste Treatment Lagoon. [District Rules 2201 and 4102]
6. Permittee shall maintain records of design specifications and calculations, including Minimum Treatment Volume (MTV) and Hydraulic Retention Time (HRT), for the Anaerobic Treatment Lagoon system in order to demonstrate that the system has been designed and is operating in accordance with the applicable National Resource Conservation Service (NRCS) technical guide. [District Rule 2201]
7. To maintain the required minimum treatment volume, the minimum liquid depth in the anaerobic treatment lagoon shall be at least 6 ft at maximum drawdown, unless a different minimum depth is approved in writing by the District and NRCS. Markers shall be installed in the treatment lagoon to indicate the maximum operating level and the maximum drawdown level. [District Rule 2201]
8. Only liquid manure that has been treated in an anaerobic treatment lagoon shall be applied to cropland. [District Rule 2201]
9. Permittee shall maintain records that only liquid manure treated with an anaerobic treatment lagoon is applied to fields. [District Rule 2201]
10. Liquid manure from the storage pond shall be mixed with irrigation water at a ratio in compliance with the facility nutrient management plan and applied to cropland at agronomic rates in accordance with the requirements of Regional Water Quality Control Board. [District Rule 2201]
11. {4539} Permittee shall maintain lagoon pH between 6.5 and 7.5. [District Rule 4570]
12. {4540} Permittee shall record and test lagoons for pH no later than six (6) months after the required date for implementation of the measure, and at least once every calendar quarter, with at least 30 days between monitoring tests thereafter unless the APCO, ARB, and EPA determines more frequent testing is required to demonstrate compliance with rule requirements. [District Rule 4570]
13. Permittee shall not allow liquid manure to stand in the fields for more than twenty-four (24) hours after irrigation. [District Rules 2201 and 4570]
14. Permittee shall maintain records to demonstrate liquid manure did not stand in the fields for more than twenty-four (24) hours after irrigation. [District Rules 2201 and 4570]
15. 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]
16. Installation of an anaerobic digester may be required for this operation contingent upon the final Dairy BACT Guideline. If the final Dairy BACT Guideline requires the installation of an an anaerobic digester for this operation, the permittee shall install the system in accordance with the timeframes and procedures established by the APCO. [District Rule 2201]
17. {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]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: C-5502-4-2 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: FAGUNDES DAIRY
MAILING ADDRESS: 11158 AVENUE 24
CHOWCHILLA, CA 93610

LOCATION: 23732 ROAD 12
CHOWCHILLA, CA 93610

EQUIPMENT DESCRIPTION:
MODIFICATION OF SOLID MANURE HANDLING CONSISTING OF OPEN MANURE STOCK PILES WITH SOLID MANURE APPLICATION TO LAND: INCREASE HERD SIZE TO 4,750 MILK COWS, 800 DRY COWS, AND 1,900 SUPPORT STOCK

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. {4035} If a licensed veterinarian, a certified nutritionist, the California Department of Food and Agriculture (CDFA), or the United States Department of Agriculture (USDA) determines that any VOC mitigation measure (with a Rule 4570 reference) is detrimental to animal health and needs to be suspended, the Permittee 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 2201 and Rule 4570]
4. 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]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (559) 230-5950 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.

Seyed Sadredin, Executive Director / APCO

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5. 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]
6. 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]
7. Dry manure (less than 50% moisture by weight) shall not be applied to fields when wind speeds exceed 10 miles per hour. [District Rule 2201]
8. Solid manure applied to fields shall be incorporated into the soil within two hours after application. [District Rules 2201 and 4570]
9. Permittee shall maintain records to demonstrate that all solid manure has been incorporated within two hours after land application. [District Rules 2201 and 4570]
10. {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 Rule 4570]
11. {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]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: C-5502-6-1 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: FAGUNDES DAIRY
MAILING ADDRESS: 11158 AVENUE 24
CHOWCHILLA, CA 93610

LOCATION: 23732 ROAD 12
CHOWCHILLA, CA 93610

EQUIPMENT DESCRIPTION:
MODIFICATION OF FEED STORAGE AND HANDLING CONSISTING OF COMMODITY BARNS AND SILAGE PILES: INCREASE HERD SIZE TO 4,750 MILK COWS, 800 DRY COWS, AND 1,900 SUPPORT STOCK

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. {4035} If a licensed veterinarian, a certified nutritionist, the California Department of Food and Agriculture (CDFA), or the United States Department of Agriculture (USDA) determines that any VOC mitigation measure (with a Rule 4570 reference) is detrimental to animal health and needs to be suspended, the Permittee 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 2201 and Rule 4570]
4. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (559) 230-5950 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.

Seyed Sadredin, Executive Director / APCO

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5. 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]
6. 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]
7. Permittee shall maintain an operating plan/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]
8. Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
9. Permittee shall maintain an operating plan/record of when feeding of total mixed rations began within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
10. Permittee shall store grain in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]
11. 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]
12. Permittee shall remove uneaten wet feed from feed bunks within twenty-four (24) hours after the end of a rain event. [District Rules 2201 and 4570]
13. Permittee shall maintain records demonstrating that uneaten wet feed was removed from feed bunks within twenty-four (24) hours after the end of a rain event. [District Rules 2201 and 4570]
14. {4468} For bagged silage/feedstuff, permittee shall utilize a sealed feed storage system (e.g., ag bag). [District Rule 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. {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 Rule 4570]
18. {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 Rule 4570]
19. {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 Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

20. {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 Rule 4570]

21. {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 Rule 4570]

22. {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 Rule 4570]

23. {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 Rule 4570]

24. {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 Rule 4570]

25. {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 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 Rule 4570]

26. {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 Rule 4570]

27. {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 Rule 4570]

28. {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 Rule 4570]

29. {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 manufacturers instructions for application of the additive. [District Rule 4570]

30. {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 Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

31. {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]