San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

SEP - 7 2018

David Godinho
Godinho Dairy, LP
12710 S. Wilson Road
Los Banos, CA 93635

Re: Notice of Preliminary Decision - Authority to Construct
Facility Number: N-6094
Project Number: N-1163277

Dear Mr. Godinho:

Enclosed for your review and comment is the District's analysis of Godinho Dairy, LP's application for an Authority to Construct for the expansion of an existing dairy operation to increase maximum herd capacity from 2,500 combined milk and dry cows to 4,700 combined milk and dry cows; including the construction of new cow housing units and a new milking parlor, at 12710 Wilson Road, Los Banos, 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. Rupi Gill of Permit Services at (209) 557-6458.

Sincerely,

Arnaud Marjollet
Director of Permit Services

AM:rg

Enclosures

cc: Tung Le, CARB (w/ enclosure) via email

Samir Sheikh
Executive Director/Air Pollution Control Officer

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San Joaquin Valley Air Pollution Control District
Authority to Construct Application Review
(Addition of New Cow Housing, rotary milking barn and Increase Herd Size)

Facility Name:	Godinho Dairy, LP	Date:	August 1, 2018
Mailing Address:	12710 S. Wilson Road	Engineer:	Rupi Gill
	Los Banos, CA 93635	Lead Engineer:	Nick Peirce
Contact Person:	Devin Godinho		
Telephone:	(209) 826-2517		
Application #s:	N-6094-1-3, -2-3, -3-3 -4-3, & -7-2		
Project #:	N-1163277		
Deemed Complete:	February 01, 2018		

I. Proposal

Godinho Dairy has requested Authority to Construct (ATC) permits for the following changes at the existing dairy:

- Increase herd size from 2,132 milk cows and 2,500 mature cows (milk and dry) to 4,000 milk cows and 4,700 mature cows (milk and dry)
- Construct two new freestall barns to house milking cows
- Extension of an existing freestall barn and designate the extended area as a separate freestall barn to house milking cows
- Extend three existing shaded barns and designate them as shade barns (#4, #5, & #6) to house dry cows.
- Install a new rotary 80 stall milking parlor
- Remove the existing 10 stall hospital milking parlor
- Relocate the hospital milking parlor to the existing herringbone parlor with 60 stalls.
- Relocate existing commodity barns

	Milk Cows	Dry Cows	Mature Cows
Current	2,132	368	2,500
Proposed	4,000	700	4,700
Change	1,868	332	2,200

The draft ATC permits for the proposed project are included in Appendix A. A project site plan showing the proposed facility is included in Appendix C and the current permits are shown in the Appendix B.

II. Applicable Rules

Rule 1070	Inspections (12/17/92)
Rule 2010	Permits Required (12/17/92)
Rule 2201	New and Modified Stationary Source Review Rule (2/18/16)
Rule 2410	Prevention of Significant Deterioration (6/16/11)
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 (10/21/10)
CH&SC §41700	Health Risk Assessment
CH&SC §42301.6	School Notice

Public Resources Code 21000-21177: California Environmental Quality Act (CEQA)
California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000-15387: CEQA Guidelines

III. Project Location

The proposed dairy is located at 12710 Wilson Road, Los Banos, CA. The proposed site is not within 1,000 feet of the outer boundaries of any K-12 schools. The public notification requirement of California Health and Safety Code §42301.6 is therefore not applicable to this project.

IV. Process Description

The primary function of the proposed facility will be the production of dairy milk, which is used to make various food products, such as fluid milk,[1] butter, cheese, ice cream, and yogurt. Production of milk requires a herd of mature dairy cows that are lactating (milk cows). A cow's lactation cycle starts shortly after calving and lasts for approximately 12 months. Typically, a 10-month lactation period is followed by a 2-month non-lactation (dry cow) period, during which the cow prepares to calve again and begin a new lactation cycle. After the first few lactation cycles, the cow's milk yield is expected to decline steadily with each subsequent cycle.

Female calves are retained in the herd while the male calves are sold off for meat production or other purposes. The calves take approximately 15 to 24 months to reach reproductive maturity, at which point they enter the milk production stream as bred heifers. Thus, in addition to the mature cows (milk and dry), a typical dairy herd also includes a certain proportion of calves and heifers at various stages of development (support stock). Mature cows that are culled from the herd (primarily due to diminishing milk yield, but also due to injury, disease, or other reasons) are replaced by the bred heifers entering the milk production stream. The

[1] Milk that has been processed in various ways (e.g. pasteurization, homogenization, fortification, etc.) and is intended to be consumed primarily as a beverage.

support stock may also include a certain number of mature bulls for breeding purposes, although this is not common due to the prevalent use of artificial insemination.

The primary functions involved in the day to day operation of a dairy include housing and feeding the herd, milking, and management of manure. These functions are described in more detail in the following sections:

A. Milking Operation (N-6094-1):

Milking is a dairy's primary income generating activity. The lactating cows are milked two to four times per day. The milk is chilled and temporarily stored in onsite tanks until it is collected by tanker truck for delivery to a creamery. A purpose-built structure known as the milking barn is used for milking and the associated onsite milk handling activities. The milking barn is located in proximity to, but separate from the lactating cow housing areas. It is designed to facilitate efficient in-and-out movement of groups of cows being milked; and also to allow workers access to individual cows during milking. The first part of the milking barn, known as the holding area, is an open-sided roofed space where cows that are ready for milking are temporarily confined as they enter the milking parlor. The milking occurs in the milking parlor within the barn. There are several different parlor designs, including flat, parallel, herringbone, and rotary. Godinho Dairy currently has 48 stall milking parlor (main parlor) and one 10 stall located in the hospital barn area. In this project applicant is proposing to install a new rotary 80 stall milking parlor and re-designate the current main parlor, and convert it to utilize as hospital parlor with 60 stalls herringbone parlour.

Due to food safety regulations, high standards of hygiene must be observed in the milking parlor. The parlor floors are constructed of concrete, and are properly sloped to ensure effective drainage. Any manure that is deposited on the parlor floors during milking is promptly sprayed down with clean water and flushed into the drainage system, from where it is carried through pipes into the manure lagoons.

B. Cow Housing N-6094-2

Freestall Barns:

Typically majority of milk cows and dry cows are housed in the freestall barns. The standard freestall barn design consists of an elongated, open-frame, roofed metal structure; with concrete-paved flooring and a central drive-through feed alley. Feed bunks are located along both sides of the drive-through alley. Stanchion fences separate the housing areas from the feed alley and also facilitate the cows' orderly access to the feed (i.e. one cow per stanchion). Watering troughs are located along the outer edges of the barn and can be accessed through the barn fencing. The rest of the barn floor is divided into bays of individual resting stalls. The stalls are padded with various bedding materials, such as sand or dried manure, to increase cow comfort and prevent injury. The stall bays are separated by access lanes, which also serve as manure collection/removal lanes (flush lanes). Manure from barn feed lanes is typically removed by flushing with water.

This dairy will house all milking cows in the freestall areas.

Shaded Barns:

Dry cows are housed in the shaded barns.

Detailed pre-project and post project housing arrangements are shown in Appendix C and Appendix D (PM10 Mitigation Measures' sheet).

C. Liquid Manure Handling System (N-6094-3):

Milk cows generate anywhere from 130 to 150 pounds of manure per day. The manure is deposited primarily in areas where the cows are housed and fed (cow housing), but a small amount is deposited in the milking barn and other transit areas. The manure is collected and managed in liquid and solid forms. Manure with a total solids 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.

The liquid manure handling system for the dairy includes the following components:

- Settling basin
- One 1,275 ft x 243 ft x 13 ft anaerobic treatment lagoon with a side slope of 1.4 ft

Settling Basin:

The liquid manure from the flushed lanes will flow to the existing settling basin for solids separation prior to entering the lagoon system. Settling basins are structures designed to separate solids from liquid manure by sedimentation. The inflow of manure is restricted to allow some of the solids to settle out. A settling basin may achieve a solids removal rate of 40-70%. The liquids from the settling basins will gradually drain to the treatment lagoon. Solids remaining in settling basins are left to dry and then are removed. Solids separation reduces the land area required when designing a liquid manure treatment system since the volume to be treated is less. The dairy currently includes one settling basin located near the lagoon. The separated solids will either be applied to cropland or stored for use as fertilizer or bedding in the freestalls.

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 (VOC). The Natural Resources Conservation Service (NRCS) Field Office Technical Guide No. 359, Waste Treatment Lagoon, for California 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 is also stated in the NRCS Guide No. 359 - maximizing the depth of the lagoon has the following advantages: i) The surface area in contact with the atmosphere is minimized, which will reduce volatilization of air pollutants; ii) The smaller surface area reduces the effects of the environment on the lagoon, which provides a more stable and favorable environment for anaerobic bacteria; iii) There is better mixing of lagoon due to rising gas bubbles; and iv) A deeper lagoon requires less land for the required treatment volume.

Land Application:

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

D. Solid Manure Handling Operation (N-6094-4):

Solid manure will be stored in stockpiles until ready to be applied to cropland as fertilizer, or shipped offsite. Separated solids will be dried and stockpiled for use as bedding material in the freestalls.

E. Feed Storage and Handing Operation (N-6094-7):

The feed storage and handling area will be used for the storage of feed ingredients and for the preparation of daily feed rations (known as 'total mixed rations' or TMR). Silage, the main ingredient in TMR, is typically stored in large elongated piles on concrete slabs. The required amount is extracted from one end of the pile, as needed. Other additive ingredients such as almond hulls, various grains, and cotton seed are stored in covered barns (commodity barns) to prevent damage from exposure to weather elements. Front-end loaders are used to retrieve the required proportions of the silage and additive ingredients and load them into a feed wagon with a built-in mixer. Once the silage and additive ingredients are thoroughly mixed, the feed wagon drives over to the cow housing areas to spread the TMR along the feed lanes.

V. Equipment Listing

Pre-Project Equipment Description:

N-6094-1-2: 2,132 COW MILKING OPERATION WITH ONE 48 STALL PARALLEL MILKING PARLOR AND ONE 10 STALL MILKING PARLOR LOCATED IN THE HOSPITAL BARN

N-6094-2-2: COW HOUSING - 2,132 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 2,500 MATURE COWS (MILK AND DRY); 3 FREESTALLS WITH FLUSH/SCRAPE SYSTEM

N-6094-3-2: LIQUID MANURE HANDLING SYSTEM CONSISTING OF ONE SETTLING BASIN; ONE LAGOON; MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION AND FURROW IRRIGATION

N-6094-4-2: SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; SOLID MANURE APPLICATION TO LAND AND HAULED OFFSITE

N-6094-7-1: FEED STORAGE AND HANDLING CONSISTING OF COMMODITY BARN(S) AND SILAGE PILE(S)

Proposed Modification:[2]

N-6094-1-3: MODIFICATION OF 2,132 COW MILKING OPERATION WITH ONE 48 STALL MILKING PARLOR AND ONE 10 STALL MILKING PARLOR LOCATED IN THE HOSPITAL BARN: INCREASE NUMBER OF MILKING COWS FROM 2,132 MILK COWS TO 4,000 MILK COWS, INSTALL A NEW 80 STALL ROTARY MILKING PARLOR, REMOVE 10 STALL HOSPITAL MILKING PARLOR, RELOCATE HOSPITAL MILKING PARLOR TO THE EXISTING HERRINGBONE PARLOR AND INCREASE NUMBER OF STALLS TO 60.

N-6094-2-3: MODIFICATION OF COW HOUSING - 2,132 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 2,500 MATURE COWS (MILK AND DRY); 3 FREESTALLS WITH FLUSH/SCRAPE SYSTEM: INSTALL ADDITIONAL 2 NEW FREESTALLS (#5 & #6) AND EXTENSION OF AN EXISTING FREESTALL AND DESIGNATED IT AS FREESTALL BARN #7 FOR TOTAL OF 7 FREESTALLS, EXTENSION OF THREE EXISTING SHADE BARNS AND DESIGNATE NEW BARN AREA AS BARN (#4, 5 & #6) FOR TOTAL OF 6 SHADED BARNS, AND INCREASE HERD SIZE FROM 2,132 MILK COWS AND 2,500 MATURE COWS TO 4,000 MILK COWS AND 4,700 MATURE COWS (MILK AND DRY)

N-6094-3-3: MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF ONE SETTLING BASIN; ONE LAGOON; MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION AND FURROW IRRIGATION: INCREASE IN LIQUID MANURE DUE TO INCREASE IN MILK COW AND DRY COW HERD PROFILE AS AUTHORIZED BY ATC N-6094-2-3 AND OPERATE 1,275' X 243' X 13' LAGOON AS PER ANAEROBIC TREATMENT LAGOON SPECIFICATION

N-6094-4-3: MODIFICATION OF SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; SOLID MANURE APPLICATION TO LAND AND HAULED OFFSITE: INCREASE IN SOLID MANURE DUE TO INCREASE IN MILK COW AND DRY COW HERD PROFILE AS AUTHORIZED BY ATC N-6094-2-3

N-6094-7-2: MODIFICATION OF FEED STORAGE AND HANDLING CONSISTING OF COMMODITY BARNS AND SILAGE PILES: INCREASE IN SILAGE AND TOTAL MIXED RATION DUE TO INCREASE IN MILK COW AND DRY COW HERD

[2] The facility currently has 4 freestall barns and this project will correct the pre project freetstall designations. The addition of two new freestalls and a freestall designated to the extended freestall will bring the total to 7 freestall barn areas after modification.

PROFILE AS AUTHORIZED BY ATC N-6094-2-3 AND RELOCATE COMMODITY BARNS

Post Project Equipment Description:

N-6094-1-3: 4,000 COW MILKING OPERATION WITH AN 80 STALL ROTARY MILKING PARLOR AND ONE 60 STALL HERRINGBONE HOSPITAL MILKING PARLOR

N-6094-2-3: COW HOUSING – 4,000 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 4,700 MATURE COWS (MILK AND DRY); 7 FREESTALLS, AND 6 SHADE BARNS WITH FLUSH/SCRAPE SYSTEM

N-6094-3-3: LIQUID MANURE HANDLING SYSTEM CONSISTING OF ONE SETTLING BASIN; ONE 1,275' X 243' X 13' ANAEROBIC TREATMENT LAGOON; MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION AND FURROW IRRIGATION

N-6094-4-3: SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; SOLID MANURE APPLICATION TO LAND AND HAULED OFFSITE

N-6094-7-2: FEED STORAGE AND HANDLING CONSISTING OF COMMODITY BARN(S) AND SILAGE PILE(S)

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:

A. Milking Parlor (N-6094-1):

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

B. Cow Housing (N-6094-2)

Majority of the mature cattle (milk cows) at this dairy are housed in freestall barns and dry cows are housed in the shaded barns with flushed lanes. Practices that will be utilized to reduce emissions at the dairy include: frequent flushing of lanes, scraping of exercise pens, and feeding animals in accordance with NRC guidelines. These practices are discussed further below.

Freestall Barns:

Godinho Dairy will house all milking cows in the freestall areas.

Housing cattle in freestall barns greatly reduces PM emissions because the cows will be on a paved surface rather than on dry dirt. Additionally, flushing of the freestall lanes creates a moist environment, which further decreases particulate matter emissions.

In order to further reduce post project PM10 emissions from the facility the applicant has proposed to eliminate exercise pens from the existing and new freestall barn areas.

Shaded Barns:

Manure, which is a source of emissions, will be removed from the shaded barn corral surface 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.

Frequent flushing is also used for the removal of manure from the lanes and walkways in the housing barns. The emissions control mechanisms are the same as described above.

Frequent Flushing of Lanes:

Manure, which is a source of emissions, will be removed from the freestall barn lanes by flushing. 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 lanes of freestall barns and open corrals. For the proposed new freestall barns and the existing freestall barn #4 will be subject to BACT for VOC and NH_3 emissions, the lanes and walkways for the mature cows (lactating and dry cows) will be required to be flushed at least four times per day.

C. Liquid Manure Handling System (N-6094-3-3)

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 Godinho Dairy includes an existing lagoon that meets the anaerobic treatment lagoon designed criteria 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 anaerobic treatment lagoon design check in Appendix I).

Solids Separation:

The liquid manure handling system at Godinho Dairy includes a settling basin for solids separation. Solids separation prevents excessive loading of volatile solids in lagoon treatment systems. Excessive loading of volatile solids in lagoons inhibits the activity of the methanogenic bacteria and leads to increased rates of volatile solids production. When the activity of the methanogenic bacteria is not inhibited, most of the VOCs are metabolized to simpler compounds, and the potential for VOC emissions is reduced.

Liquid Manure Land Application:

Liquid manure from the lagoon/storage pond will be applied through flood and furrow 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.

D. Solid Manure Handling (N-6094-4)

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 VOC and NH_3. 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, NH_3,

and any H_2S are absorbed onto particles of soil providing the opportunity for microbes in the soil to oxidize these compounds into carbon dioxide, water, nitrates, and sulfates.[3]

E. Feed Handling and Storage (N-6094-7)

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 VOCs, NH_3, and H_2S upon decomposition.

Silage Pile Management:

The feed storage system at Godinho Dairy includes storage of silage piles covered with plastic tarps to minimize volatilization of pollutants from the pile surfaces.

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).

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

VII. General Calculations

A. Assumptions

- Potential to emit calculations will be based on the permitted limits for the different age categories of cows in the proposed herd.
- Only non-fugitive emissions are considered when determining major source status. For this facility, the lagoon/storage pond, emergency engine and gasoline dispensing are the only sources of non-fugitive emissions.
- All PM_{10} emissions will be allocated to the cow housing permit unit (N-6094-2).
- All H_2S emissions will be allocated to the liquid manure permit unit - lagoon/storage pond (N-6094-3); and will be assumed to be equivalent to 10% of the NH_3 emissions from the lagoon/storage pond.
- The PM_{10} control efficiency for shade structures is from a District document titled "Dairy/Feedlot PM_{10} Mitigation Practices and their Control Efficiencies."[4]

[3] U.S. EPA's Draft Document Emissions From Animal Feeding Operations (http://www.epa.gov/ttn/chief/ap42/ch09/draft/draftanimalfeed.pdf)
[4] http://www.valleyair.org/busind/pto/dpag/Dairy_PM10_Control_Efficiencies.pdf

- The PM_{10} emission factors are from a District document titled "Dairy and Feedlot PM_{10} Emissions Factors,"[5] which compiled data from studies performed by Texas A&M and ASAE, and a USDA/UC Davis report, quantifying dairy and feedlot emissions.

- The VOC emission factors for milk cows are from a District document titled "Air Pollution Control Officer's Revision to the Dairy VOC Emission Factors, February 2012."[6] Volatile solids excretion ratios were used to derive the proportionate VOC emission factors for dry cows and support stock.

- The NH_3 emission factor for milk cows is based on California Air Resources Board's dairy cattle ammonia emission factor.[7] Manure-based VOC emission ratios were used to apportion the NH_3 emission factor to the various emissions units. Further, nitrogen excretion ratios were used to derive the proportionate NH_3 emission factors for dry cows and support stock.

- All the mitigation measures evaluated are expected to result in VOC emission reductions. Where a specific control efficiency has not been determined, a conservative 10% control efficiency will be assumed, unless noted otherwise.

- An anaerobic treatment lagoon designed and operated in accordance with NRCS Field Office Technical Guide No. 359 has the potential to significantly reduce VOC emissions by promoting the conversion of volatile solids in the manure into methane and carbon dioxide. Although significant VOC emission reductions are expected, a conservative control efficiency of 40% will be applied to this mitigation measure for both storage and land application of liquid manure.

B. Emission Factors

Detailed emission factors are listed in the emissions calculation spreadsheet in Appendix D ('Dairy Emission Factors' sheet).

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 pre-project emission control practices in use at the dairy.

[5] http://www.valleyair.org/busind/pto/dpag/FYI_%20Dairy_Feedlot_PM10_Emission_Factor.pdf
[6] http://www.valleyair.org/busind/pto/emission_factors/2012-Final-Dairy-EE-Report/FinalDairyEFReport(2-23-12).pdf
[7] http://www.arb.ca.gov/ei/areasrc/livestockemisfwp.pdf

Emission calculations for this project are included in the dairy emissions calculation spreadsheet in Appendix D. PE1 for each dairy permit unit is shown in the tables below.

Daily Project Potential to Emit (PE1)							
Permit Unit	NOx	SOx	PM_{10}	CO	VOC	NH_3	H2S
N-6094-1-2	0	0	0	0	2.3	0.8	0
N-6094-2-2	0	0	9.3	0	63.3	134.2	0
N-6094-3-2	0	0	0	0	15.5	78.2	7.1
N-6094-4-2	0	0	0	0	3.0	17.9	0
N-6094-7-1	0	0	0	0	66.6	0	0
Total	**0**	**0**	**9.3**	**0.0**	**150.7**	**231.1**	**7.1**

Annual Project Potential to Emit (PE1)							
Permit Unit	NOx	SOx	PM_{10}	CO	VOC	NH_3	H2S
N-6094-1-2	0	0	0	0	853	292	0
N-6094-2-2	0	0	3,426	0	23,071	48,985	0
N-6094-3-2	0	0	0	0	5,670	28,549	2,573
N-6094-4-2	0	0	0	0	1,094	6,560	0
N-6094-7-1	0	0	0	0	24,311	0	0
Total	**0**	**0**	**3,426**	**0**	**54,999**	**84,386**	**2,573**

2. Post-Project Potential to Emit (PE2)

The PE2 is based on the maximum permitted capacity for each age category of cows and the controls required and proposed by the applicant. All the emission calculations are included in Appendix D. A summary of the PE2 is shown in the following table:

Daily Project Potential to Emit (PE2)							
Permit Unit	NOx	SOx	PM_{10}	CO	VOC	NH_3	H2S
N-6094-1-3	0	0	0	0	4.4	1.5	0
N-6094-2-3	0	0	5.2	0	118.6	251.8	0
N-6094-3-3	0	0	0	0	16.5	114.8	7.1
N-6094-4-3	0	0	0	0	3.9	26.2	0
N-6094-7-2	0	0	0	0	146.8	0	0
Total	**0.0**	**0.0**	**5.2**	**0.0**	**290.2**	**394.3**	**7.1**

Annual Project Potential to Emit (PE2)							
Permit Unit	NOx	SOx	PM_{10}	CO	VOC	NH_3	H2S
N-6094-1-3	0	0	0	0	1,600	547	0
N-6094-2-3	0	0	1,791	0	43,340	92,008	0
N-6094-3-3	0	0	0	0	6,045	41,910	2,573
N-6094-4-3	0	0	0	0	1,446	9,577	0
N-6094-7-2	0	0	0	0	53,616	0	0
Total	**0**	**0**	**1,791**	**0**	**106,047**	**144,042**	**2,573**

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

Pursuant to District Rule 2201, the SSPE1 is the sum of 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.

SSPE1							
Permit Unit	NOx	SOx	PM_{10}	CO	VOC	NH_3	H2S
N-6094-1-2 (Milking Parlor)	0	0	0	0	853	292	0
N-6094-2-2 (Cows Housing)	0	0	3,426	0	23,071	48,985	0
N-6094-3-2 (Liquid Manure Handling)	0	0	0	0	5,670	28,549	2,573
N-6094-4-2 (Solid Manure Handling)	0	0	0	0	1,094	6,560	0
N-6094-5-0[8] (Emergency Engine)	397	7	20	121	45	0	0
N-6094-6-0[8] (Gasoline Dispensing)	0	0	0	0	35	0	0
N-6094-7-1 (Feed Storage)	0	0	0	0	24,311	0	0
Total	**397**	**7**	**3,446**	**121**	**55,079**	**84,386**	**2,573**

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

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

[8] Emissions taken from Project N-1070003.

SSPE2							
Permit Unit	NOx	SOx	PM_{10}	CO	VOC	NH_3	H2S
N-6094-1-3 (Milking Parlor)	0	0	0	0	1,600	547	0
N-6094-2-3 (Cows Housing)	0	0	1,791	0	43,340	92,008	0
N-6094-3-3 (Liquid Manure Handling)	0	0	0	0	6,045	41,910	2,573
N-6094-4-3 (Solid Manure Handling)	0	0	0	0	1,446	9,577	0
N-6094-5-0 (Emergency Engine)	397	7	20	121	45	0	0
N-6094-6-0 (Gasoline Dispensing)	0	0	0	0	35	0	0
N-6094-7-2 (Feed Storage)	0	0	0	0	53,616	0	0
Total	**397**	**7**	**1,811**	**121**	**106,127**	**144,042**	**2,573**

5. Major Source Determination

Rule 2201 Major Source Determination

Pursuant to District Rule 2201, a major source is a stationary source with an SSPE2 equal to or exceeding one or more of the major source thresholds shown in Table 3-3. 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 engines (i.e. engines at a particular site at the facility for less than 12 months)
- Fugitive emissions, except for the source categories specified in 40 CFR 51.165

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

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

Milking Parlor

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

Cow Housing

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

Manure Storage Areas

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

Land Application

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

Feed Storage and Handling

Silage and total mixed rations (TMR) are the primary sources of emissions from feed storage and handling.

Silage is stored in silage piles. Only three piles will be actively used at any given time and the remainder of the piles will remain covered. One end/face of the silage

pile that is actively being used to prepare feed rations must remain open to allow extraction of the silage. A front-end loader is used to extract silage from the open face of the pile throughout the day as the feed rations for the various groups or categories of cows are prepared. A significant proportion of silage pile emissions are associated with this open face, which is exposed to the atmosphere and frequently disturbed during silage extraction. Due to the need to access the pile's open face throughout the day, it is not practical to enclose it or equip it with any kind of device or system that could be used to capture of emissions.

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

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

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, IC engine, and gasoline dispensing will be used to determine if this facility is a major source.

Pre-Project Major Source Determination:

Pre-Project lagoon emissions for this project are included in Appendix D.

Pre-Project Major Source Determination (lb/year)						
	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO	VOC
N-6094-3-2 (liquid manure handling – Lagoon(s)/storage pond(s)	0	0	0	0	0	2,730
N-6094-5-0 (emergency IC engine)	397	7	20	20	121	45
N-6094-6-0 (gasoline)	0	0	0	0	0	35
Non-Fugitive SSPE1	**397**	**7**	**20**	**20**	**121**	**2,810**
Major Source Threshold	20,000	140,000	140,000	200,000	200,000	20,000

Note: PM2.5 assumed to be equal to PM10

Post-Project Major Source Determination:

Post-Project lagoon emissions for this project are included in Appendix D.

Post-Project Major Source Determination (lb/year)						
	NOx	SOx	PM_{10}	$PM_{2.5}$	CO	VOC
N-6094-3-3 (liquid manure handling – Lagoon(s)/storage pond(s)	0	0	0	0	0	3,066
N-6094-5-0 (emergency IC engine)	397	7	20	20	121	45
N-6094-6-0	0	0	0	0	0	35
Non-Fugitive SSPE2	**397**	**7**	**20**	**20**	**121**	**3,146**
Major Source Threshold	20,000	140,000	140,000	200,000	200,000	20,000

Note: PM2.5 assumed to be equal to PM10

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

Rule 2410 Major Source Determination

In determining if a stationary source is a PSD major source, the following sources of emissions shall not be included:

- Emissions from non-road engines (i.e. engines at a particular site at the facility for less than 12 months)
- Fugitive emissions, except for the source categories specified in 40 CFR 52.21(b)(1)(iii)

Agricultural operations do not belong to any of the source categories specified in specified in 40 CFR 52.21(b)(1)(i). Since the proposed facility is an agricultural operation, fugitive emissions shall not be included in determining whether it will be a PSD major source; and the PSD major source threshold is 250 tons/yr (tpy) for any regulated NSR pollutant.

The non-fugitive stationary source emissions from the preceding section have been converted into tons. The PSD major source determination is summarized in the following table:

PSD Major Source Determination						
Category	**NO_2**	**VOC**	**SO_2**	**CO**	**PM**	**PM_{10}**
Estimated facility PE before project increase (tpy)	0.2	1.4	0.004	0.06	0.01	0.01
PSD major source threshold (tpy)	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 calculations are performed, pollutant by pollutant, for each emissions unit involved in the project. The BE are subsequently used to calculate the quarterly net emissions change (QNEC), and if applicable, to determine the amount of offsets required.

Pursuant to District Rule 2201, BE = PE1 for:

- Any unit located at a non-major source,
- Any highly-utilized emissions unit located at a major source,
- Any fully-offset emissions unit located at a major source, or
- Any clean emissions unit located at a major source.

Otherwise,

BE = historic actual emissions (HAE), calculated pursuant to District Rule 2201.

Since the proposed facility will not be a major source for any pollutants, BE = PE1.

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 the proposed facility will not be a major source for any of the pollutants addressed in this project, the project does not constitute an SB 288 major modification.

8. Federal Major Modification

District Rule 2201, Section 3.18, states that federal major modifications are the same as "Major Modification" as defined in 40 CFR 51.165 and part D of Title I of the CAA.

Since the proposed facility will not be a major source for any pollutant, this project does not constitute a federal major modification.

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

Rule 2410 applies to any pollutant regulated under the Clean Air Act, except those for which the District has been classified nonattainment. The pollutants which must be addressed in the PSD applicability determination for sources located in the San Joaquin Valley and which are involved in this project are:[9]

- PM
- PM_{10}
- Hydrogen sulfide (H_2S)

[9] See 52.21(b)(23) - definition of significant.

- Total reduced sulfur (inlcuding H_2S)

Project Emissions Increase - New Major Source Determination

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

Agricultural operations do not belong to any of the source categories specified in specified in 40 CFR 52.21(b)(1)(i). Since the proposed facility is an agricultural operation, fugitive emissions shall not be included in determining whether it will be a PSD major source; and the PSD major source threshold is 250 tons/yr (tpy) for any regulated NSR pollutant.

The non-fugitive stationary source emissions from Section VII.C.5 have been converted into tons. The PSD applicability determination is summarized in the following table:

PSD Applicability Determination - New Major Source				
Category	**PM**	**PM_{10}**	**H_2S**	**S**
Total PE from new and modified units (tpy)	0	0	1.3	1.3
PSD major source threshold (tpy)	250	250	250	250
New PSD major source? (Y/N)	N	N	N	N

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

10. Quarterly Net Emissions Change (QNEC)

The QNEC is calculated solely to establish emissions that are used to complete the District's PAS database (emissions profile screen). Detailed QNEC calculations are included in Appendix J.

VIII. Compliance

Rule 1070 Inspections

This rule applies to any source operation which emits or may emit air contaminants. The rule requires 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 authorizes the District to require record keeping, to make inspections and to conduct tests of air pollution sources. The following conditions will be placed on the ATC permits 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 3.0, any person building, altering or replacing any operation, article, machine, equipment, or other contrivance, the use of which may cause the issuance of air contaminants or the use of which may eliminate or reduce or control the issuance of air contaminants, shall first obtain authorization for such construction from the APCO. An Authority to Construct shall remain in effect until the Permit to Operate the source operation for which the application was filed is granted or denied, or the application is canceled as described in Rule 2050 (Cancellation of Application).

Pursuant to Section 4.0, before any new or modified source operation described in Section 3.0, or any existing source operation so described may be operated, 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.

An Authority to Construct permit application for the proposed facility has been submitted. Continued compliance with the requirements of this rule is therefore expected.

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 Major 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

The applicant is proposing to expand the herd size and adding new cow housing. As shown in Appendix E, BACT calculations the following new emissions units will have increases of more than 2.0 lb/day for each respective pollutant and triggers Best Available Control Technology (BACT) requirements.

Cow Housing:

VOC: New Freestall Barn Areas (# 5, #6, & #7) and Shaded Barn Area (#6)
NH3: New Freestall Barn Area (#5, 6, & 7) and Shade Barn Areas (#4, 5 & 6)

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

There are no emissions units being relocated from one stationary source to another. BACT is therefore not triggered under this category.

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

The applicant is proposing to expand the herd size and adding new cow housing. As shown in Appendix E, BACT for the following modified emissions units will have increases of more than 2.0 lb/day for each respective pollutant and triggers Best Available Control Technology (BACT) requirements.

N-6094-1-3: Milking Operation

Milking Operation - VOC

N-6094-2-3: Cow Housing:

Existing Freestall Barn Area (#4) – NH3

N-6094-3-3: Liquid Manure Handling

Liquid Manure Land Application – VOC & NH3
Lagoon/Storage Ponds – VOC & NH3

N-6094-4-3: Solid Manure Handling

Solid Manure Storage – NH3
Solid Manure Land Application – NH3

N-6094-7-2: Feed Storage and Handling

Dairy Feed Storage and Handling System & Total Mix Ration (TMR) - VOC

d. SB 288/Federal Major Modification

As discussed in Sections VII.C.7 and VII.C.8 of this evaluation, this project does not constitute an SB 288 and/or federal major modification. BACT is therefore not triggered under this category.

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 (Appendix G), BACT has been satisfied with the following:

N-6094-1-3: Milking Operation

VOC: Flush/spray before, after or during milking each group of cows.

N-6094-2-3: Cow Housing

:

VOC: New Freestall Barn Areas (# 5, #6, & #7) and Shaded Barn Area (#6)

- Concrete feed lanes and walkways;

- Flushing feed lanes and walkways for mature cows (milk and dry cows) at least four times per day and flushing feed lanes and walkways for support stock at least once per day;

- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;

- Properly sloping exercise pens/corrals (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing exercise pens/corrals to ensure proper drainage;

- Scraping exercise pens/corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions; and

- Rule 4570 measures.

NH_3: New Freestall Barn Area (#5, 6, & 7), Shade Barn Areas (#4, 5 & 6) & Existing Freestall Barn Area (#4)

- Concrete feed lanes and walkways;

- Flushing feed lanes and walkways for mature cows (milk and dry cows) at least four

times per day and flushing feed lanes and walkways for support stock at least once per day;

- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;

- Properly sloping exercise pens/corrals (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing exercise pens/corrals to ensure proper drainage; and

-Scraping exercise pens/corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions.

ATC Conditions:

Following conditions on the ATC enforces BACT requirements stated above:

Since the BACT is only triggered for the Freestall Barns #4, #5, #6, & #7 and Shade Barns #4, #5, & #6 and these barns will only house mature cows and the applicant is proposing to eliminate exercise pens associated with the each freestall therefore the following conditions will be added to the ATC to enforce BACT:

- *Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201, 4102 & 4570] N*

- *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, 4102, & 4570] N*

- *Permittee shall pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers. [District Rules 2201, 4102, & 4570] N*

- *For the Freestall Barns #4, #5, #6, & #7 and Shade Barns #4, #5, & #6, the feedlanes and walkways shall be constructed of concrete. [District Rules 2201, 4102 & 4570] N*

- *For the Freestall Barns #4, #5, #6, & #7 and Shade Barns #4, #5, & #6, permittee shall flush the feed lanes and walkways for the mature cows (milk and dry cows) at least four times per day or scraping feed lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day. [District Rule 2201, 4102 & 4570] N*

- *For the Freestall Barns #4, #5, #6, & #7 and Shade Barns #4, #5, & #6, permittee shall maintain records sufficient to demonstrate that lanes are flushed or scrapped at*

least four times per day for mature cows. [District Rules 2201, 4102, & 4570] N

- *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, 4102 & 4570] N*

- *Permittee shall scrape exercise pen/corral surfaces every two weeks using a pull-type scraper during morning hours, except when prevented by wet conditions. [District Rules 2201 and 4102] N*

- *Permittee shall maintain sufficient records to demonstrate that exercise pen/corral surfaces are scraped every two weeks using a pull-type scraper during morning hours, except when prevented by wet conditions. [District Rules 2201 and 4102] N*

Liquid Manure Handling System

Lagoon/Storage Pond

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

NH_3: 1) All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.

Land Application

VOC: 1) Irrigation of crops using liquid/slurry manure from a secondary lagoon/ holding/storage pond preceded by an uncovered anaerobic treatment lagoon designed to meet Natural Resources Conservation Service (NRCS) standards.

NH_3: 1) All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.

ATC Conditions:

Following conditions on the ATC enforces BACT requirements stated above:

- *Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4102] N*

- *All liquid manure shall be treated in an anaerobic treatment lagoon system that is designed and operated according to the Natural Resources Conservation Service (NRCS) Field Office Technical Guide No. 359. [District Rules 2201 and 4102] N*

- *Permittee shall maintain design specifications and calculations, including minimum treatment volume (MTV) and hydraulic retention time (HRT) calculations, demonstrating that the anaerobic treatment lagoon system meets the requirements listed in the NRCS Field Office Technical Guide No. 359. [District Rules 2201 and 4102] N*

- *Any liquid manure applied to land shall have been treated in an anaerobic treatment lagoon system that is designed and operated according to the NRCS Field Office Technical Guide No. 359. [District Rules 2201 and 4102] N*

Solid Manure Handling Operation

Storage Piles

NH_3: 1) All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.

Land Application

NH_3: 1) Rapid incorporation of solid manure into the soil after land application, and all animals fed in accordance with NRC or other District-approved guidelines.

ATC Conditions:

Following conditions on the ATC enforces BACT requirements stated above:

- *Solid manure shall be incorporated into the soil within two hours of land application. [District Rules 2201 and 4570]*

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

Feed Storage and Handling Operation

Silage:

VOC: 1) VOC mitigation measures required by District Rule 4570.

TMR:

VOC: 1) VOC mitigation measures required by District Rule 4570.

See detailed discussion under Rule 4570 compliance section for conditions that will be added to the ATC to enforce BACT. The Rule 2201 reference will be added in the applicable rule section at the end of the each condition to enforce BACT.

B. Offsets

1. Offset Applicability

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

Offset Determination (lb/year)					
	NO_X	SO_X	PM_{10}	CO	VOC
SSPE2	397	7	1,811	121	106,127
Offset Thresholds	20,000	54,750	29,200	200,000	20,000
Offsets triggered?	No	No	No	No	Yes

2. Quantity of Offsets Required

The SSPE for VOC emissions exceeds the VOC offset threshold level. However, per Section 4.6.9 of Rule 2201, offsets are not required for agricultural sources unless they are a major source. As determined in Section VII.C.5 of this evaluation, the proposed facility will not be a major source for any pollutants. Offsets are therefore not required.

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,
d. Any project with an SSIPE of greater than 20,000 lb/year for any pollutant, and/or
e. Any project which results in a Title V significant permit modification.

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

New major sources are new facilities, which are also major sources. Since the proposed facility will not be a major source, public noticing is not required for this project for new major source purposes.

As demonstrated in sections VII.C.7 and VII.C.8 of this evaluation, this project does not constitute an SB 288 or federal major modification. Public noticing for SB 288 or federal major modification purposes is therefore not required.

b. PE > 100 lb/day

Applications which include a new emissions unit with a PE greater than 100 pounds during any one day for any pollutant will trigger public noticing requirements.

As shown in the calculations in Appendix E, this project does not include any new emissions units with a PE > 100 lb/day for any pollutant. Public notice is therefore not required under this category.

c. Offset Thresholds

The following table compares the SSPE1 and the SSPE2 to the offset thresholds in order to determine if any thresholds have been surpassed due to this project:

Offset Thresholds				
Pollutant	**SSPE1 (lb/yr)**	**SSPE2 (lb/yr)**	**Offset Threshold (lb/yr)**	**Public Notice Required?**
NO_X	397	397	20,000	No
SO_X	7	7	54,750	No
PM_{10}	3,446	1,811	29,200	No
CO	121	121	200,000	No
VOC	55,079	106,127	20,000	No

As shown in the preceding table, no offset threshold has been surpassed due to this project; therefore public noticing is not triggered under this category.

d. SSIPE > 20,000 lb/year

Public notice is required for any permitting action that results in a Stationary Source Increase in Permitted Emissions (SSIPE) of more than 20,000 lb/year of any affected pollutant. According to District policy, the SSIPE is calculated as the Post Project Stationary Source Potential to Emit (SSPE2) minus the Pre-Project Stationary Source Potential to Emit (SSPE1), i.e. SSIPE = SSPE2 – SSPE1. The values for SSPE1 and SSPE2 are calculated according to Rule 2201, Sections 4.9 and 4.10, respectively.

The SSIPE is compared to the SSIPE public notice thresholds in the following table:

SSIPE Public Notice Thresholds					
Pollutant	**SSPE2 (lb/yr)**	**SSPE1 (lb/yr)**	**SSIPE (lb/yr)**	**Public Notice Threshold (lb/yr)**	**Public Notice Required?**
NO_x	397	397	0	20,000	No
SO_x	7	7	0	20,000	No
PM_{10}	1,811	3,446	- 1,635	20,000	No
CO	121	121	0	20,000	No
VOC	106,127	55,079	51,048	20,000	Yes
NH_3	144,042	84,386	59,656	20,000	Yes
H_2S	2,573	2,573	0	20,000	No

As shown above, the SSIPE for VOC & NH_3 is greater than 20,000 lb/year. Public notice for SSIPE purposes is therefore required.

e. Title V Significant Permit Modification

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

2. Public Notice Action

As discussed above, public notice is required for this project. 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 Madera County prior to the issuance of the ATC permits.

D. Daily Emission Limits (DELs)

Daily Emissions Limitations (DELs) and other enforceable conditions are required by Section 3.16 to restrict a unit's maximum daily emissions, to a level at or below the emissions associated with the maximum design capacity. Per Sections 3.16.1 and 3.16.2, 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 based on the numbers and age categories of the cows in the permitted herd, as well as conditions enforcing BACT requirements. The following DEL conditions also enforce project design specifications proposed by the applicant for compliance with the ambient air quality standard for PM_{10}.

Proposed DEL Conditions:

Milking Operation

- *{modified 4484} Permittee shall flush or hose down the milking parlor immediately prior to, immediately after, or during each milking. [District Rules 2201 and 4570]*

Cow Housing

- *{modified 4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 2201, 4102, and 4570]*
- *{modified 4486} Permittee shall pave feed lanes for a width of at least 8 feet along the corral side of the feed lane fence for milk and dry cows and at least 6 feet along the corral side of the feed lane fence for support stock. [District Rules 2201, 4102, and 4570]*
- *For Freestall Barns #4, #5, #6 & #7 and Shade Barns #4, #5 & #6 the feedlanes and walkways shall be constructed of concrete. [District Rules 2201, 4102, and 4570] N*
- *{modified 4487} For Freestall Barns #4, #5, #6 & #7 and Shade Barns #4, #5, & #6 permittee shall flush the feed lanes and walkways for the mature cows (milk and dry cows) at least four times per day or scraping feed lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day. [District Rules 2201, 4102, and 4570] N*
- *{modified 4491} Permittee shall 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). [District Rules 2201 & 4570] N*
- *{modified 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 & 4570] N*
- *{modified 4499} Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rules 2201 and 4570]*
- *{modified 4501} Permittee shall clean manure from corrals at least four (4) times per year with at least sixty (60) days between cleanings; 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]*
- *{modified 4554} Permittee shall implement at least one of the following mitigation measures: 1) slope the surfaces of the corrals and exercise pens at least 3% where the available space for each animal is 400 square feet or less and at least 1.5% where the available space for each animal is more than 400 square feet; 2) maintain corrals and exercise pens to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape corrals and exercise pens sufficiently to maintain a dry surface, except during periods of wet weather. [District*

Rules 2201 and 4570]

- *Permittee shall scrape corral and exercise pen surfaces every two weeks using a pull-type scraper during morning hours, except when prevented by wet weather. [District Rule 2201]*
- *{modified 4518} Permittee shall manage corrals such that the manure depth in the corral does not exceed twelve (12) inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rules 2201 & 4570]*

Liquid Manure Handling

- *{modified 4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 2201]*
- *All liquid manure shall be treated in an anaerobic treatment lagoon system that is designed and operated according to the Natural Resources Conservation Service (NRCS) Field Office Technical Guide No. 359. [District Rule 2201 and 4102]*
- *{modified 4538} Permittee shall remove solids with a solids separation system prior to the manure entering the lagoon. [District Rules 2201 and 4570]*
- *Any liquid manure applied to land shall have been treated in an anaerobic treatment lagoon system that is designed and operated according to the NRCS Field Office Technical Guide No. 359. [District Rule 2201]*
- *{modified 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]*

Solid Manure Handling

- *{modified 4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 2201]*
- *{modified 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 Rule 4570]*
- *{modified 4541} Solid manure shall be incorporated into the soil within two hours of land application. [District Rules 2201 and 4570]*

Feed Storage and Handling

- *{modified 4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]*
- *{modified 4456} Permittee shall push feed so that it is within three feet of the feed lane fences within two hours of putting out the feed, or use feed troughs or other feeding structures designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]*
- *{modified 4458} Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rules 2201 and 4570]*
- *{modified 4460} Permittee shall store grain in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]*
- *{modified 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]*
- *{modified 4468} For bagged silage/feedstuff, permittee shall utilize a sealed feed storage system (e.g., ag bag). [District Rules 2201 and 4570]*
- *{modified 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]*
- *{modified 4471} Permittee shall select and implement one of the following mitigation measures for building each silage pile at the facility: Option 1) build the silage pile such that the average bulk density is at least 44 lb/cu ft for corn silage and 40 lb/cu ft for other silage types, as measured in accordance with Section 7.11 of District Rule 4570; Option 2) Adjust filling parameters when creating the silage pile to achieve an average bulk density of at least 44 lb/cu ft for corn silage and at least 40 lb/cu ft for other silage types as determined using a District-approved spreadsheet; or Option 3) build silage piles using crops harvested with the applicable minimum moisture content, maximum Theoretical Length of Chop (TLC), and roller opening identified in District Rule 4570, Table 4.1, 1.d and manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. Records of the option chosen as a mitigation measure for building each silage pile shall be maintained. [District Rules 2201 and 4570]*
- *{modified 4474} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall harvest corn used for the pile at an average moisture content of at least 65% and*

harvest other silage crops for the pile at an average moisture content of at least 60%. [District Rules 2201 and 4570]

- *{modified 4476} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall adjust setting of equipment used to harvest crops for the pile to incorporate the following parameters for Theoretical Length of Chop (TLC) and roller opening, as applicable: 1) Corn with no processing: TLC not exceeding 1/2 inch, 2) Processed Corn: TLC not exceeding 3/4 inch and roller opening of 1-4 mm, 3) Alfalfa/Grass: TLC not exceeding 1.0 inch, 4) Other silage crops: TLC not exceeding 1/2 inch. [District Rules 2201 and 4570]*

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

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

E. Compliance Assurance

1. Source Testing

Pursuant to District Policy APR 1705, Source Testing Frequency, source testing is not required for the proposed project.

2. Monitoring

No monitoring requirements are applicable to the proposed project.

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 (N-6094-1), the Liquid Manure Handling System (N-6094-3), and the Solid Manure Handling System (N-6094-4) and the Feed Storage and Handling System (N-6094-7) 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 (N-6094-2). Conditions that will be placed on the ATC permits are listed below.

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

Milking Parlor (N-6094-1)

The following conditions will be placed on the ATC:

- {modified 4485} Permittee shall provide verification that milk parlor is flushed or hosed down immediately prior to, immediately after, or during each milking. [District Rules 2201 and 4570]

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

Cow Housing (N-6094-2)

The following conditions will appear on the ATC for the Cow Housing Permit:

- 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, 4102, and 4570]

- Permittee shall maintain records sufficient to demonstrate that freestall lanes are flushed, scraped or vacuumed immediately prior to, immediately after or during each milking. [District Rules 2201 & 4570] N

- {modified 4488} For Freestall Barns #4, #5, #6, & #7 and Shade Barns #4, #5, & #6 permittee shall maintain records sufficient to demonstrate that lanes are flushed at least four times per day or scraped four times per day. [District Rules 2201, 4102, and 4570]

- {modified 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]

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

- {modified 4502} Permittee shall demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning or demonstrate that corrals are cleaned at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]

- {modified 4555} Permittee shall either 1) maintain sufficient records to demonstrate that exercise pens/corrals are maintained to ensure proper drainage preventing water from standing for more than forty-eight hours; or 2) maintain records of dates when exercise pens/corrals are groomed (i.e., harrowed, raked, or scraped, etc.). [District Rules 2201, 4102, and 4570]

- Permittee shall maintain sufficient records to demonstrate that exercise pen and corral surfaces are scraped every two weeks using a pull-type scraper during morning hours, except when prevented by wet conditions. [District Rule 2201] N

- {modified 4449} Permittee shall maintain a record of the number of animals of each species and production group at the facility and shall maintain quarterly records of any changes to this information. [District Rules 2201, 4102, and 4570]

- {modified 4519} Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rules 2201, 4102, and 4570]

- {modified 4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201, 4102, and 4570]

Liquid Manure Handling System (N-6094-3)

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 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 4102]

- Permittee shall maintain design specifications and calculations, including minimum treatment volume (MTV) and hydraulic retention time (HRT) calculations, demonstrating that the anaerobic treatment lagoon system meets the requirements listed in the NRCS Field Office Technical Guide No. 359. [District Rules 2201 and 4102]

- Permittee shall maintain records to demonstrate that liquid manure applied to land has been treated in an anaerobic treatment lagoon system that is designed and

operated according to the NRCS Field Office Technical Guide No. 359. [District Rule 2201]

- {modified 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]
- {modified 4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201, 4102, and 4570]

Solid Manure Handling System (N-6094-4)

The following conditions will be placed on the ATC:

- 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]
- {modified 4527} Permittee shall keep records of dates when manure is removed from the dairy 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]
- {modified 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]
- {modified 4542} Permittee shall maintain records to demonstrate that solid manure has been incorporated into the soil within two hours of land application. [District Rules 2201 and 4570]
- {modified 4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

Feed Storage and Handling System (N-6094-7)

The following conditions will be placed on the ATC:

- {modified 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]

- {modified 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]

- {modified 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]

- {modified 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]

- {modified 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 Rule 2201 & 4570]

- {modified 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 Rule 2201 & 4570]

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

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 for the proposed project.

F. Ambient Air Quality Analysis (AAQA)

An AAQA is conducted for the purpose of determining whether a new or modified stationary source will cause, or worsen, the violation of an ambient air quality standard (AAQS). The District's Technical Services Division conducted the required analysis. A summary of the results is included in Appendix H of this evaluation.

The proposed facility will be located in an attainment area for NOx, CO, and SOx. As shown in the AAQA summary, the proposed facility will not cause a violation of an AAQS for NOx, CO, or SOx.

The proposed facility will be located in a non-attainment area for PM_{10} (state) and $PM_{2.5}$ (state and federal) AAQS. As shown in the AAQA summary, the proposed facility will not cause a violation of an AAQS PM_{10} or $PM_{2.5}$.

Rule 2410 Prevention of Significant Deterioration

As shown in Section VII.C.9 of this evaluation, the proposed facility does not result in a new PSD major source or PSD major modification. This project is therefore not subject to the requirements of this rule.

Rule 2520 Federally Mandated Operating Permits

As shown in Section VII.C.5 of this evaluation, the proposed facility will not be a major source. The facility will therefore not be subject to the requirements of this rule.

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.

Newly constructed facilities or reconstructed units or sources at existing facilities are subject to preconstruction review 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) and the new units are not already subject to a standard promulgated under Section 112(d), 112(j), or 112(h) of the Clean Air Act." Facilities or sources subject to Rule 2550 would be subject to stringent air pollution control requirements, referred to as Maximum Achievable Control Technology (MACT).

The federal Clean Air Act (Section 112(b)(1)) lists 189 substances as potential hazardous air pollutants (HAPs). The following table outlines the HAPs expected to be emitted from dairies, and their estimated emission rates, based on the best data currently available:

Hazardous Air Pollutant Emissions from Dairies		
HAP	**Emission Rate lb/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
Ethylbenzene	0.003	
o-Xylene	0.005	
1,2-Dibromo-3chloropropane	0.011	
1,2,4-Trichlorobenzene	0.025	
Naphthalene	0.012	
Hexachlorobutadiene	0.012	
Formaldehyde	0.005	
Acetaldehyde	0.029	
Chloroform	0.017	California State University Fresno

Styrene	0.01	(CSUF) - *Monitoring and Modeling of ROG at California Dairies*, 2005
Vinyl acetate[10]	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[11]	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**	

Since the proposed dairy is subject to Best Available Control Technology (BACT) emissions control requirements and Rule 4570 mitigation measures, many of the pollutants listed above are expected to be controlled significantly. However, in order to ensure that this evaluation is based on the worst-case scenario, no controls will be factored into the HAPs emissions estimates. Please note that a conclusion that MACT requirements are triggered would necessarily involve consideration of controlled emissions levels.

Based on the total emission rate shown in the preceding table, the HAPs emissions calculations for the proposed dairy are summarized in the table below:

HAPs Emissions Calculations						
Category	**Number of cows**		**Emission Rate lb/cow-yr[12]**		**Emissions**	
					lb/yr	**tons/yr**
Milking Cows	4,000	x	1.828	=	7,312	3.7
Dry Cows	700	x	1.123	=	786	0.4
Support Stock	0	x	0.786	=	0	0
Calves (0 - 3 mon)	0	x	0.584	=	0	0
				Total =	**8,098**	**4.1**

As shown above, total HAPs emissions are expected to be less than 10 tons per year. The proposed facility will therefore not be a major air toxics source and the provisions of Rule 2550 are not applicable.

Rule 4101 Visible Emissions

Pursuant to Section 4.12, the requirements of this rule do not apply to emissions subject to or specifically exempt from Regulation VIII (Fugitive PM10 Prohibitions).

[10] 0.01 + 0.07 = 0.08 lbs/hd-yr.
[11] 0.012 + 0.15 = 0.162 lbs/hd-yr.
[12] The emission rate total has been adjusted for each cow category using ratios based on manure production rates.

Pursuant to Rule 8011, Section 4.4, on-field agricultural sources are exempt from the requirements of Regulation VIII.

The proposed project involves only on-field agricultural sources and is therefore exempt from the requirements of Rule 4101.

Rule 4102 Nuisance

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

The proposed project is subject to BACT and additional mitigation measures required by District Rule 4570; hence nuisance conditions are not expected.

California Health and Safety Code §41700 (Health Risk Assessment)

District Policy APR 1905, Risk Management Policy for Permitting New and Modified Sources, requires that for an increase in emissions associated with a proposed new source or modification, the District shall 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 Risk Management Review (RMR) summary in Appendix H of this evaluation, the proposed project's total prioritization score, including the proposed project, is greater than one. An HRA was therefore required to determine the short-term acute and long-term chronic exposure risk.

The cancer risk for the proposed project is summarized in the following table:

RMR Summary						
Units	**Prioritization Score**	**Acute Hazard Index**	**Chronic Hazard Index**	**Maximum Individual Cancer Risk**	**T-BACT Required?**	**Special Permit Requirements?**
Unit 1-3 (Milk Parlor)	1.68	0.01	0.00	6.98E-07	No	No
Unit 2-3 (Cow Housing)	52.1	0.29	0.14	2.21E-06	No[3]	No
Unit 3-3 (Lagoons & Land Application)	53.8	0.02	0.01	3.07E-07	No	No
Unit 4-3 (Solid Manure Piles & Land Application)	0.00	0.01	0.00	0.00[2]	No	No
Unit 7-2 (Feed Storage & Handling)	N/A[1]	N/A[1]	N/A[1]	N/A[1]	N/A[1]	N/A[1]
Project Totals	>1	0.33	0.16	3.21E-06		
Facility Totals	>1	0.33	0.16	3.21E-06		

[1]There is no risk associated with Unit 7-2 as the District does not have an approved toxic speciation profile for dairy feed and storage handling operations.
[2]The Maximum Individual Cancer Risk was not calculated since there is no risk factor or the risk factor is so low that it has been determined to be insignificant for this type of unit.
[3]T-BACT is determined by each individual cow housing area. Detail T-BACT for each housing is addressed in the RMR analysis in Appendix H under Conclusion Section of this report.

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 not required for this project because the HRA indicates that the risk is not above the District's thresholds for triggering T-BACT requirements; therefore, compliance with the District's Risk Management Policy is expected.

District policy APR 1905 also specifies that the increase in emissions associated with a proposed new source or modification not have acute or chronic indices, or a cancer risk greater than the District's significance levels (i.e. acute and/or chronic indices greater than 1 and a cancer risk greater than 20 in a million). As outlined in the RMR summary in Appendix H, the risk increases for the proposed project were 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 the 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.

This facility received District approval for its current CMP plan in 2005. The proposed project does not involve any changes or modifications to the previously approved CMP plan. Continued compliance with the requirements of this rule is therefore 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) through the implementation of various mitigation measures for each emissions unit.

The facility was issued ATC permits to implement the requirements of this rule under project N-1111041. The applicant has proposed to change feed mitigation measure option, freestall flushing option and corral concrete lane mitigation option. All other previously selected mitigation measures will be carried over in the Authority to Construct permits issued under this project.

General Condition on all ATCs

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

- {modified 4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201, 4102, and 4570]

A. Milking Parlor (N-6094-1)

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

- {modified 4484} Permittee shall flush or hose down the milking parlor immediately prior to, immediately after, or during each milking. [District Rules 2201 and 4570]

- {modified 4485} Permittee shall provide verification that the milking parlor is flushed or hosed down immediately prior to, immediately after, or during each milking. [District Rules 2201 and 4570]

- {modified 4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201, 4102, and 4570]

B. Cow Housing (N-6094-2)

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

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

Freestall Barn Mitigation Measures:

- {modified 4486} Permittee shall pave feedlanes for a width of at least 8 feet along the housing side of the feedlane fence for mature cows and at least 6 feet along the housing side of the feedlane fence for heifers. [District Rules 2201, 4102, and 4570]

- {modified 4487} Permittee shall flush, scrape or vacuum freestall lanes immediately prior to, immediately after or during each milking. [District Rules 2201 & 4570]

- {modified 4488} Permittee shall maintain records sufficient to demonstrate that freestall lanes are flushed, scraped or vacuumed immediately prior to, immediately after or during each milking. [District Rules 2201 & 4570]

- {modified 4491} Permittee shall 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). [District Rules 2201 & 4570]

Corral Mitigation Measures

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

- {modified 4499} Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rules 2201 and 4570]

- {modified 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]

- {modified 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]

- {modified 4502} Permittee shall demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning or demonstrate that corrals are cleaned at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]

- {modified 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 & 4570]

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

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

- {modified 4511} Shade structures shall be installed in any of the following ways: 1) constructed with a light permeable roofing material; 2) uphill of any slope in the corral; 3)

installed so that the structure has a North/South orientation. OR Permittee shall clean manure from under corral shades at least once every fourteen (14) days, when weather permits access into the corral. [District Rules 2201 and 4570] N

- {modified 4555} Permittee shall either 1) maintain sufficient records to demonstrate that exercise pens/corrals are maintained to ensure proper drainage preventing water from standing for more than forty-eight hours; or 2) maintain records of dates when exercise pens/corrals are groomed (i.e., harrowed, raked, or scraped, etc.). [District Rules 2201, 4102, and 4570]

- {modified 4518) Permittee shall manage corrals such that the manure depth in the corral does not exceed twelve (12) inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rules 2201, 4102, and 4570]

- Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rules 2201, 4102, and 4570]

C. Liquid Manure Handling System (N-6094-3)

- {modified 4538} Permittee shall remove solids with a solid separator system, prior to the manure entering the lagoon. [District Rules 2201, 4102, and 4570]

- {modified 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]

- {modified 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]

- {modified 4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201, 4102, and 4570]

D. Solid Manure Handling System (N-6094-4)

- {modified 4526} Within seventy two (72) hours of removal of solid manure from housing, permittee shall either 1) remove dry manure from the dairy, 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]

- {modified 4527} Permittee shall keep records of dates when manure is removed from the dairy 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]

- {modified 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]

- {modified 4541} Solid manure shall be incorporated into the soil within two hours of land application. [District Rules 2201 and 4570]

- {modified 4542} Permittee shall maintain records to demonstrate that solid manure has been incorporated into the soil within two hours of land application. [District Rules 2201 and 4570]

E. Feed Storage and Handling System (N-6094-7)

- {modified 4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 & 4570]

- {modified 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 & 4570]

- {modified 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 & 4570]

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

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

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

- {modified 4460} Permittee shall store grain in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 & 4570]

- {modified 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 & 4570]

- {modified 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 & 4570]

- {modified 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 & 4570]

Silage

- {modified 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 & 4570]

- {modified 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 & 4570]

- {modified 4471} Permittee shall select and implement one of the following mitigation measures for building each silage pile at the facility: Option 1) build the silage pile such that the average bulk density is at least 44 lb/cu ft for corn silage and 40 lb/cu ft for other silage types, as measured in accordance with Section 7.11 of District Rule 4570; Option 2) Adjust filling parameters when creating the silage pile to achieve an average bulk density of at least 44 lb/cu ft for corn silage and at least 40 lb/cu ft for other silage types as determined using a District-approved spreadsheet; or Option 3) build silage piles using crops harvested with the applicable minimum moisture content, maximum Theoretical Length of Chop (TLC), and roller opening identified in District Rule 4570, Table 4.1, 1.d and manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. Records of the option chosen as a mitigation measure for building each silage pile shall be maintained. [District Rules 2201 & 4570]

- {modified 4472} For each silage pile that Option 1 (Measured Bulk Density) is chosen as a mitigation measure for building the pile, records of the measured bulk density shall be maintained. [District Rules 2201 & 4570]

- {modified 4473} For each silage pile that Option 2 (Bulk Density Determined by Spreadsheet) is chosen as a mitigation measure for building the pile, records of the filling parameters entered into the District-approved spreadsheet to determine the bulk density shall be maintained. [District Rules 2201 & 4570]

- {modified 4474} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall harvest corn used for the pile at an average moisture content of at least 65% and

harvest other silage crops for the pile at an average moisture content of at least 60%. [District Rules 2201 & 4570]

- {modified 4475} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records of the average percent moisture of crops harvested for silage shall be maintained. [District Rules 2201 & 4570]

- {modified 4476} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall adjust setting of equipment used to harvest crops for the pile to incorporate the following parameters for Theoretical Length of Chop (TLC) and roller opening, as applicable: 1) Corn with no processing: TLC not exceeding 1/2 inch, 2) Processed Corn: TLC not exceeding 3/4 inch and roller opening of 1-4 mm, 3) Alfalfa/Grass: TLC not exceeding 1.0 inch, 4) Other silage crops: TLC not exceeding 1/2 inch. [District Rules 2201 & 4570]

- {modified 4477} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records that equipment used to harvest crops for the pile was set to the required TLC and roller opening for the type of crop harvested shall be maintained. [District Rules 2201 & 4570]

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

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

- {modified 4480} Permittee shall select and implement at least two of the following mitigation measures for management of silage piles at the facility: Option 1) manage silage piles such that only one silage pile has an uncovered face and the total exposed surface area is less than 2,150 square feet, or manage multiple uncovered silage piles such that the total exposed surface area of all uncovered silage piles is less than 4,300 square feet; Option 2) use a shaver/facer to remove silage from the silage pile, or shall use another method to maintain a smooth vertical surface on the working face of the silage pile; or Option 3) inoculate silage with homolactic lactic acid bacteria in accordance with manufacturer recommendations to achieve a concentration of at least 100,000 colony forming units per gram of wet forage, apply propionic acid, benzoic acid, sorbic acid, sodium benzoate, or potassium sorbate at the rate specified by the manufacturer to reduce yeast counts when forming silage piles, or apply other additives at rates that have been demonstrated to reduce alcohol concentrations in silage and/or VOC emissions from silage and have been approved

by the District and EPA. Records of the options chosen for managing each silage pile shall be maintained. [District Rules 2201 & 4570]

- {modified 4481} If Option 1 (Limiting Exposed Area of Silage) is chosen as a mitigation measure for managing silage piles, the permittee shall calculate and record the maximum (largest part of pile) total exposed area of each silage pile. Records of the maximum calculated area shall be maintained. [District Rules 2201 & 4570]

- {modified 4482} For each silage pile that Option 2 (Shaver/Facer or Smooth Face) is chosen as a mitigation measure for building the pile, the permittee shall maintain records that a shaver/facer was used to remove silage from the pile or shall visually inspect the pile at least daily to verify that the working face was smooth and maintain records of the visual inspections. [District Rules 2201 & 4570]

- {modified 4483} For each silage pile that Option 3 (Silage Additives) is chosen as a mitigation measure for building the pile, records shall be maintained of the type additive (e.g. inoculants, preservative, other District & EPA-approved additive), the quantity of the additive applied to the pile, and a copy of the manufacturer's instructions for application of the additive. [District Rules 2201 & 4570]

According to the District's inspection records, this facility has been operating in compliance with Rule 4570 requirements. Since the proposed modifications do not fundamentally alter the nature of the facility's operations, continued compliance with the requirements of this rule 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 any schools. Therefore, pursuant to California Health and Safety Code §42301.6, a school notice is not required.

California Environmental Quality ACT (CEQA)

Merced County (County) is the Agency which has principal responsibility for approving this dairy project. The County determined that the Project would have a significant adverse environmental impact and prepared an Environmental Impact Report (EIR) for the Project. In certifying the Final EIR, the County determined that after implementing all feasible mitigation measures certain impacts on air quality would be significant and unavoidable. The County approved the Project and adopted a Statement of Overriding Considerations (SOC), in accordance with CEQA Guidelines §15093(a), stating that economic, legal, social, technological, and other benefits resulting from the Project will outweigh the unavoidable adverse environmental effects.

The District is a Responsible Agency because of its discretionary approval power over the Project via its Permits Required Rule (Rule 2010) and New and Modified Stationary Source Review Rule (Rule 2201) (CEQA Guidelines §15381). Rule 2010 requires operators of emission sources to obtain an authority to construct and permit to operate from the District. Rule 2201 requires that new and modified stationary sources of emissions mitigate their emissions using Best Available Control Technology (BACT) and offsetting emissions when

above certain thresholds. As a Responsible Agency, the District complies with CEQA by considering the EIR prepared by the Lead Agency and by reaching its own conclusion on whether and how to approve the project involved (CEQA Guidelines §15096)

The District has prepared an Authority to Construct Application Review, this document, and has determined that compliance with District rules and required mitigation measures will reduce project specific stationary source emissions to the extent feasible. Before reaching a final decision to approve the Project and issue ATCs the District will prepare findings and file a Notice of Determination consistent with CEQA Guidelines §15096 requirements.

Indemnification Agreement/Letter of Credit Determination

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

Although this Project is a potential operation of public concern in the Valley (Dairy), the District has determined that compliance with District rules and required mitigation measures, (including BACT requirements for VOC, NH3, and PM10 emissions), will reduce project specific stationary source emissions to the extent feasible. The facility is not a Major Source and offsets are not required for this Project. As such, an Indemnification Agreement and a Letter of Credit will not be required for this Project in the absence of expressed public concern.

IX. Recommendation

Compliance with all applicable rules and regulations is expected. Pending a successful public noticing period, issue Authority to Construct permits N-6094-1-3, -2-3, -3-3, -4-3, and -7-2; subject to the permit conditions shown on the drafts in Appendix A.

X. Billing Information

Annual Permit Fees			
Permit Number	**Fee Schedule**	**Fee Description**	**Annual Fee**
N-6094-1-3	3020-06	Milking Operation	$122
N-6094-2-3	3020-06	Cow Housing	$122
N-6094-3-3	3020-06	Liquid Manure Handling System	$122
N-6094-4-3	3020-06	Solid Manure Handling Operation	$122
N-6094-7-2	3020-06	Feed Storage and Handling Operation	$122

XI. Appendices

A: Draft ATC Permits
B: Current Permits to Operate N-6094-1-2, -2-2, -3-2, -4-2 & -7-1
C: Pre and Post Project Site Plan
D: Emissions Calculations
E: BACT Calculations
F: BACT Guidelines
G: BACT Analysis
H: RMR and AAQA Summary
I: Anaerobic Lagoon Design Check Spreadsheets
J: QNEC

Appendix A

Draft Authority to Construct Permits

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: N-6094-1-3

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: GODINHO DAIRY
MAILING ADDRESS: 12710 WILSON RD
LOS BANOS, CA 93635

LOCATION: 12710 WILSON RD
LOS BANOS, CA 93635

EQUIPMENT DESCRIPTION:
MODIFICATION OF 2,132 COW MILKING OPERATION WITH ONE 48 STALL MILKING PARLOR AND ONE 10 STALL MILKING PARLOR LOCATED IN THE HOSPITAL BARN: INCREASE NUMBER OF MILKING COWS FROM 2,132 MILK COWS TO 4,000 MILK COWS, INSTALL A NEW 80 STALL ROTARY MILKING PARLOR, REMOVE 10 STALL HOSPITAL MILKING PARLOR, RELOCATE HOSPITAL MILKING PARLOR TO THE EXISTING HERRINGBONE PARLOR AND INCREASE NUMBER OF STALLS TO 60.

CONDITIONS

1. This Authority to Construct (ATC) shall be implemented concurrently with ATC N-6094-2-3. [District Rule 2201]
2. {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]
3. {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]
4. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

CONDITIONS CONTINUE ON NEXT PAGE

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

Samir Sheikh, Executive Director / APCO

DRAFT

Arnaud Marjollet, Director of Permit Services

N-6094-1-3 Aug 2 2018 8:47AM – GILLR Joint Inspection Required with GILLR

5. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
6. Permittee shall flush or hose milk parlor immediately prior to, immediately after, or during each milking. [District Rules 2201 and 4570]
7. Permittee shall provide verification that milk parlor is flushed or hosed down immediately prior to, immediately after, or during each milking. [District Rules 2201 and 4570]
8. 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]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: N-6094-2-3

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: GODINHO DAIRY
MAILING ADDRESS: 12710 WILSON RD
LOS BANOS, CA 93635

LOCATION: 12710 WILSON RD
LOS BANOS, CA 93635

EQUIPMENT DESCRIPTION:
MODIFICATION OF COW HOUSING - 2,132 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 2,500 MATURE COWS (MILK AND DRY); 3 FREESTALLS WITH FLUSH/SCRAPE SYSTEM: INSTALL ADDITIONAL 2 NEW FREESTALLS (#5 & #6) AND EXTENSION OF AN EXISTING FREESTALL AND DESIGNATED IT AS BARN #7 FOR TOTAL OF 7 FREESTALLS, EXTENSION OF THREE EXISTING SHADE BARNS AND DESIGNATE NEW SHADED BARN AREA AS BARN (#4, 5 & #6) FOR TOTAL OF 6 SHADED BARNS, AND INCREASE HERD SIZE FROM 2,132 MILK COWS AND 2,500 MATURE COWS TO 4,000 MILK COWS AND 4,700 MATURE COWS (MILK AND DRY)

CONDITIONS

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

CONDITIONS CONTINUE ON NEXT PAGE

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

Samir Sheikh, Executive Director / APCO

DRAFT

Arnaud Marjollet, Director of Permit Services

N-6094-2-3 Aug 2 2010 8:47AM – GILLR Joint Inspection Required with GILLR

4. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
5. For the freestall barns permittee shall not allow animals in exercise pens. [District Rule 2201]
6. Permittee shall maintain an operating plan or provide verification that no animals housed in the freestall barn are allowed in the exercise pens at any time. [District Rule 2201]
7. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201, 4102, and 4570]
8. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201, 4102, and 4570]
9. Permittee shall pave feedlanes for a width of at least 8 feet along the housing side of the feedlane fence for mature cows and at least 6 feet along the housing side of the feedlane fence for heifers. [District Rules 2201, 4102, and 4570]
10. For the Freestall Barns #4, #5, #6, & #7 and Shade Barns #4, #5, & #6 the feedlanes and walkways shall be constructed of concrete. [District Rules 2201, 4102, and 4570]
11. For the Freestall Barns #4, #5, #6, & #7 and Shade Barns #4, #5, & #6 permittee shall flush the feed lanes and walkways for the mature cows (milk and dry cows) at least four times per day or scraping feed lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day. [District Rules 2201, 4102, and 4570]
12. For the Freestall Barns #4, #5, #6, & #7, Shade Barns #4, #5, & #6 shall maintain records sufficient to demonstrate that lanes are flushed at least four times per day or scraped four times per day. [District Rules 2201, 4102, and 4570]
13. Permittee shall flush, scrape or vacuum freestall lanes immediately prior to, immediately after or during each milking. [District Rules 2201 & 4570]
14. Permittee shall maintain records sufficient to demonstrate that freestall lanes are flushed, scraped or vacuumed immediately prior to, immediately after or during each milking. [District Rules 2201 & 4570]
15. Permittee shall 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). [District Rules 2201 & 4570]
16. Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rules 2201 and 4570]
17. 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]
18. 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]
19. Permittee shall demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning or demonstrate that corrals are cleaned at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]
20. 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 & 4570]
21. Permittee shall measure and document the depth of manure on the concrete lanes at least once every ninety (90) days. [District Rule 2201 & 4570]

CONDITIONS CONTINUE ON NEXT PAGE

22. Permittee shall implement at least one of the following mitigation measures: 1) slope the surfaces of exercise pens/corrals at least 3% where the available space for each animal is 400 square feet or less and at least 1.5% where the available space for each animal is more than 400 square feet per animal; 2) maintain exercise pens/corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape exercise pens/corrals sufficiently to maintain a dry surface except during periods of rainy weather. [District Rule 2201, 4102, and 4570]

23. Shade structures shall be installed in any of the following ways: 1) constructed with a light permeable roofing material; 2) uphill of any slope in the corral; 3) installed so that the structure has a North/South orientation. OR Permittee shall clean manure from under corral shades at least once every fourteen (14) days, when weather permits access into the corral. [District Rules 2201 and 4570]

24. Permittee shall either 1) maintain sufficient records to demonstrate that exercise pens/corrals are maintained to ensure proper drainage preventing water from standing for more than forty-eight hours; or 2) maintain records of dates when exercise pens/corrals are groomed (i.e., harrowed, raked, or scraped, etc.). [District Rule 2201, 4102, and 4570]

25. Permittee shall scrape exercise pen and corral surfaces every two weeks using a pull-type scraper during morning hours, except when prevented by wet conditions and shall utilize utilize water sprinkler system. [District Rule 2201]

26. Permittee shall maintain sufficient records to demonstrate that exercise pen and corral surfaces are scraped every two weeks using a pull-type scraper during morning hours, except when prevented by wet conditions. [District Rule 2201]

27. Permittee shall manage corrals such that the manure depth in the corral does not exceed twelve (12) inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rules 2201, 4102, and 4570]

28. Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rules 2201, 4102, and 4570]

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

30. {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]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: N-6094-3-3

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: GODINHO DAIRY
MAILING ADDRESS: 12710 WILSON RD
LOS BANOS, CA 93635

LOCATION: 12710 WILSON RD
LOS BANOS, CA 93635

EQUIPMENT DESCRIPTION:
MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF ONE SETTLING BASIN; ONE LAGOON; MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION AND FURROW IRRIGATION: INCREASE IN LIQUID MANURE DUE TO INCREASE IN MILK COW AND DRY COW HERD PROFILE AS AUTHORIZED BY ATC N-6094-2-3 AND OPERATE 1,275' X 243' X 13' LAGOON AS PER ANAEROBIC TREATMENT LAGOON SPECIFICATION

CONDITIONS

1. This Authority to Construct (ATC) shall be implemented concurrently with ATC N-6094-2-3. [District Rule 2201]
2. {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]
3. {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]
4. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

CONDITIONS CONTINUE ON NEXT PAGE

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

Samir Sheikh, Executive Director / APCO

DRAFT

Arnaud Marjollet, Director of Permit Services

N-6094-3-3 Aug 2 2018 8:47AM – GILLR Joint Inspection Required with GILLR

5. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
6. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4102]
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 Rules 2201 and 4102]
8. All liquid manure shall be treated in an anaerobic treatment lagoon system that is designed and operated according to the Natural Resources Conservation Service (NRCS) Field Office Technical Guide No. 359. [District Rules 2201 and 4102]
9. Permittee shall maintain design specifications and calculations, including minimum treatment volume (MTV) and hydraulic retention time (HRT) calculations, demonstrating that the anaerobic treatment lagoon system meets the requirements listed in the NRCS Field Office Technical Guide No. 359. [District Rules 2201 and 4102]
10. Permittee shall remove solids with a solid separator system, prior to the manure entering the lagoon. [District Rules 2201 and 4570]
11. Any liquid manure applied to land shall have been treated in an anaerobic treatment lagoon system that is designed and operated according to the NRCS Field Office Technical Guide No. 359. [District Rules 2201 and 4102]
12. Permittee shall maintain records to demonstrate that liquid manure applied to land has been treated in an anaerobic treatment lagoon system that is designed and operated according to the NRCS Field Office Technical Guide No. 359. [District Rule 2201]
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, 4102, and 4570]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: N-6094-4-3

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: GODINHO DAIRY
MAILING ADDRESS: 12710 WILSON RD
LOS BANOS, CA 93635

LOCATION: 12710 WILSON RD
LOS BANOS, CA 93635

EQUIPMENT DESCRIPTION:
MODIFICATION OF SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; SOLID MANURE APPLICATION TO LAND AND HAULED OFFSITE: INCREASE IN SOLID MANURE DUE TO INCREASE IN MILK COW AND DRY COW HERD PROFILE AS AUTHORIZED BY ATC N-6094-2-3

CONDITIONS

1. This Authority to Construct (ATC) shall be implemented concurrently with ATC N-6094-2-3. [District Rule 2201]
2. {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]
3. {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]
4. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

CONDITIONS CONTINUE ON NEXT PAGE

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

Samir Sheikh, Executive Director / APCO

DRAFT

Arnaud Marjollet, Director of Permit Services

N-6094-4-3 : Aug 2 2018 8:47AM – GILLR : Joint Inspection Required with GILLR

5. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
6. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4102]
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 Rules 2201 and 4102]
8. Solid manure shall be incorporated into the soil within two hours of land application. [District Rules 2201 and 4570]
9. Permittee shall maintain records to demonstrate that solid manure has been incorporated into the soil within two hours of land application. [District Rules 2201 and 4570]
10. 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 2201 & 4570]
11. Permittee shall keep records of dates when separated solids are removed from the facility or permittee shall maintain records to demonstrate that separated solids piles outside the pens are covered with a weatherproof covering from October through May. [District Rules 2201 & 4570]
12. 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 Rules 2201 & 4570]
13. Permittee shall incorporate all solid manure within seventy-two (72) hours of land application. [District Rules 2201 & 4570]
14. Permittee shall maintain records to demonstrate that all solid manure has been incorporated within seventy-two (72) hours of land application. [District Rules 2201 & 4570]
15. {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]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: N-6094-7-2

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: GODINHO DAIRY
MAILING ADDRESS: 12710 WILSON RD
LOS BANOS, CA 93635

LOCATION: 12710 WILSON RD
LOS BANOS, CA 93635

EQUIPMENT DESCRIPTION:
MODIFICATION OF FEED STORAGE AND HANDLING CONSISTING OF COMMODITY BARNS AND SILAGE PILES: INCREASE IN SILAGE AND TOTAL MIXED RATION DUE TO INCREASE IN MILK COW AND DRY COW HERD PROFILE AS AUTHORIZED BY ATC N-6094-2-3 AND RELOCATE COMMODITY BARNS

CONDITIONS

1. This Authority to Construct (ATC) shall be implemented concurrently with ATC N-6094-2-3. [District Rule 2201]
2. {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]
3. {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]
4. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

CONDITIONS CONTINUE ON NEXT PAGE

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

Samir Sheikh, Executive Director / APCO

DRAFT

Arnaud Marjollet, Director of Permit Services

Northern Regional Office • 4800 Enterprise Way • Modesto, CA 95356-8718 • (209) 557-6400 • Fax (209) 557-6475

5. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
6. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
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 Rules 2201 and 4570]
8. 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]
9. Permittee shall maintain an operating plan or record that requires feed to be pushed within three feet of feedlane fence within two hours of putting out the feed, or use of a feed trough or other structure designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]
10. Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
11. Permittee shall maintain an operating plan or record of when feeding of total mixed rations began within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
12. Permittee shall store grain in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]
13. 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]
14. Permittee shall remove uneaten wet feed from feed bunks within twenty-four (24) hours after the end of a rain event. [District Rules 2201 & 4570]
15. 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 & 4570]
16. For bagged silage/feedstuff, permittee shall utilize a sealed feed storage system (e.g., ag bag). [District Rules 2201 and 4570]
17. 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]
18. 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]

CONDITIONS CONTINUE ON NEXT PAGE

19. Permittee shall select and implement one of the following mitigation measures for building each silage pile at the facility: Option 1) build the silage pile such that the average bulk density is at least 44 lb/cu ft for corn silage and 40 lb/cu ft for other silage types, as measured in accordance with Section 7.11 of District Rule 4570; Option 2) Adjust filling parameters when creating the silage pile to achieve an average bulk density of at least 44 lb/cu ft for corn silage and at least 40 lb/cu ft for other silage types as determined using a District-approved spreadsheet; or Option 3) build silage piles using crops harvested with the applicable minimum moisture content, maximum Theoretical Length of Chop (TLC), and roller opening identified in District Rule 4570, Table 4.1, 1.d and manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. Records of the option chosen as a mitigation measure for building each silage pile shall be maintained. [District Rules 2201 and 4570]
20. For each silage pile that Option 1 (Measured Bulk Density) is chosen as a mitigation measure for building the pile, records of the measured bulk density shall be maintained. [District Rules 2201 and 4570]
21. For each silage pile that Option 2 (Bulk Density Determined by Spreadsheet) is chosen as a mitigation measure for building the pile, records of the filling parameters entered into the District-approved spreadsheet to determine the bulk density shall be maintained. [District Rules 2201 and 4570]
22. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall harvest corn used for the pile at an average moisture content of at least 65% and harvest other silage crops for the pile at an average moisture content of at least 60%. [District Rules 2201 and 4570]
23. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records of the average percent moisture of crops harvested for silage shall be maintained. [District Rules 2201 and 4570]
24. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall adjust setting of equipment used to harvest crops for the pile to incorporate the following parameters for Theoretical Length of Chop (TLC) and roller opening, as applicable: 1) Corn with no processing: TLC not exceeding 1/2 inch, 2) Processed Corn: TLC not exceeding 3/4 inch and roller opening of 1-4 mm, 3) Alfalfa/Grass: TLC not exceeding 1.0 inch, 4) Other silage crops: TLC not exceeding 1/2 inch. [District Rules 2201 and 4570]
25. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records that equipment used to harvest crops for the pile was set to the required TLC and roller opening for the type of crop harvested shall be maintained. [District Rules 2201 and 4570]
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 manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rules 2201 and 4570]
27. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall maintain a plan that requires that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rules 2201 and 4570]
28. Permittee shall select and implement at least two of the following mitigation measures for management of silage piles at the facility: Option 1) manage silage piles such that only one silage pile has an uncovered face and the total exposed surface area is less than 2,150 square feet, or manage multiple uncovered silage piles such that the total exposed surface area of all uncovered silage piles is less than 4,300 square feet; Option 2) use a shaver/facer to remove silage from the silage pile, or shall use another method to maintain a smooth vertical surface on the working face of the silage pile; or Option 3) inoculate silage with homolactic lactic acid bacteria in accordance with manufacturer recommendations to achieve a concentration of at least 100,000 colony forming units per gram of wet forage, apply propionic acid, benzoic acid, sorbic acid, sodium benzoate, or potassium sorbate at the rate specified by the manufacturer to reduce yeast counts when forming silage piles, or apply other additives at rates that have been demonstrated to reduce alcohol concentrations in silage and/or VOC emissions from silage and have been approved by the District and EPA. Records of the options chosen for managing each silage pile shall be maintained. [District Rules 2201 and 4570]

CONDITIONS CONTINUE ON NEXT PAGE

29. If Option 1 (Limiting Exposed Area of Silage) is chosen as a mitigation measure for managing silage piles, the permittee shall calculate and record the maximum (largest part of pile) total exposed area of each silage pile. Records of the maximum calculated area shall be maintained. [District Rules 2201 and 4570]

30. For each silage pile that Option 2 (Shaver/Facer or Smooth Face) is chosen as a mitigation measure for managing the pile, the permittee shall maintain records that a shaver/facer was used to remove silage from the pile or shall visually inspect the pile at least daily to verify that the working face was smooth and maintain records of the visual inspections. [District Rules 2201 and 4570]

31. For each silage pile that Option 3 (Silage Additives) is chosen as a mitigation measure for managing the pile, records shall be maintained of the type additive (e.g. inoculants, preservative, other District & EPA-approved additive), the quantity of the additive applied to the pile, and a copy of the manufacturers instructions for application of the additive. [District Rules 2201 and 4570]

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

Appendix B

Current Permits to Operate
(N-6094-1-2, -2-2, -3-2, -4-2, -7-1)

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: N-6094-1-2 **EXPIRATION DATE:** 12/31/2020

EQUIPMENT DESCRIPTION:
2,132 COW MILKING OPERATION WITH ONE 48 STALL PARALLEL MILKING PARLOR AND ONE 10 STALL MILKING PARLOR LOCATED IN THE HOSPITAL BARN

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: N-6094-2-2 **EXPIRATION DATE:** 12/31/2020

EQUIPMENT DESCRIPTION:
COW HOUSING - 2,132 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 2,500 MATURE COWS (MILK AND DRY); 3 FREESTALLS WITH FLUSH/SCRAPE SYSTEM

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]
4. 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, scrape or vacuum freestall lanes immediately prior to, immediately after or during each milking. [District Rule 4570]
7. Permittee shall maintain records sufficient to demonstrate that freestall lanes are flushed, scraped or vacuumed immediately prior to, immediately after or during each milking. [District Rule 4570]
8. Permittee shall 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). [District Rule 4570]
9. Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rule 4570]
10. 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]
11. 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]
12. 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]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

13. 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]
14. 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]
15. Permittee shall scrape, vacuum or flush concrete lanes in corrals at least once every day for mature cows and every seven (7) days for support stock. [District Rule 4570]
16. Permittee shall maintain records demonstrating that concrete lanes in corrals are scraped, vacuumed, or flushed at least once every day for mature cows and at least once every seven (7) days for support stock. [District Rule 4570]
17. 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]
18. 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]
19. Permittee shall manage corrals such that the manure depth in the corral does not exceed twelve (12) inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rule 4570]
20. Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rule 4570]
21. 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]
22. 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: N-6094-3-2 **EXPIRATION DATE:** 12/31/2020

EQUIPMENT DESCRIPTION:
LIQUID MANURE HANDLING SYSTEM CONSISTING OF ONE SETTLING BASIN; ONE LAGOON; MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION AND FURROW 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 remove solids with a solid separator system, prior to the manure entering the lagoon. [District Rule 4570]
6. Permittee shall not allow liquid manure to stand in the fields for more than twenty-four (24) hours after irrigation. [District Rule 4570]
7. 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]
8. 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: N-6094-4-2 **EXPIRATION DATE:** 12/31/2020

EQUIPMENT DESCRIPTION:
SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; SOLID MANURE APPLICATION TO LAND AND 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 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]
6. 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]
7. 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]
8. Permittee shall incorporate all solid manure within seventy-two (72) hours of land application. [District Rule 4570]
9. Permittee shall maintain records to demonstrate that all solid manure has been incorporated within seventy-two (72) hours of land application. [District Rule 4570]
10. 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: N-6094-7-1 **EXPIRATION DATE:** 12/31/2020

EQUIPMENT DESCRIPTION:
FEED STORAGE AND HANDLING CONSISTING OF COMMODITY BARN(S) AND SILAGE PILE(S)

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 or record that requires feed to be pushed within three feet of feedlane fence within two hours of putting out the feed, or use of a feed trough or other structure designed to maintain feed within reach of the animals. [District 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 or 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]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

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

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

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]

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]

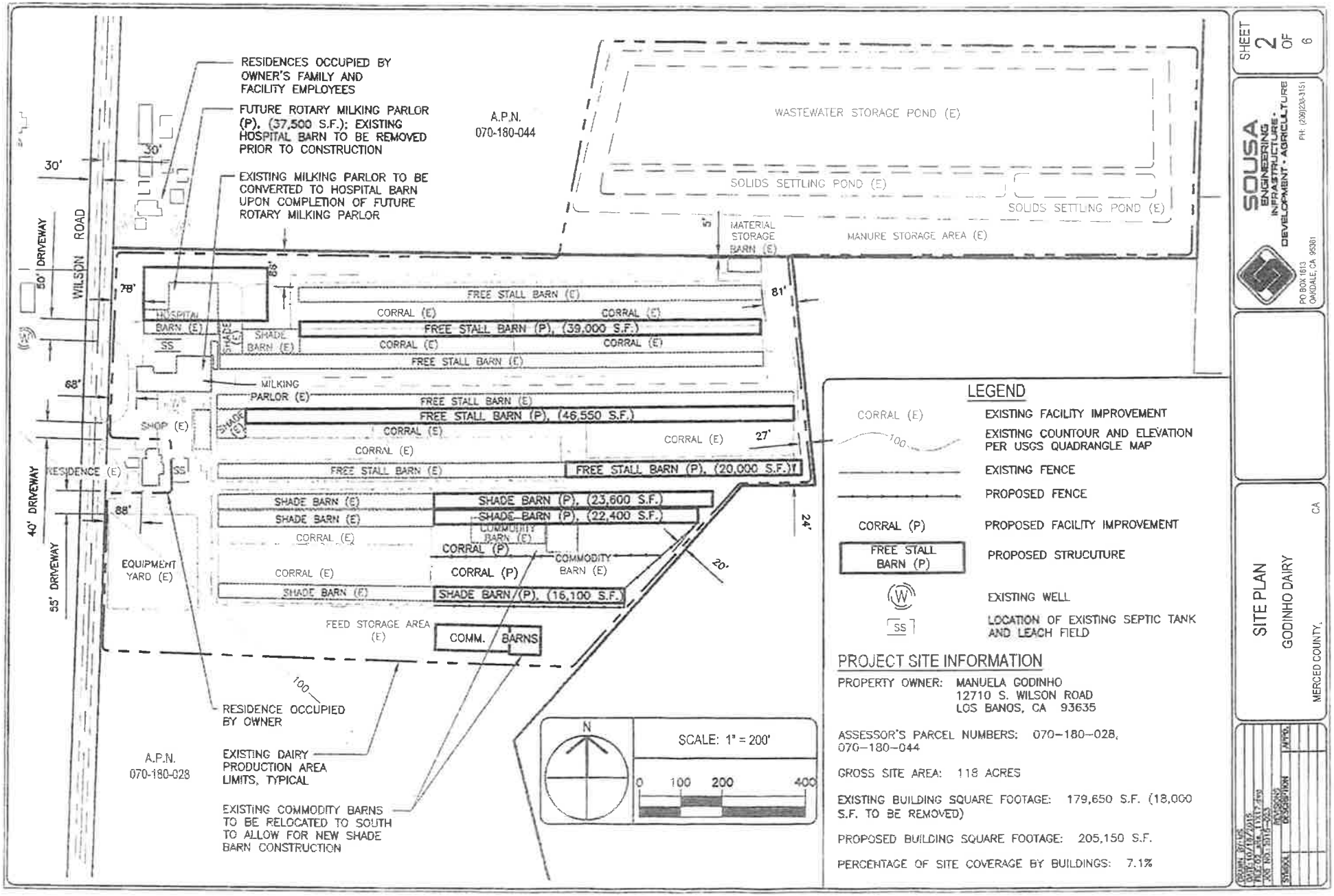
29. For each silage pile that Option 2 (Shaver/Facer or Smooth Face) is chosen as a mitigation measure for managing the pile, the permittee shall maintain records that a shaver/facer was used to remove silage from the pile or shall visually inspect the pile at least daily to verify that the working face was smooth and maintain records of the visual inspections. [District Rule 4570]

30. For each silage pile that Option 3 (Silage Additives) is chosen as a mitigation measure for managing the pile, records shall be maintained of the type additive (e.g. inoculants, preservative, other District & EPA-approved additive), the quantity of the additive applied to the pile, and a copy of the 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 C

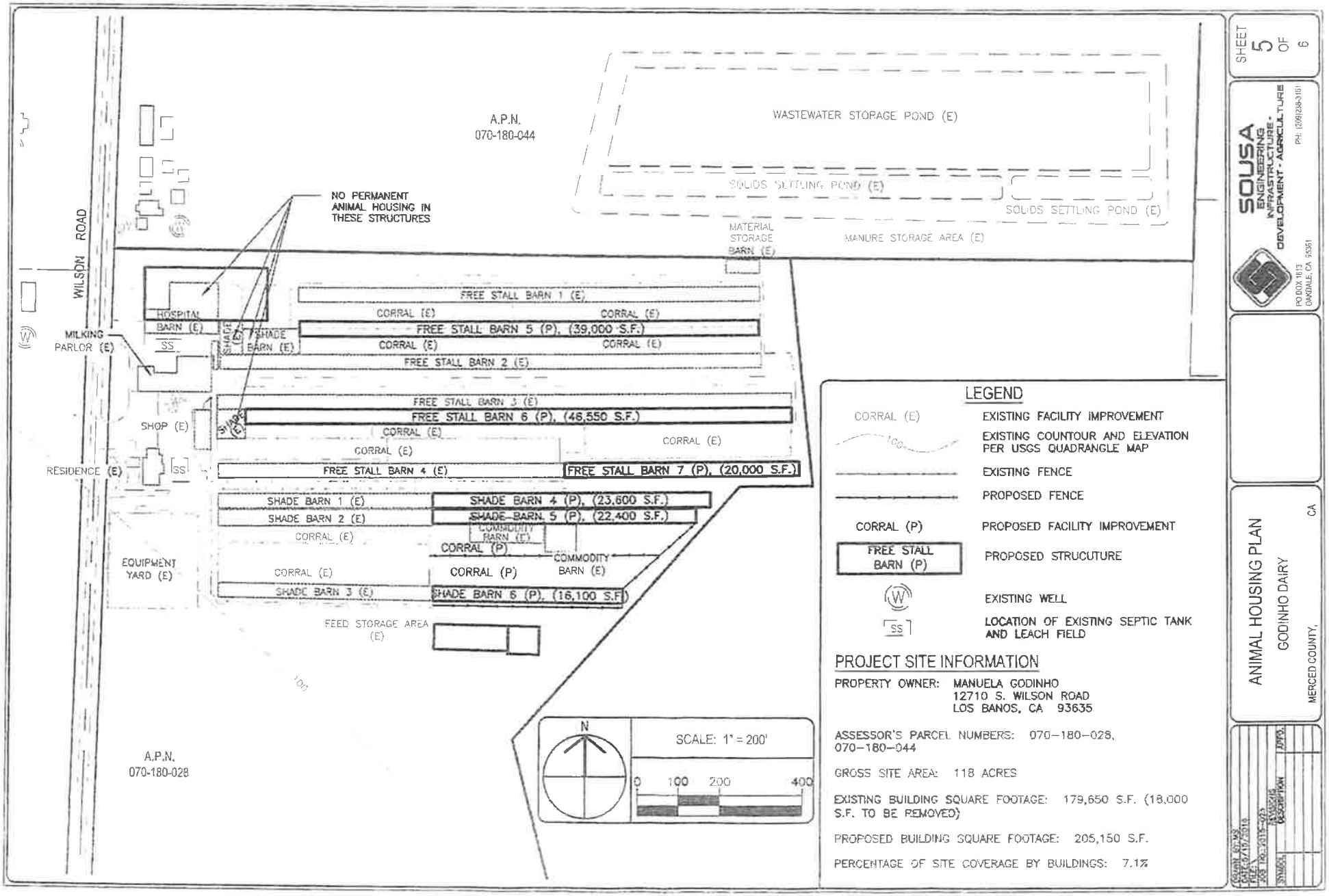
Pre and Post Project Site Plan



SHEET 2 OF 6

SOUSA ENGINEERING INFRASTRUCTURE - DEVELOPMENT - AGRICULTURE
PO BOX 1613 OAKDALE, CA 95361 PH: (209)200-3151

SITE PLAN
GODINHO DAIRY
MERCED COUNTY, CA



LEGEND

CORRAL (E)	EXISTING FACILITY IMPROVEMENT
100	EXISTING COUNTOUR AND ELEVATION PER USGS QUADRANGLE MAP
	EXISTING FENCE
	PROPOSED FENCE
CORRAL (P)	PROPOSED FACILITY IMPROVEMENT
FREE STALL BARN (P)	PROPOSED STRUCUTURE
W	EXISTING WELL
SS	LOCATION OF EXISTING SEPTIC TANK AND LEACH FIELD

PROJECT SITE INFORMATION

PROPERTY OWNER: MANUELA GODINHO
12710 S. WILSON ROAD
LOS BANOS, CA 93635

ASSESSOR'S PARCEL NUMBERS: 070-180-028, 070-180-044

GROSS SITE AREA: 118 ACRES

EXISTING BUILDING SQUARE FOOTAGE: 179,650 S.F. (18,000 S.F. TO BE REMOVED)

PROPOSED BUILDING SQUARE FOOTAGE: 205,150 S.F.

PERCENTAGE OF SITE COVERAGE BY BUILDINGS: 7.1%

SHEET 5 OF 6

SOUSA
ENGINEERING
INFRASTRUCTURE - DEVELOPMENT - AGRICULTURE
PH: (209)268-3161
PO BOX 1613
OAKDALE, CA 95361

ANIMAL HOUSING PLAN

GODINHO DAIRY

MERCED COUNTY, CA

Appendix D

Emissions Calculations

Rev. November 29, 2016

Pre-Project Facility Information

1. Does this facility house Holstein or Jersey cows? Holstein
   Most facilities 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/storage pond? yes
   Answering "yes" assumes worst case.

Pre-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals
Milk Cows	2,132				2,132
Dry Cows	368				368
Support Stock (heifers, Calves, and Bulls)					0
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
Calves							0

Total Herd Summary

Total Milk Cows	2,132
Total Mature Cows	2,500
Support Stock (heifers, Calves, and Bulls)	0
Total Calves	0
Total Dairy Head	2,500

Pre-Project Silage Information

Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	1	15	100
Alfalfa			
Wheat	1	15	50

Post-Project Facility Information

1. Does this facility house Holstein or Jersey cows? Holstein
   Most facilities 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/storage pond? 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

Post-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals
Milk Cows	4,000				4,000
Dry Cows	700				700
Support Stock (heifers, Calves, and Bulls)					0
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
Calves							0

Total Herd Summary

Total Milk Cows	4,000
Total Mature Cows	4,700
Support Stock (heifers, Calves, and Bulls)	0
Total Calves	0
Total Dairy Head	4,700

Post-Project Silage Information

Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	1	25	150
Alfalfa	1	25	150
Wheat	1	25	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.

VOC Mitigation Measures and Control Efficiencies

Milking Parlor				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	VOC Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Enteric Emissions Mitigations		
☑	☑	**(D)** Feed according to NRC guidelines	10%	10%
		Total Control Efficiency	10%	10%
		Milking Parlor Floor Mitigations		
☑	☑	**(D)** Feed according to NRC guidelines	10%	10%
☑	☑	**(D)** 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	10%	10%

Cow Housing				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	VOC Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Enteric Emissions Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%
		Total Control Efficiency	10%	10%
		Corrals/Pens Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%
☑	☑	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%
☑	☑	Dairies: 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. Note: No additional control given for increased cleaning frequency (e.g. BACT requirement). **Heifer/Calf Ranches:** Scrape corrals twice a year with at least 90 days between cleanings, excluding in-corral mounds. Note: No additional control given for increased cleaning frequency (e.g. BACT requirement)	0%	0%
☑	☑	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. Note: No additional control given for increased cleaning frequency (e.g. BACT requirement).	10%	10%
☑	☑	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%
☐	☐	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.		
☐	☐	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.		
☐	☐	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.		
☑	☑	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%
☐	☐	Knockdown fence line manure build-up prior to it exceeding a height of 12 inches at any time or point. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. The facility must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible.	0%	0%
☐	☐	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	23.05%	23.05%
		Bedding Mitigations		

☑	☑	Feed according to NRC guidelines	10%	10%
☑	☑	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)	10%	10%
☐	☐	For a large dairy (1,000 milk cows or larger) or a heifer/calf ranch - Remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every 7 days.	0%	0%
☐	☐	(D) For a medium dairy only (500 to 999 milk cows) - Remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every 14 days.	0%	0%
		Total Control Efficiency	19.00%	19.00%
		Lanes Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%
☑	☑	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%
☑	☑	**Dairies:** 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. **Heifer/Calf Ranches:** Vacuum, scrape, or flush freestalls at least once every seven days.	10%	10%
☐	☐	(D) Have no animals in exercise pens or corrals at any time.	0%	0%
		Total Control Efficiency	19.00%	19.00%

Liquid Manure Handling				
Measure Proposed?		**Mitigation Measure(s) per Emissions Point**	**VOC Control Efficiency (%)**	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Lagoons/Storage Ponds Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%
☐	☐	Use phototropic lagoon	0%	0%
☐	☑	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%
☐	☐	Maintain lagoon pH between 6.5 and 7.5	0%	0%
		Total Control Efficiency	10.00%	46.00%
		Liquid Manure Land Application Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%
☐	☑	Only apply liquid manure that has been treated with an anaerobic or aerobic treatment lagoon, aerobic lagoon, or digester system	0%	40%
☑	☑	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%	10%
		Total Control Efficiency	10.00%	51.40%

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		
☑	☑	Feed according to NRC guidelines	10%	10%
☑	☑	LARGE CAFO ONLY: 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	19.00%	19.00%
		Separated Solids Piles Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%
☑	☑	LARGE CAFO ONLY: 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.	10%	10%
		Total Control Efficiency	19.00%	19.00%
		Solid Manure Land Application Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%
☑	☑	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. Note: No additional control given for rapid manure incorporation (e.g. BACT requirement).	0%	0%
☐	☑	Only apply solid manure that has been treated with an anaerobic treatment lagoon, aerobic lagoon or digester system.	0%	40%
☐	☑	Apply no solid manure with a moisture content of more than 50%	0%	10%
		Total Control Efficiency	10.00%	51.40%

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		

☑	☑	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. For dairies - implement two of the following: For heifer/calf ranches - implement one of the following: Manage Exposed Silage. 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 Maintain Silage Working Face. 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 Silage Additive. 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	39.0%	39.0%
		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		
☑	☑	(D) Push feed so that it is within 3 feet of feedlane fence within 2 hrs of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the cows.	10%	10%
☑	☑	(D) 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%
☑	☑	Remove uneaten wet feed from feed bunks within 24 hrs after then end of a rain event	10%	10%
☐	☐	(D) For total mixed rations that contain at least 30% by weight of silage, feed animals total mixed rations that contain at least 45% moisture.	0%	0%
☑	☑	Feed according to NRC guidelines. Note: If selected for dairies, control efficiency already included in EF.	0%	0%
		Total Control Efficiency	19.00%	19.00%

Ammonia Mitigation Measures and Control Efficiencies

Milking Parlor				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	NH3 Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Milking Parlor Floor Mitigations		
☑	☑	Feed according to NRC guidelines	28%	28%
		Total Control Efficiency	28%	28%

Cow Housing				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	NH3 Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Corrals/Pens Mitigations		
☑	☑	Feed according to NRC guidelines	28%	28%
☑	☑	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. OR Use lime or a similar absorbent material in the corral according to the manufacturer's recommendation to minimize moisture in the corrals. OR Apply thymol to the corral soil in accordance with the manufacturer's recommendation.	50%	50%
		Total Control Efficiency	64%	64%
		Bedding Mitigations		
☑	☑	Feed according to NRC guidelines	28%	28%
☑	☑	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). OR 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. OR 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.	47.7%	47.7%
		Total Control Efficiency	62.34%	62.34%
		Lanes Mitigations		
☑	☑	Feed according to NRC guidelines	28%	28%
		Total Control Efficiency	28%	28%

Liquid Manure Handling				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	NH3 Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Lagoons/Storage Ponds Mitigations		
☑	☑	Feed according to NRC guidelines	28%	28%
☐	☐	Use phototropic lagoon OR Remove solids from the waste system with a solid separator system, prior to the waste entering the lagoon.	0%	0%
		Total Control Efficiency	28.0%	28.0%
		Liquid Manure Land Application Mitigations		
☑	☑	Feed according to NRC guidelines	28%	28%
☐	☑	Only apply liquid manure that has been treated with an anaerobic treatment lagoon	0%	42%
		Total Control Efficiency	28.00%	58.24%

Solid Manure Handling				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	NH3 Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Solid Manure Land Application Mitigations		
☑	☑	Feed according to NRC guidelines	28%	28%
☐	☑	Incorporate all solid manure within 72 hours of land application, AND Only apply solid manure that has been treated with an anaerobic treatment lagoon, aerobic lagoon or digester system. AND Apply no solid manure with a moisture content of more than 50%	0%	42%
		Total Control Efficiency	28.00%	58.24%

lb/hd-yr Dairy Emissions Factors for Holstein Cows

			Milk Cows				Dry Cows				Large Heifers (15 to 24 months)				Medium Heifers (7 to 14 months)				Small Heifers (3 to 6 months)				Calves (0 - 3 months)				Bulls			
			Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled	
			<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2
Milking Parlor	VOC	Enteric Emissions in Milking Parlors	0.43	0.41	0.37	0.37	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
		Milking Parlor Floor	0.04	0.03	0.03	0.03	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
		Total	**0.47**	**0.44**	**0.40**	**0.40**	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
	NH3	**Total**	**0.19**	**0.19**	**0.14**	**0.14**	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
Cow Housing	VOC	Enteric Emissions in Cow Housing	3.89	3.69	3.32	3.32	2.33	2.23	2.01	2.01	1.81	1.71	1.54	1.54	1.23	1.17	1.05	1.05	0.69	0.65	0.58	0.58	0.32	0.31	0.28	0.28	1.10	1.04	0.94	0.94
		Corrals/Pens	10.00	9.60	5.06	5.06	5.40	3.59	2.76	2.76	4.20	2.76	2.12	2.12	2.85	1.88	1.45	1.45	1.60	1.04	0.80	0.80	0.75	0.50	0.39	0.39	2.55	1.67	1.29	1.29
		Bedding	1.05	1.00	0.81	0.81	0.57	0.54	0.44	0.44	0.44	0.42	0.34	0.34	0.30	0.28	0.23	0.23	0.17	0.16	0.13	0.13	0.08	0.08	0.06	0.06	0.27	0.25	0.20	0.20
		Lanes	0.84	0.80	0.65	0.65	0.45	0.44	0.35	0.35	0.35	0.33	0.27	0.27	0.24	0.23	0.18	0.18	0.13	0.13	0.10	0.10	0.06	0.06	0.05	0.05	0.21	0.20	0.16	0.16
		Total	**15.78**	**12.09**	**9.86**	**9.86**	**8.75**	**6.80**	**5.57**	**5.57**	**6.81**	**5.22**	**4.27**	**4.27**	**4.62**	**3.56**	**2.91**	**2.91**	**2.59**	**1.84**	**1.62**	**1.62**	**1.22**	**0.95**	**0.78**	**0.78**	**4.13**	**3.16**	**2.59**	**2.59**
	NH3	Enteric Emissions in Cow Housing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Corrals/Pens	41.90	41.90	15.08	15.08	21.20	21.20	7.63	7.63	11.00	11.00	3.96	3.96	7.90	7.90	2.84	2.84	6.00	6.00	2.16	2.16	1.80	1.80	0.65	0.65	15.30	15.30	5.51	5.51
		Bedding	6.30	6.30	2.27	2.27	3.20	3.20	1.20	1.20	1.70	1.70	0.64	0.64	1.20	1.20	0.45	0.45	0.90	0.90	0.34	0.34	0.30	0.30	0.11	0.11	2.30	2.30	0.87	0.87
		Lanes	5.10	5.10	3.67	3.67	2.60	2.60	1.87	1.87	1.30	1.30	0.94	0.94	1.00	1.00	0.72	0.72	0.70	0.70	0.50	0.50	0.20	0.20	0.14	0.14	1.90	1.90	1.37	1.37
		Total	**53.30**	**53.30**	**21.13**	**21.13**	**27.00**	**27.00**	**10.71**	**10.71**	**14.00**	**14.00**	**5.54**	**5.54**	**10.10**	**10.10**	**4.02**	**4.02**	**7.60**	**7.60**	**3.00**	**3.00**	**2.30**	**2.30**	**0.90**	**0.90**	**19.50**	**19.50**	**7.74**	**7.74**
Liquid Manure Handling	VOC	Lagoons/Storage Ponds	1.52	1.30	1.17	0.70	0.82	0.71	0.64	0.38	0.64	0.54	0.49	0.29	0.43	0.37	0.33	0.20	0.24	0.21	0.19	0.11	0.11	0.10	0.09	0.05	0.40	0.33	0.30	0.18
		Liquid Manure Land Application	1.64	1.40	1.26	0.68	0.89	0.76	0.69	0.37	0.69	0.58	0.53	0.28	0.47	0.40	0.36	0.19	0.26	0.22	0.20	0.11	0.12	0.11	0.10	0.05	0.42	0.35	0.32	0.17
		Total	**3.16**	**2.70**	**2.43**	**1.38**	**1.71**	**1.47**	**1.33**	**0.75**	**1.33**	**1.13**	**1.02**	**0.57**	**0.90**	**0.77**	**0.69**	**0.38**	**0.51**	**0.43**	**0.38**	**0.22**	**0.24**	**0.21**	**0.18**	**0.10**	**0.82**	**0.68**	**0.61**	**0.35**
	NH3	Lagoons/Storage Ponds	8.20	8.20	5.90	5.90	4.20	4.20	3.02	3.02	2.20	2.20	1.56	1.56	1.50	1.50	1.06	1.06	1.20	1.20	0.86	0.86	0.35	0.35	0.25	0.25	3.00	3.00	2.16	2.16
		Liquid Manure Land Application	8.90	8.90	6.41	3.72	4.50	4.50	3.24	1.88	2.30	2.30	1.66	0.96	1.70	1.70	1.22	0.71	1.30	1.30	0.94	0.54	0.37	0.37	0.27	0.15	3.23	3.23	2.33	1.35
		Total	**17.10**	**17.10**	**12.31**	**9.62**	**8.70**	**8.70**	**6.26**	**4.90**	**4.50**	**4.50**	**3.24**	**2.54**	**3.20**	**3.20**	**2.30**	**1.79**	**2.50**	**2.50**	**1.80**	**1.41**	**0.72**	**0.72**	**0.52**	**0.41**	**6.23**	**6.23**	**4.49**	**3.51**
Solid Manure Handling	VOC	Solid Manure Storage	0.16	0.15	0.12	0.12	0.09	0.08	0.07	0.07	0.07	0.06	0.05	0.05	0.05	0.04	0.03	0.03	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	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.01	0.01	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	0.30	0.16	0.21	0.18	0.16	0.09	0.16	0.14	0.12	0.07	0.11	0.09	0.08	0.05	0.06	0.05	0.05	0.03	0.03	0.03	0.02	0.01	0.10	0.08	0.07	0.04
		Total	**0.61**	**0.54**	**0.47**	**0.33**	**0.33**	**0.29**	**0.25**	**0.18**	**0.26**	**0.23**	**0.20**	**0.14**	**0.17**	**0.15**	**0.13**	**0.09**	**0.10**	**0.08**	**0.07**	**0.06**	**0.05**	**0.04**	**0.04**	**0.03**	**0.16**	**0.14**	**0.12**	**0.09**
	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	1.50	0.87	1.06	1.06	0.76	0.44	0.55	0.55	0.40	0.23	0.39	0.39	0.28	0.16	0.30	0.30	0.22	0.13	0.09	0.09	0.06	0.04	0.76	0.76	0.55	0.32
		Total	**3.42**	**3.42**	**2.83**	**2.20**	**1.73**	**1.73**	**1.43**	**1.11**	**0.90**	**0.90**	**0.75**	**0.58**	**0.64**	**0.64**	**0.53**	**0.41**	**0.45**	**0.45**	**0.40**	**0.31**	**0.15**	**0.15**	**0.12**	**0.10**	**1.25**	**1.25**	**1.04**	**0.81**

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

		Silage Type	Uncontrolled	EF1	EF2
Feed Storage and Handling	VOC	Corn Silage	34,661	21,155	21,155
		Alfalfa Silage	17,455	10,649	10,649
		Wheat Silage	43,944	26,745	26,745
		TMR	13,096	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 Loafing Barns	2.73	SJVAPCD
Heifers/Bulls in Loafing Barns	5.26	SJVAPCD
Calves in Loafing Barns	0.69	SJVAPCD
Milk/Dry in Corrals	5.46	Based on a Summer 2003 study by Texas A&M ASAE at a West Texas Dairy
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
Calf above-ground flushed	0.069	SJVAPCD
Calf above-ground scraped	0.206	SJVAPCD

The controlled PM10 EF will be calculated based on the specific PM10 mitigation measures, if any, for each freestall, corral, or calf hutch area. See the PM Mitigation Measures for calculations.

Dairy Emission Factors

lb/hd-yr Dairy Emissions Factors for Jersey Cows

Note: Jersey cows will be assumed to generate 71% of the amount of VOC and NH3 emissions as a Holstein cow

			Milk Cows				Dry Cows				Large Heifers (15 to 24 months)				Medium Heifers (7 to 14 months)				Small Heifers (2 to 6 months)				Calves (0 - 3 months)				Bulls			
			Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled	
			<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2
Milking Parlor	VOC	Enteric Emissions in Milking Parlors	0.31	0.29	0.26	0.26	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
		Milking Parlor Floor	0.03	0.02	0.02	0.02	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
		Total	**0.34**	**0.31**	**0.28**	**0.28**	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
	NH3	**Total**	**0.13**	**0.13**	**0.10**	**0.10**	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
Cow Housing	VOC	Enteric Emissions in Cow Housing	2.76	2.62	2.36	2.36	1.66	1.58	1.43	1.43	1.29	1.22	1.09	1.09	0.87	0.83	0.75	0.75	0.49	0.46	0.41	0.41	0.23	0.22	0.20	0.20	0.78	0.74	0.66	0.66
		Corrals/Pens	7.10	4.69	3.61	3.61	3.83	2.55	1.96	1.96	2.96	1.96	1.51	1.51	2.02	1.33	1.03	1.03	1.14	0.74	0.57	0.57	0.53	0.36	0.27	0.27	1.81	1.19	0.91	0.91
		Bedding	0.75	0.71	0.58	0.58	0.40	0.39	0.31	0.31	0.31	0.30	0.24	0.24	0.21	0.20	0.16	0.16	0.12	0.11	0.09	0.09	0.06	0.05	0.04	0.04	0.19	0.18	0.14	0.14
		Lanes	0.60	0.57	0.46	0.46	0.32	0.31	0.25	0.25	0.25	0.24	0.19	0.19	0.17	0.16	0.13	0.13	0.10	0.09	0.07	0.07	0.04	0.04	0.03	0.03	0.15	0.14	0.12	0.12
		Total	**11.20**	**8.68**	**7.00**	**7.00**	**6.21**	**4.53**	**3.95**	**3.95**	**4.82**	**3.71**	**3.03**	**3.03**	**3.29**	**2.53**	**2.07**	**2.07**	**1.84**	**1.40**	**1.16**	**1.16**	**0.86**	**0.67**	**0.55**	**0.55**	**2.93**	**2.24**	**1.84**	**1.84**
	NH3	Enteric Emissions in Cow Housing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Corrals/Pens	29.75	29.75	10.71	10.71	15.05	15.05	5.42	5.42	7.81	7.81	2.81	2.81	5.61	5.61	2.02	2.02	4.26	4.26	1.53	1.53	1.28	1.28	0.46	0.46	10.86	10.86	3.91	3.91
		Bedding	4.47	4.47	1.68	1.68	2.27	2.27	0.86	0.86	1.21	1.21	0.45	0.45	0.85	0.85	0.32	0.32	0.64	0.64	0.24	0.24	0.21	0.21	0.08	0.08	1.63	1.63	0.61	0.61
		Lanes	3.82	3.82	2.61	2.61	1.85	1.85	1.33	1.33	0.92	0.92	0.66	0.66	0.71	0.71	0.51	0.51	0.50	0.50	0.36	0.36	0.14	0.14	0.10	0.10	1.35	1.35	0.97	0.97
		Total	**37.84**	**37.84**	**15.00**	**15.00**	**19.17**	**19.17**	**7.60**	**7.60**	**9.94**	**9.94**	**3.93**	**3.93**	**7.17**	**7.17**	**2.85**	**2.85**	**5.40**	**5.40**	**2.13**	**2.13**	**1.63**	**1.63**	**0.64**	**0.64**	**13.86**	**13.86**	**5.50**	**5.50**
Liquid Manure Handling	VOC	Lagoons/Storage Ponds	1.56	0.92	0.63	0.50	0.58	0.50	0.45	0.27	0.45	0.39	0.35	0.21	0.31	0.26	0.24	0.14	0.17	0.15	0.13	0.08	0.09	0.08	0.07	0.04	0.30	0.25	0.22	0.12
		Liquid Manure Land Application	1.16	0.99	0.89	0.48	0.63	0.54	0.49	0.26	0.49	0.42	0.37	0.20	0.33	0.28	0.25	0.14	0.19	0.16	0.14	0.08	0.09	0.08	0.07	0.04	0.30	0.25	0.22	0.12
		Total	**2.24**	**1.92**	**1.72**	**0.98**	**1.21**	**1.04**	**0.94**	**0.53**	**0.94**	**0.80**	**0.72**	**0.41**	**0.64**	**0.55**	**0.49**	**0.28**	**0.36**	**0.30**	**0.27**	**0.16**	**0.17**	**0.15**	**0.13**	**0.07**	**0.60**	**0.48**	**0.43**	**0.25**
	NH3	Lagoons/Storage Ponds	5.82	5.82	4.19	4.19	2.98	2.98	2.15	2.15	1.56	1.56	1.12	1.12	1.07	1.07	0.77	0.77	0.85	0.85	0.61	0.61	0.25	0.25	0.18	0.18	2.13	2.13	1.53	1.53
		Liquid Manure Land Application	6.32	6.32	4.55	2.64	3.20	3.20	2.30	1.33	1.63	1.63	1.18	0.68	1.21	1.21	0.87	0.50	0.92	0.92	0.66	0.39	0.26	0.26	0.19	0.11	2.29	2.29	1.65	0.96
		Total	**12.14**	**12.14**	**8.74**	**6.83**	**6.18**	**6.18**	**4.45**	**3.48**	**3.20**	**3.20**	**2.30**	**1.81**	**2.27**	**2.27**	**1.64**	**1.27**	**1.78**	**1.78**	**1.28**	**1.00**	**0.51**	**0.51**	**0.37**	**0.29**	**4.42**	**4.42**	**3.18**	**2.49**
Solid Manure Handling	VOC	Solid Manure Storage	0.11	0.11	0.09	0.09	0.06	0.06	0.05	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.02	0.02
		Separated Solids Piles	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
		Solid Manure Land Application	0.28	0.23	0.21	0.11	0.15	0.13	0.11	0.06	0.12	0.10	0.09	0.05	0.08	0.07	0.06	0.03	0.04	0.04	0.03	0.02	0.02	0.02	0.02	0.01	0.07	0.06	0.05	0.03
		Total	**0.43**	**0.38**	**0.33**	**0.23**	**0.23**	**0.21**	**0.18**	**0.13**	**0.18**	**0.16**	**0.14**	**0.10**	**0.12**	**0.11**	**0.09**	**0.07**	**0.07**	**0.06**	**0.05**	**0.04**	**0.03**	**0.03**	**0.03**	**0.02**	**0.11**	**0.10**	**0.09**	**0.06**
	NH3	Solid Manure Storage	0.67	0.67	0.67	0.67	0.34	0.34	0.34	0.34	0.16	0.16	0.16	0.16	0.13	0.13	0.13	0.13	0.09	0.09	0.09	0.09	0.03	0.03	0.03	0.03	0.25	0.25	0.25	0.25
		Separated Solids Piles	0.27	0.27	0.27	0.27	0.13	0.13	0.13	0.13	0.07	0.07	0.07	0.07	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.10	0.10	0.10	0.10
		Solid Manure Land Application	1.48	1.48	1.07	0.62	0.75	0.75	0.54	0.31	0.39	0.39	0.28	0.16	0.28	0.28	0.20	0.12	0.21	0.21	0.15	0.09	0.08	0.08	0.05	0.03	0.54	0.54	0.39	0.23
		Total	**2.43**	**2.43**	**2.01**	**1.56**	**1.23**	**1.23**	**1.02**	**0.79**	**0.64**	**0.64**	**0.53**	**0.41**	**0.46**	**0.46**	**0.38**	**0.29**	**0.34**	**0.34**	**0.28**	**0.22**	**0.11**	**0.11**	**0.09**	**0.07**	**0.89**	**0.89**	**0.74**	**0.57**

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 Loafing Barns	2.73	SJVAPCD
Heifers/Bulls in Loafing Barns	5.26	SJVAPCD
Calves in Loafing Barns	0.69	SJVAPCD
Milk/Dry in Corrals	5.46	Based on a Summer 2003 study by Texas A&M ASAE at a West Texas Dairy
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
Calf above-ground flushed	0.069	SJVAPCD
Calf above-ground scraped	0.206	SJVAPCD

The controlled PM10 EF will be calculated based on the specific PM10 mitigation measures, if any, for each freestall, corral, or calf hutch area. See the PM Mitigation Measures for calculations.

PM10 Mitigation Measures and Control Efficiencies

Control Measure	PM10 Control Efficiency
Shaded corrals (milk and dry cows)	16.7%
Shaded corrals (heifers and bulls)	8.3%
Downwind shelterbelts	12.5%
Upwind shelterbelts	10%
Freestall with no exercise pens and non-manure based bedding	90%
Freestall with no exercise pens and manure based bedding	80%
Fibrous layer in dusty areas (i.e. hay, etc.)	10%
Bi-weekly corral/exercise pen scraping and/or manure removal using a pull type manure harvesting equipment in morning hours when moisture in air except during periods of rainy weather	15%
Sprinkling of open corrals/exercise pens	15%
Feeding young stock (heifers and calves) near dusk	10%

Pre-Project PM10 Mitigation Measures

	Pre-Project PM10 Mitigation Measures														
	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows in Each Housing Structure(s)	Maximum Design Capacity of Each Structure	# of Combined Housing Structures in row	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk
1	Freestall #1	freestall	milk cows	480	480	1	☐	☐	☐	☐	☐	☐	☐	☐	☐
2	Freestall #2	freestall	milk cows	580	580	1	☐	☐	☐	☐	☐	☐	☐	☐	☐
3	Freestall #3	freestall	milk cows	640	640	1	☐	☐	☐	☐	☐	☐	☐	☐	☐
4	Freestall #4	freestall	milk cows	432	432	1	☐	☐	☐	☐	☐	☐	☐	☐	☐
5	Shade Barn #1	saudi style barn	dry cows	92	92	1	☑	☐	☐	☐	☐	☐	☐	☐	☐
6	Shade Barn #2	saudi style barn	dry cows	92	92	1	☑	☐	☐	☐	☐	☐	☐	☐	☐
7	Shade Barn #3	saudi style barn	dry cows	184	184	1	☑	☐	☐	☐	☐	☐	☐	☐	☐
8							☐	☐	☐	☐	☐	☐	☐	☐	☐
9							☐	☐	☐	☐	☐	☐	☐	☐	☐
10							☐	☐	☐	☐	☐	☐	☐	☐	☐
11							☐	☐	☐	☐	☐	☐	☐	☐	☐
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13							☐	☐	☐	☐	☐	☐	☐	☐	☐
14							☐	☐	☐	☐	☐	☐	☐	☐	☐
15							☐	☐	☐	☐	☐	☐	☐	☐	☐
16							☐	☐	☐	☐	☐	☐	☐	☐	☐
17							☐	☐	☐	☐	☐	☐	☐	☐	☐
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40							☐	☐	☐	☐	☐	☐	☐	☐	☐
			Pre-Project Total # of Cows	2,500											

Pre-Project PM10 Control Efficiencies and Emission Factors

	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows in Each Housing Structure(s)	Maximum Design Capacity of Each Structure	Uncontrolled EF (lb/hd-yr)	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk	Controlled EF (lb/hd-yr)
1	Freestall #1	freestall	milk cows	480	480	1.370										1.37
2	Freestall #2	freestall	milk cows	580	580	1.370										1.37
3	Freestall #3	freestall	milk cows	640	640	1.370										1.37
4	Freestall #4	freestall	milk cows	432	432	1.370										1.37
5	Shade Barn #1	saudi style barn	dry cows	92	92	1.370										1.37
6	Shade Barn #2	saudi style barn	dry cows	92	92	1.370										1.37
7	Shade Barn #3	saudi style barn	dry cows	184	184	1.370										
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37																
38																
39																
40			Pre-Project Total # of Cows	2,500												

Post-Project PM10 Mitigation Measures

Post-Project PM10 Mitigation Measures

	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows in Each Housing Structure(s)	Maximum Design Capacity of Each Structure	# of Combined Housing Structures in row	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk
1	Freestall #1	freestall	milk cows	500	500	1	☐	☐	☐	☐	☑	☐	☐	☐	☐
2	Freestall #2	freestall	milk cows	500	500	1	☐	☐	☐	☐	☑	☐	☐	☐	☐
3	Freestall #3	freestall	milk cows	500	500	1	☐	☐	☐	☐	☑	☐	☐	☐	☐
4	Freestall #4	freestall	milk cows	500	500	1	☐	☐	☐	☐	☑	☐	☐	☐	☐
5	Shade Barn 1	saudi style barn	dry cows	100	100	1	☑	☐	☐	☐	☐	☐	☑	☑	☐
6	Shade Barn 2	saudi style barn	dry cows	100	100	1	☑	☐	☐	☐	☐	☐	☑	☑	☐
7	Shade Barn 3	saudi style barn	dry cows	150	150	1	☑	☐	☐	☐	☐	☐	☑	☑	☐
8							☐	☐	☐	☐	☐	☐	☐	☐	☐
9							☐	☐	☐	☐	☐	☐	☐	☐	☐
10							☐	☐	☐	☐	☐	☐	☐	☐	☐
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13							☐	☐	☐	☐	☐	☐	☐	☐	☐
14							☐	☐	☐	☐	☐	☐	☐	☐	☐
15							☐	☐	☐	☐	☐	☐	☐	☐	☐
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Post-Project PM10 Mitigation Measures for New Housing Units at an Expanding Dairy

	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows in Each Housing Structure(s)	Maximum Design Capacity of Each Structure	# of Combined Housing Structures in row	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk
1	Freestall #5	freestall	milk cows	900	900	1	☐	☐	☐	☐	☑	☐	☐	☐	☐
2	Freestall #6	freestall	milk cows	900	900	1	☐	☐	☐	☐	☑	☐	☐	☐	☐
3	Freestall #7	freestall	milk cows	200	200	1	☐	☐	☐	☐	☑	☐	☐	☐	☐
4	Shade Barn 4	saudi style barn	dry cows	100	100	1	☑	☐	☐	☐	☐	☐	☑	☑	☐
5	Shade Barn 5	saudi style barn	dry cows	100	100	1	☑	☐	☐	☐	☐	☐	☑	☑	☐
6	Shade Barn 6	saudi style barn	dry cows	150	150	1	☑	☐	☐	☐	☐	☐	☑	☑	☐
7							☐	☐	☐	☐	☐	☐	☐	☐	☐
8							☐	☐	☐	☐	☐	☐	☐	☐	☐
9							☐	☐	☐	☐	☐	☐	☐	☐	☐
10							☐	☐	☐	☐	☐	☐	☐	☐	☐
11							☐	☐	☐	☐	☐	☐	☐	☐	☐
12							☐	☐	☐	☐	☐	☐	☐	☐	☐
13							☐	☐	☐	☐	☐	☐	☐	☐	☐
14							☐	☐	☐	☐	☐	☐	☐	☐	☐
	Post-Project Total # of Cows			4,700		(The post-project total includes		2,350	dairy cows already on-site and		2,350	new cows from the expansion.)			

Post-Project PM10 Control Efficiencies and Emission Factors

	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows in Each Housing Structure(s)	Maximum Design Capacity of Each Structure	Uncontrolled EF (lb/hd-yr)	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk	Controlled EF (lb/hd-yr)
1	Freestall #1	freestall	milk cows	500	500	1.370					80%					0.27
2	Freestall #2	freestall	milk cows	500	500	1.370					80%					0.27
3	Freestall #3	freestall	milk cows	500	500	1.370					80%					0.27
4	Freestall #4	freestall	milk cows	500	500	1.370					80%					0.27
5	Shade Barn 1	saudi style barn	dry cows	100	100	1.370							15%	15%		0.99
6	Shade Barn 2	saudi style barn	dry cows	100	100	1.370							15%	15%		0.99
7	Shade Barn 3	saudi style barn	dry cows	150	150	1.370							15%	15%		0.99
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Post-Project PM10 Control Efficiencies and Emission Factors for New Housing Emissions Units

	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows in Each Housing Structure(s)	Maximum Design Capacity of Each Structure	Uncontrolled EF (lb/hd-yr)	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk	Controlled EF (lb/hd-yr)
1	Freestall #5	freestall	milk cows	900	900	1.370					80%					0.27
2	Freestall #6	freestall	milk cows	900	900	1.370					80%					0.27
3	Freestall #7	freestall	milk cows	200	200	1.370					80%					0.27
4	Shade Barn 4	saudi style barn	dry cows	100	100	1.370							15%	15%		0.99
5	Shade Barn 5	saudi style barn	dry cows	100	100	1.370							15%	15%		0.99
6	Shade Barn 6	saudi style barn	dry cows	150	150	1.370							15%	15%		0.99
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Pre-Project Potential to Emit - Cow Housing

	Pre-Project Potential to Emit - Cow Housing											
	Housing Name(s) or #(s)	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
1	Freestall #1	milk cows	480	9.86	21.13	1.37	13.0	4,733	27.8	10,142	1.8	658
2	Freestall #2	milk cows	580	9.86	21.13	1.37	15.7	5,719	33.6	12,254	2.2	795
3	Freestall #3	milk cows	640	9.86	21.13	1.37	17.3	6,310	37.0	13,522	2.4	877
4	Freestall #4	milk cows	432	9.86	21.13	1.37	11.7	4,260	25.0	9,127	1.6	592
5	Shade Barn #1	dry cows	92	5.57	10.71	1.37	1.4	512	2.7	985	0.3	126
6	Shade Barn #2	dry cows	92	5.57	10.71	1.37	1.4	512	2.7	985	0.3	126
7	Shade Barn #3	dry cows	184	5.57	10.71	1.37	2.8	1,025	5.4	1,970	0.7	252
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	Pre-Project Total # of Cows		2,500				63.3	23,071	134.2	48,985	9.3	3,426

Pre-Project Totals						
Total # of Cows	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
2,500	63.3	23,071	134.2	48,985	9.3	3,426

Calculations:

Annual PE 1 for each pollutant (lb/yr) = Controlled EF (lb/hd-yr) x # of cows (hd)
Daily PE1 for each pollutant (lb/day) = [Controlled EF (lb/hd-yr) x # of cows (hd)] ÷ 365 (day/yr)

Post-Project Potential to Emit - Cow Housing

	Post-Project Potential to Emit - Cow Housing											
	Housing Name(s) or #(s)	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
1	Freestall #1	milk cows	500	9.86	21.13	0.27	13.5	4,930	28.9	10,564	0.4	137
2	Freestall #2	milk cows	500	9.86	21.13	0.27	13.5	4,930	28.9	10,564	0.4	137
3	Freestall #3	milk cows	500	9.86	21.13	0.27	13.5	4,930	28.9	10,564	0.4	137
4	Freestall #4	milk cows	500	9.86	21.13	0.27	13.5	4,930	28.9	10,564	0.4	137
5	Shade Barn 1	dry cows	100	5.57	10.71	0.99	1.5	557	2.9	1,071	0.3	99
6	Shade Barn 2	dry cows	100	5.57	10.71	0.99	1.5	557	2.9	1,071	0.3	99
7	Shade Barn 3	dry cows	150	5.57	10.71	0.99	2.3	836	4.4	1,606	0.4	149
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	Post-Project # of Cows (non-expansion)		2,350				59.3	21,670	125.8	46,004	2.6	895

	Post-Project Potential to Emit - Cow Housing: New Housing Units at an Expanding Dairy											
	Housing Name(s) or #(s)	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
1	Freestall #5	milk cows	900	9.86	21.13	0.27	24.3	8,874	52.1	19,015	0.7	247
2	Freestall #6	milk cows	900	9.86	21.13	0.27	24.3	8,874	52.1	19,015	0.7	247
3	Freestall #7	milk cows	200	9.86	21.13	0.27	5.4	1,972	11.6	4,226	0.2	55
4	Shade Barn 4	dry cows	100	5.57	10.71	0.99	1.5	557	2.9	1,071	0.3	99
5	Shade Barn 5	dry cows	100	5.57	10.71	0.99	1.5	557	2.9	1,071	0.3	99
6	Shade Barn 6	dry cows	150	5.57	10.71	0.99	2.3	836	4.4	1,606	0.4	149
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10												
11												
12												
13												
14												
	Total # of Cows From Expansion		2,350				59.3	21,670	126.0	46,004	2.6	896

Post-Project Totals						
Total # of Cows	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
4,700	118.6	43,340	251.8	92,008	5.2	1,791

Calculations:

Annual PE 2 for each pollutant (lb/yr) = Controlled EF (lb/hd-yr) x # of cows (hd)
Daily PE2 for each pollutant (lb/day) = [Controlled EF (lb/hd-yr) x # of cows (hd)] ÷ 365 (day/yr)

Pre-Project Potential to Emit (PE1)

Pre-Project Herd Size					
Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals
Milk Cows	2,132	0	0	0	2,132
Dry Cows	368	0	0	0	368
Support Stock (Heifers, Calves and Bulls)	0	0	0	0	0
Large Heifers	0	0	0	0	0
Medium Heifers	0	0	0	0	0
Small Heifers	0	0	0	0	0
Bulls	0	0	0	0	0

	Calf Hutches				Calf Corrals		
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	Total # of Calves
Calves	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	15	100	1,087
Alfalfa	0	0	0	
Wheat	1	15	50	600

Milking Parlor				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	2.3	853	0.8	292

Cow Housing						
Cow	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Total	63.3	23,071	134.2	48,985	9.3	3,426

Liquid Manure Handling						
Cow	VOC		NH3		H2S*	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	14.2	5,181	71.9	26,245	6.5	2,362
Dry Cows	1.3	489	6.3	2,304	0.6	212
Support Stock (Heifers, Calves and Bulls)	0.0	0	0.0	0	0	0
Large Heifers	0.0	0	0.0	0	0	0
Medium Heifers	0.0	0	0.0	0	0	0
Small Heifers	0.0	0	0.0	0	0	0
Calves	0.0	0	0.0	0	0	0
Bulls	0.0	0	0.0	0	0	0
Total	15.5	5,670	78.2	28,549	7.1	2,573

Solid Manure Handling				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	2.7	1,002	16.5	6,034
Dry Cows	0.3	92	1.4	526
Support Stock (Heifers, Calves and Bulls)	0.0	0	0.0	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
Calves	0.0	0	0.0	0
Bulls	0.0	0	0.0	0
Total	3.0	1,094	17.9	6,560

Feed Handling and Storage		
	Daily PE (lb-VOC/day)	Annual PE (lb-VOC/yr)
Corn Emissions	6.8	2,471
Alfalfa Emissions	0.0	0
Wheat Emissions	4.7	1,724
TMR	55.1	20,116
Total	66.6	24,311

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	2.3	0.8	0.0
Cow Housing	0.0	0.0	9.3	0.0	63.3	134.2	0.0
Liquid Manure	0.0	0.0	0.0	0.0	15.5	78.2	7.1
Solid Manure	0.0	0.0	0.0	0.0	3.0	17.9	0.0
Feed Handling	0.0	0.0	0.0	0.0	66.6	0.0	0.0
Total	0.0	0.0	9.3	0.0	150.7	231.1	7.1

Total Annual Pre-Project Potential to Emit (lb/yr)							
Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	853	292	0
Cow Housing	0	0	3,426	0	23,071	48,985	0
Liquid Manure	0	0	0	0	5,670	28,549	2,573
Solid Manure	0	0	0	0	1,094	6,560	0
Feed Handling	0	0	0	0	24,311	0	0
Total	0	0	3,426	0	54,999	84,385	2,573

Major Source Emissions (lb/yr)					
Permit	NOx	SOx	PM10	CO	VOC
Milk Parlor	0	0	0	0	0
Cow Housing	0	0	0	0	0
Liquid Manure	0	0	0	0	2,730
Solid Manure	0	0	0	0	0
Feed Handling	0	0	0	0	0
Total	0	0	0	0	2,730

Calculations for milking parlor:

Annual PE = (# milk cows) x (EF1 lb-pollutant/hd-yr)

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

Calculations for cow housing:

See detailed calculations under Cow Housing Calculations worksheet.

Calculations for liquid manure and solid manure handling:

Annual PE = [(# milk cows) x (EF1 lb-pollutant/hd-yr)] + [(# dry cows) x (EF1 lb-pollutant/hd-yr)] + [(# large heifers) x (EF1 lb-pollutant/hd-yr)] + [(# medium heifers) x (EF1 lb-pollutant/hd-yr)] + [(# small heifers) x (EF1 lb-pollutant/hd-yr)] + [(# calves) x (EF1 lb-pollutant/hd-yr)] + [(# bulls) x (EF1 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.

Calculations for silage emissions:

Annual PE = (EF1) x (area ft²) x (0.0929 m²/ft²) x (8,760 hr/yr) x (60 min/hr) x 2.20E-9 lb/µg

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

Calculation for TMR emissions:

Annual PE = (# cows) x (EF1) x (0.658 m³) x (525,600 min/yr) x (2.20E-9 lb/µg)

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

Calves are not included in TMR calculation.

*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.

Post-Project Potential to Emit (PE2)

Post-Project Herd Size					
Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals
Milk Cows	4,000	0	0	0	4,000
Dry Cows	700	0	0	0	700
Support Stock (Heifers, Calves, and Bulls)	0	0	0	0	0
Large Heifers	0	0	0	0	0
Medium Heifers	0	0	0	0	0
Small Heifers	0	0	0	0	0
Bulls	0	0	0	0	0

	Calf Hutches				Calf Corrals		
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	Total # of Calves
Calves	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	25	150	2,763
Alfalfa	1	25	150	2,763
Wheat	1	25	150	2,763

Milking Parlor				
Cow	VOC		NH3	
Milk Cows	lb/day	lb/yr	lb/day	lb/yr
Total	4.4	1,600	1.5	547

Cow Housing						
	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Total	118.6	43,340	251.8	92,008	5.2	1,791

Liquid Manure Handling						
Cow	VOC		NH3		H2S	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	15.1	5,520	105.4	38,480	6.5	2,362
Dry Cows	1.4	525	9.4	3,430	0.6	212
Support Stock (Heifers, Calves, and Bulls)	0.0	0	0.0	0	0	0
Large Heifers	0.0	0	0.0	0	0	0
Medium Heifers	0.0	0	0.0	0	0	0
Small Heifers	0.0	0	0.0	0	0	0
Calves	0.0	0	0.0	0	0	0
Bulls	0.0	0	0.0	0	0	0
Total	16.5	6,045	114.8	41,910	7.1	2,573

Solid Manure Handling				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	3.6	1,320	24.1	8,800
Dry Cows	0.3	126	2.1	777
Support Stock (Heifers, Calves, and Bulls)	0.0	0	0.0	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
Calves	0.0	0	0.0	0
Bulls	0.0	0	0.0	0
Total	3.9	1,446	26.2	9,577

Feed Handling and Storage		
	Daily PE (lb-VOC/day)	Annual PE (lb-VOC/yr)
Corn Emissions	17.2	6,279
Alfalfa Emissions	4.3	1,580
Wheat Emissions	21.7	7,938
TMR	103.6	37,818
Total	146.8	53,616

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 cow housing:

See detailed calculations under Cow Housing Calculations worksheet.

Calculations for liquid manure and solid manure handling:

Annual PE = [(# milk cows) x (EF1 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.

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 2.20E-9 lb/µg

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

Calculation for TMR emissions:

Annual PE = (# cows) x (EF2) x (0.658 m^3) x (525,600 min/yr) x (2.20E-9 lb/µg)

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

Calves are not included in TMR calculation.

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	4.4	1.5	0.0
Cow Housing	0.0	0.0	5.2	0.0	118.6	251.8	0.0
Liquid Manure	0.0	0.0	0.0	0.0	16.5	114.8	7.1
Solid Manure	0.0	0.0	0.0	0.0	3.9	26.2	0.0
Feed Handling	0.0	0.0	0.0	0.0	146.8	0.0	0.0
Total	0.0	0.0	5.2	0.0	290.2	394.3	7.1

Major Source Emissions (lb/yr)					
Permit	NOx	SOx	PM10	CO	VOC
Milk Parlor	0	0	0	0	0
Cow Housing	0	0	0	0	0
Liquid Manure	0	0	0	0	3,066
Solid Manure	0	0	0	0	0
Feed Handling	0	0	0	0	0
Total	0	0	0	0	3,066

Total Annual Post-Project Potential to Emit (lb/yr)							
Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	1,600	547	0
Cow Housing	0	0	1,791	0	43,340	92,008	0
Liquid Manure	0	0	0	0	6,045	41,910	2,573
Solid Manure	0	0	0	0	1,446	9,577	0
Feed Handling	0	0	0	0	53,616	0	0
Total	0	0	1,791	0	106,047	144,042	2,573

Increase in Emissions

SSIPE (lb/yr)							
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	747	256	0
Cow Housing	0	0	-1,635	0	20,269	43,023	0
Liquid Manure	0	0	0	0	375	13,361	0
Solid Manure	0	0	0	0	352	3,017	0
Feed Handling	0	0	0	0	29,305	0	0
Total	**0**	**0**	**-1,635**	**0**	**51,048**	**59,657**	**0**

Total Daily Change in Emissions (lb/day)							
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0.0	0.0	0.0	0.0	2.1	0.7	0.0
Cow Housing	0.0	0.0	-4.1	0.0	55.3	117.6	0.0
Liquid Manure	0.0	0.0	0.0	0.0	1.0	36.6	0.0
Solid Manure	0.0	0.0	0.0	0.0	0.9	8.3	0.0
Feed Handling	0.0	0.0	0.0	0.0	80.2	0.0	0.0
Total	**0.0**	**0.0**	**-4.1**	**0.0**	**139.5**	**163.2**	**0.0**

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	336	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**	**336**	**0**	**0**

Uncontrolled CH4 Emission Factors (lb/hd-yr)

Animal Type	CH4 (Anaerobic Treatment Lagoon)	CH4 (Lagoon)	CH4 (Manure Spreading)	CH4 (Solid Manure Storage)	CH4 (Enteric)	CO2 Equivalent Multiplier for CH4
Milk Cows	513	307.8	3.5	27.7	271.5	21
Dry Cows	513	307.8	3.5	27.7	271.5	21
Support Stock*	110.4	110.4	1.8	--	151.8	21
Large Heifers	110.4	110.4	1.8	--	151.8	21
Medium Heifers	110.4	110.4	1.8	--	100.5	21
Small Heifers	110.4	110.4	1.8	--	100.5	21
Calves	--	--	--	--	--	--
Bulls*	110.4	110.4	1.8	--	151.8	21

Uncontrolled CH4 Emission Factors (lb/hd-yr)

Animal Type	N2O (Anaerobic Treatment Lagoon)	N2O (Manure Spreading)	N2O (Solid Manure Storage)	N2O (Enteric)	CO2 Equivalent Multiplier for N2O
Milk Cows	1.5	0	2.8	0	310
Dry Cows	1.5	0	2.8	0	310
Support Stock*	1.4	0	--	0	310
Large Heifers	1.4	0	--	0	310
Medium Heifers	1.4	0	--	0	310
Small Heifers	1.4	0	--	0	310
Calves	--	0	--	0	--
Bulls*	1.4	0	--	0	310

*Emission factors for Support Stock and Bulls assumed to be the same as Large Heifers

1 short ton = 0.9072 metric ton

CO2e from CH4 = [CH4 (anaerobic treatment lagoon + CH4 manure spreading + CH4 solid manure storage + CH4 enteric] x 21 x 0.9072 metric tons/short tons ÷ 2000 lb/ton

CO2e from N2O = [N2O anaerobic treatment lagoon + N2O manure spreading + N2O solid manure storage + N2O enteric] x 310 x 0.9072 metric tons/short tons ÷ 2000 lb/ton

Pre-Project CO2e Emissions

Pre-Project Lagoon CO2e Emissions from CH4 (metric tons/yr)

Animal Type	Number of Cows	CH4 Lagoons (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (metric tons/yr)
Milk Cows	2,132	307.8	21.0	6,291
Dry Cows	368	307.8	21.0	1,079
Support Stock	0	110.4	21.0	0
Large Heifers	0	110.4	21.0	0
Medium Heifers	0	110.4	21.0	0
Small Heifers	0	110.4	21.0	0
Calves	0	--	--	0
Bulls	0	110.4	21.0	0

Pre-Project Non-Lagoons CO2e Emissions from CH4 (metric tons/yr)

Animal Type	Number of Cows	CH4 Manure Spreading (lbs/hd-yr)	CH4 Solid Manure Storage (lbs/hd-yr)	CH4 Enteric (lbs/hd-yr)	Multiplier	CO2e Non-Lagoons (metric tons/yr)
Milk Cows	2,132	3.5	27.7	271.5	21.0	6,147
Dry Cows	368	3.5	27.7	271.5	21.0	1,061
Support Stock	0	1.8	--	151.8	21.0	0
Large Heifers	0	1.8	--	151.8	21.0	0
Medium Heifers	0	1.8	--	100.5	21.0	0
Small Heifers	0	1.8	--	100.5	21.0	0
Calves	0	--	--	--	--	0
Bulls	0	1.8	--	151.8	21.0	0

Pre-Project Lagoon CO2e Emissions from N2O (metric tons/yr)

Animal Type	Number of Cows	N2O Lagoons (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (metric tons/yr)
Milk Cows	2,132	0.0	310.0	0
Dry Cows	368	0.0	310.0	0
Support Stock	0	0.0	310.0	0
Large Heifers	0	0.0	310.0	0
Medium Heifers	0	0.0	310.0	0
Small Heifers	0	0.0	310.0	0
Calves	0	0.0	--	0
Bulls	0	0.0	310.0	0

Pre-Project Non-Lagoons CO2e Emissions from N2O (metric tons/yr)

Animal Type	Number of Cows	N2O Manure Spreading (lbs/hd-yr)	N2O Solid Manure Storage (lbs/hd-yr)	N2O Enteric (lbs/hd-yr)	Multiplier	CO2e Non-Lagoons (metric tons/yr)
Milk Cows	2,132	0.0	2.8	0.0	310.0	779
Dry Cows	368	0.0	2.8	0.0	310.0	135
Support Stock	0	0.0	--	0.0	310.0	0
Large Heifers	0	0.0	--	0.0	310.0	0
Medium Heifers	0	0.0	--	0.0	310.0	0
Small Heifers	0	0.0	--	0.0	310.0	0
Calves	0	0.0	--	0.0	--	0
Bulls	0	0.0	--	0.0	310.0	0

Total Pre-Project CO2e Emissions (metric tons/yr)

Animal Type	CO2e from CH4	CO2e from N2O	Total
Milk Cows	12,288	779	13,178
Dry Cows	2,140	135	2,275
Support Stock	0	0	0
Large Heifers	0	0	0
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	15,453

Post-Project CO2e Emissions

Post-Project Lagoon CO2e Emissions from CH4 (metric tons/yr)

Animal Type	Number of Cows	CH4 Lagoons (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (metric tons/yr)
Milk Cows	4,000	513.0	21.0	19,547
Dry Cows	700	513.0	21.0	3,421
Support Stock	0	110.4	21.0	0
Large Heifers	0	110.4	21.0	0
Medium Heifers	0	110.4	21.0	0
Small Heifers	0	110.4	21.0	0
Calves	0	--	--	0
Bulls	0	110.4	21.0	0

Post-Project Non-Lagoons CO2e Emissions from CH4 (metric tons/yr)

Animal Type	Number of Cows	CH4 Manure Spreading (lbs/hd-yr)	CH4 Solid Manure Storage (lbs/hd-yr)	CH4 Enteric (lbs/hd-yr)	Multiplier	CO2e Non-Lagoons (metric tons/yr)
Milk Cows	4,000	3.5	27.7	271.5	21.0	11,534
Dry Cows	700	3.5	27.7	271.5	21.0	2,018
Support Stock	0	1.8	--	151.8	21.0	0
Large Heifers	0	1.8	--	151.8	21.0	0
Medium Heifers	0	1.8	--	100.5	21.0	0
Small Heifers	0	1.8	--	100.5	21.0	0
Calves	0	--	--	--	--	0
Bulls	0	1.8	--	151.8	21.0	0

Post-Project Lagoon CO2e Emissions from N2O (metric tons/yr)

Animal Type	Number of Cows	N2O Lagoons (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (metric tons/yr)
Milk Cows	4,000	1.5	310.0	844
Dry Cows	700	1.5	310.0	148
Support Stock	0	1.4	310.0	0
Large Heifers	0	1.4	310.0	0
Medium Heifers	0	1.4	310.0	0
Small Heifers	0	1.4	310.0	0
Calves	0	--	--	0
Bulls	0	1.4	310.0	0

Post-Project Non-Lagoons CO2e Emissions from N2O (metric tons/yr)

Animal Type	Number of Cows	N2O Manure Spreading (lbs/hd-yr)	N2O Solid Manure Storage (lbs/hd-yr)	N2O Enteric (lbs/hd-yr)	Multiplier	CO2e Non-Lagoons (metric tons/yr)
Milk Cows	4,000	0.0	2.8	0.0	310.0	1,482
Dry Cows	700	0.0	2.8	0.0	310.0	256
Support Stock	0	0.0	--	0.0	310.0	0
Large Heifers	0	0.0	--	0.0	310.0	0
Medium Heifers	0	0.0	--	0.0	310.0	0
Small Heifers	0	0.0	--	0.0	310.0	0
Calves	0	0.0	--	0.0	--	0
Bulls	0	0.0	--	0.0	310.0	0

Total Post-Project CO2e Emissions (metric tons/yr)

Animal Type	CO2e from CH4	CO2e from N2O	Total
Milk Cows	31,080	2,326	33,386
Dry Cows	5,439	404	5,843
Support Stock	0	0	0
Large Heifers	0	0	0
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	39,229

Change in CO2e Emissions

Change in Project GHG Emissions

Animal Type	Pre-Project CO2e (metric tons/yr)	Post-Project CO2e (metric tons/yr)	Change (metric tons/yr)
Milk Cows	13,178	33,386	20,208
Dry Cows	2,275	5,843	3,568
Support Stock	0	0	0
Large Heifers	0	0	0
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	23,776

Uncontrolled GHG Emission Factors (lb/hd-yr)

Animal Type	CH4 (Anaerobic Treatment Lagoon)	CH4 (Lagoon)	CH4 (Manure Spreading)**	CH4 (Solid Manure Storage)**	CH4 (Enteric)**	CO2 Equivalent Multiplier for CH4
Milk Cows	513	307.8	0	0	0	21
Dry Cows	513	307.8	0	0	0	21
Support Stock*	110.4	110.4	0	--	0	21
Large Heifers	110.4	110.4	0	--	0	21
Medium Heifers	110.4	110.4	0	--	0	21
Small Heifers	110.4	110.4	0	--	0	21
Calves	--	--	--	--	--	--
Bulls*	110.4	110.4	0	--	0	21

Uncontrolled GHG Emission Factors (lb/hd-yr)

Animal Type	N2O (Anaerobic Treatment Lagoon)	N2O (Manure Spreading)	N2O (Solid Manure Storage)**	N2O (Enteric)	CO2 Equivalent Multiplier for N2O
Milk Cows	1.5	0	0	0	310
Dry Cows	1.5	0	0	0	310
Support Stock*	1.4	0	--	0	310
Large Heifers	1.4	0	--	0	310
Medium Heifers	1.4	0	--	0	310
Small Heifers	1.4	0	--	0	310
Calves	--	0	--	0	--
Bulls*	1.4	0	--	0	310

Notes:

*Emission factors for Support Stock and Bulls are assumed to be the same as Large Heifers

**Fugitive emissions from dairies (non-lagoon) shall be excluded in determining if a source is a major source for PSD purposes.

Calculations:

CO2e from Lagoons = # Cows (hd) x [CH4/N2O Lagoon (lb/hd-yr) x Multiplier + 2000 lb/ton

CO2e from Non Lagoons = # Cows (hd) x [(CH4/N2O Manure Spreading (lb/hd-yr) + CH4/N2O Solid Manure Storage (lb/hd-yr) + CH4/N2O Enteric (lb/hd-yr)] x Multiplier ÷ 2000 lb/ton

Pre-Project CO2e Emissions

Pre-Project Lagoon CO2e Emissions from CH4 (short tons/yr)

Animal Type	Number of Cows with Manure Flushed to Lagoon	EF CH4 Lagoons (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (short tons/yr)
Milk Cows	2132	307.8	21	8,890
Dry Cows	368	307.8	21	1,189
Support Stock	0	110.4	21	0
Large Heifers	0	110.4	21	0
Medium Heifers	0	110.4	21	0
Small Heifers	0	110.4	21	0
Calves	0	--	--	0
Bulls	0	110.4	21	0

Pre-Project Non-Lagoons CO2e Emissions from CH4 (short tons/yr)

Animal Type	Number of Cows	EF CH4 Manure Spreading (lb/hd-yr)	EF CH4 Solid Manure Storage (lb/hd-yr)	EF CH4 Enteric (lb/hd-yr)	CO2e Multiplier	CO2e Non-Lagoons (short tons/yr)
Milk Cows	2,132	0.0	0.0	0.0	21	0
Dry Cows	368	0.0	0.0	0.0	21	0
Support Stock	0	0.0	--	0.0	21	0
Large Heifers	0	0.0	--	0.0	21	0
Medium Heifers	0	0.0	--	0.0	21	0
Small Heifers	0	0.0	--	0.0	21	0
Calves	0	--	--	--	--	0
Bulls	0	0.0	--	0.0	21	0

Pre-Project Lagoon CO2e Emissions from N2O (short tons/yr)

Animal Type	Number of Cows	EF N2O Anaerobic Treatment Lagoon (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (short tons/yr)
Milk Cows	2132	0.0	310	0
Dry Cows	368	0.0	310	0
Support Stock	0	0.0	310	0
Large Heifers	0	0.0	310	0
Medium Heifers	0	0.0	310	0
Small Heifers	0	0.0	310	0
Calves	0	0.0	--	0
Bulls	0	0.0	310	0

Pre-Project Non-Lagoons CO2e Emissions from N2O (short tons/yr)

Animal Type	Number of Cows	EF N2O Manure Spreading (lb/hd-yr)	EF N2O Solid Manure Storage (lb/hd-yr)	N2O Enteric (lb/hd-yr)	CO2e Multiplier	CO2e Non-Lagoons (short tons/yr)
Milk Cows	2,132	0.0	0.0	0.0	310	0
Dry Cows	368	0.0	0.0	0.0	310	0
Support Stock	0	0.0	--	0.0	310	0
Large Heifers	0	0.0	--	0.0	310	0
Medium Heifers	0	0.0	--	0.0	310	0
Small Heifers	0	0.0	--	0.0	310	0
Calves	0	0.0	--	0.0	--	0
Bulls	0	0.0	--	0.0	310	0

Total Pre-Project CO2e Emissions (short tons/yr)

Animal Type	CO2e from CH4	CO2e from N2O	Total
Milk Cows	8,890	0	8,890
Dry Cows	1,189	0	1,189
Support Stock	0	0	0
Large Heifers	0	0	0
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	0.000

Post-Project CO2e Emissions

Post-Project Lagoon CO2e Emissions from CH4 (short tons/yr)

Animal Type	Number of Cows with Manure Flushed to Lagoon	EF CH4 Anaerobic Treatment Lagoon (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (short tons/yr)
Milk Cows	4000	513.0	21	21,546
Dry Cows	700	513.0	21	3,771
Support Stock	0	110.4	21	0
Large Heifers	0	110.4	21	0
Medium Heifers	0	110.4	21	0
Small Heifers	0	110.4	21	0
Calves	0	--	--	0
Bulls	0	110.4	21	0

Post-Project Non-Lagoons CO2e Emissions from CH4 (short tons/yr)

Animal Type	Number of Cows	EF CH4 Manure Spreading (lb/hd-yr)	EF CH4 Solid Manure Storage (lb/hd-yr)	EF CH4 Enteric (lb/hd-yr)	CO2e Multiplier	CO2e Non-Lagoons (short tons/yr)
Milk Cows	4,000	0.0	0.0	0.0	21	0
Dry Cows	700	0.0	0.0	0.0	21	0
Support Stock	0	0.0	--	0.0	21	0
Large Heifers	0	0.0	--	0.0	21	0
Medium Heifers	0	0.0	--	0.0	21	0
Small Heifers	0	0.0	--	0.0	21	0
Calves	0	--	--	--	--	0
Bulls	0	0.0	--	0.0	21	0

Post-Project Lagoon CO2e Emissions from N2O (metric tons/yr)

Animal Type	Number of Cows	EF N2O Anaerobic Treatment Lagoon (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (metric tons/yr)
Milk Cows	4000	1.5	310	833
Dry Cows	700	1.5	310	163
Support Stock	0	1.4	310	0
Large Heifers	0	1.4	310	0
Medium Heifers	0	1.4	310	0
Small Heifers	0	1.4	310	0
Calves	0	--	--	0
Bulls	0	1.4	310	0

Post-Project Non-Lagoons CO2e Emissions from N2O (short tons/yr)

Animal Type	Number of Cows	EF N2O Manure Spreading (lb/hd-yr)	EF N2O Solid Manure Storage (lb/hd-yr)	EF N2O Enteric (lb/hd-yr)	CO2e Multiplier	CO2e Non-Lagoons (short tons/yr)
Milk Cows	4,000	0.0	0.0	0.0	310	0
Dry Cows	700	0.0	0.0	0.0	310	0
Support Stock	0	0.0	--	0.0	310	0
Large Heifers	0	0.0	--	0.0	310	0
Medium Heifers	0	0.0	--	0.0	310	0
Small Heifers	0	0.0	--	0.0	310	0
Calves	0	0.0	--	0.0	--	0
Bulls	0	0.0	--	0.0	310	0

Total Post-Project CO2e Emissions (short tons/yr)

Animal Type	CO2e from CH4	CO2e from N2O	Total
Milk Cows	21,546	930	22,476
Dry Cows	3,771	163	3,933
Support Stock	0	0	0
Large Heifers	0	0	0
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	26,409

Change in CO2e Emissions

Change in Project GHG Emissions

Animal Type	Pre-Project CO2e (short tons/yr)	Post-Project CO2e (short tons/yr)	Change (short tons/yr)
Milk Cows	8,890	22,476	13,586
Dry Cows	1,189	3,933	2,744
Support Stock	0	0	0
Large Heifers	0	0	0
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	16,330

☐Check the box to the left to hide all unused rows. Uncheck to show or unhide all rows.

	SSIPE RMR - Cow Housing								
	Housing Name(s) or #(s)	Type of Cow	# of Cows Added	VOC Increase (lb/hr)	VOC Increase (lb/yr)	NH3 Increase (lb/hr)	NH3 Increase (lb/yr)	PM10 Increase (lb/hr)	PM10 Increase (lb/yr)
	Existing/Modified Cow Housing								
1	Freestall #1	milk cows	20	0.0	197	27.7	422	-0.1	-521
2	Freestall #2	milk cows	-80	-0.1	-789	27.5	-1,690	-0.1	-658
3	Freestall #3	milk cows	-140	-0.2	-1,380	27.4	-2,958	-0.1	-740
4	Freestall #4	milk cows	68	0.1	670	27.9	1,437	-0.1	-455
5	Shade Barn #1	dry cows	8	0.0	45	2.8	86	0.0	-27
6	Shade Barn #2	dry cows	8	0.0	45	2.8	86	0.0	-27
7	Shade Barn #3	dry cows	-34	0.0	-189	4.2	-364	0.0	-103
8									
9									
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14									
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16									
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32									
33									
34									
35									
36									
37									
38									
39									
40									
	New Cow Housing								
41	Freestall #5	milk cows	900	1.0	8,874	2.2	19,015	0.0	247
42	Freestall #6	milk cows	900	1.0	8,874	2.2	19,015	0.0	247
43	Freestall #7	milk cows	200	0.2	1,972	0.5	4,226	0.0	55
44	Shade Barn 4	dry cows	100	0.1	557	0.1	1,071	0.0	99
45	Shade Barn 5	dry cows	100	0.1	557	0.1	1,071	0.0	99
46	Shade Barn 6	dry cows	150	0.1	836	0.2	1,606	0.0	149
47									
48									
49									
50									
51									
52									
53									
54									

SSIPE RMR Summary							
	PM10 lb/hr	PM10 lb/yr	VOC lb/hr	VOC lb/yr	NH3 lb/hr	NH3 lb/yr	H2S lb/yr
Milking Parlor	-	-	0.1	747	0.0	256	-
Cow Housing	-0.2	-1,635	2.3	20,269	4.9	43,023	-
Liquid Manure	-	-	0.0	375	1.5	13,361	-
Solid Manure	-	-	0.0	352	0.3	3,017	-
Feed Handling	-	-	3.3	29,305	-	-	-
Lagoon/Storage Pond	-	-	0.2	1,460	1.4	12,045	0
Land Application (Liquid)	-	-	0.2	1,387	0.9	7,553	-
Land Application (Solid)	-	-	0.0	356	0.2	1,764	-
Solid Manure Storage	-	-	0.0	365	0.3	2,701	-

SSIPE Total Herd Summary	
Total Milk Cows	4,000
Total Dairy Head	4,700
Total Dairy Head (Flushed)	2,200

Appendix E

BACT Calculations

BACT Applicability

Milking Parlor					
VOC Emissions					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	4 4	2 3	0 40	0 40	2 1
BACT triggered for VOC for milking parlor				Total	2.1
NH3 Emissions					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	1 5	0 8	0 14	0.14	0 7
				Total	0.7

Cow Housing
See detailed cow housing AIPE calculations on following pages.

Liquid Manure Handling					
VOC Emissions - Lagoon/Storage Pond(s)					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	7 7	6 8	0.70	1 17	3 6
Dry Cows	0 7	0.6	0 38	0 64	0 3
Support Stock (Heifers, Calves, and Bulls)	0 0	0 0	0 29	0 49	0 0
Large Heifers	0 0	0 0	0 29	0 49	0 0
Medium Heifers	0 0	0 0	0 20	0 33	0 0
Small Heifers	0 0	0.0	0 11	0 19	0 0
Calves	0 0	0 0	0 05	0 09	0 0
Bulls	0 0	0 0	0 18	0 30	0 0
BACT triggered for VOC for Lagoon/Storage Ponds				Total	4.0
VOC Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	7 5	7 4	0.68	1 26	3 5
Dry Cows	0 7	0 7	0 37	0 69	0 3
Support Stock (Heifers, Calves, and Bulls)	0 0	0 0	0 28	0 53	0 0
Large Heifers	0 0	0 0	0 28	0 53	0 0
Medium Heifers	0 0	0 0	0 19	0 36	0 0
Small Heifers	0 0	0 0	0 11	0 20	0 0
Calves	0 0	0 0	0 05	0 10	0 0
Bulls	0 0	0 0	0 17	0 32	0 0
BACT triggered for VOC for Liquid Manure Land Application				Total	3.8
NH3 Emissions - Lagoon/Storage Pond(s)					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	64 7	34 5	5 90	5 90	30 2
Dry Cows	5 8	3 0	3 02	3.02	2 8
Support Stock (Heifers, Calves, and Bulls)	0.0	0.0	1 58	1.58	0 0
Large Heifers	0 0	0 0	1.58	1 58	0 0
Medium Heifers	0 0	0 0	1 08	1 08	0 0
Small Heifers	0 0	0 0	0 86	0 86	0 0
Calves	0 0	0 0	0 25	0 25	0 0
Bulls	0 0	0 0	2 16	2 16	0 0
BACT triggered for NH3 for Lagoon/Storage Ponds				Total	33.0
NH3 Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	40.7	37 4	3 72	6 41	19 0
Dry Cows	3 6	3 3	1 88	3 24	1 7
Support Stock (Heifers, Calves, and Bulls)	0 0	0 0	0 96	1 66	0 0
Large Heifers	0 0	0 0	0 96	1 66	0 0
Medium Heifers	0 0	0 0	0 71	1.22	0 0
Small Heifers	0 0	0 0	0.54	0 94	0 0
Calves	0 0	0 0	0 15	0 27	0 0
Bulls	0 0	0 0	1.35	2 33	0 0
BACT triggered for NH3 for Liquid Manure Land Application				Total	20.7
H2S Emissions - Lagoon/Storage Pond(s)					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	6 5	6 5	0.59	0 59	0 0
Dry Cows	0 6	0 6	0 30	0.30	0 0
Support Stock (Heifers, Calves, and Bulls)	0 0	0 0	0 16	0 16	0 0
Large Heifers	0 0	0 0	0 16	0 16	0 0
Medium Heifers	0 0	0 0	0 11	0 11	0 0
Small Heifers	0 0	0 0	0 09	0 09	0.0
Calves	0 0	0 0	0 03	0 03	0 0
Bulls	0 0	0 0	0 22	0 22	0 0
				Total	0.0

Solid Manure Handling					
VOC Emissions - Solid Manure Storage/Separated Solids Piles					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	1 9	1 0	0.17	0 17	0 9
Dry Cows	0 2	0 1	0 09	0 09	0 1
Support Stock (Heifers, Calves, and Bulls)	0 0	0 0	0 10	0 07	0 0
Large Heifers	0 0	0 0	0 07	0 07	0 0
Medium Heifers	0 0	0 0	0 05	0 05	0 0
Small Heifers	0.0	0 0	0 03	0 03	0 0
Calves	0.0	0 0	0 01	0 01	0 0
Bulls	0 0	0 0	0 05	0 05	0 0
				Total	1.0
VOC Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	1 8	1 7	0.16	0 30	0 9
Dry Cows	0 2	0 2	0.09	0 16	0 1
Support Stock (Heifers, Calves, and Bulls)	0 0	0 0	0.07	0 12	0.0
Large Heifers	0.0	0 0	0 07	0 12	0.0
Medium Heifers	0 0	0 0	0 05	0 08	0 0
Small Heifers	0.0	0 0	0 03	0 05	0 0
Calves	0 0	0 0	0 01	0 02	0 0
Bulls	0 0	0 0	0 04	0 07	0 0
				Total	1.0
NH3 Emissions - Solid Manure Storage/Separated Solids Piles					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	14 6	7 8	1 33	1.33	6 8
Dry Cows	1.3	0 7	0 67	0 67	0 6
Support Stock (Heifers, Calves, and Bulls)	0 0	0 0	0 35	0 35	0 0
Large Heifers	0 0	0 0	0 35	0 35	0 0
Medium Heifers	0 0	0 0	0 25	0 25	0 0
Small Heifers	0 0	0 0	0 18	0 18	0 0
Calves	0 0	0 0	0 06	0.06	0 0
Bulls	0 0	0 0	0 49	0 49	0 0
BACT triggered for NH3 for Solid Manure Storage				Total	7.4
NH3 Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	9 6	6 8	0 67	1 50	4 5
Dry Cows	0 8	0 8	0 44	0 75	0.3
Support Stock (Heifers, Calves, and Bulls)	0 0	0 0	0 23	0 40	0 0
Large Heifers	0 0	0 0	0 23	0 40	0 0
Medium Heifers	0 0	0 0	0 16	0 28	0 0
Small Heifers	0 0	0 0	0 13	0 22	0 0
Calves	0 0	0 0	0 04	0 06	0 0
Bulls	0 0	0 0	0 32	0 55	0 0
BACT triggered for NH3 for Solid Manure Land Application				Total	4.8

Feed Storage and Handling					
VOC Emissions - Silage					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Corn Silage	17 2	6.8	21,155	21,155	10.4
Alfalfa Silage	4.3	0.0	10,649	10,649	4 3
Wheat Silage	21 7	4.7	26,745	26,745	17 0
BACT triggered for VOC for Silage				Total	31.7
VOC Emissions - TMR					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
TMR	103 6	55 1	10,575	10,575	48 5
BACT triggered for VOC for TMR				Total	48.5

Cow Housing - VOC Emissions

	Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)	BACT Triggered?
1	Freestall #1	13.5	13.0	9.86	9.86	0.5	No
2	Freestall #2	13.5	15.7	9.86	9.86	-2.2	No
3	Freestall #3	13.5	17.3	9.86	9.86	-3.8	No
4	Freestall #4	13.5	11.7	9.86	9.86	1.8	No
5	Shade Barn 1	1.5	1.4	5.57	5.57	0.1	No
6	Shade Barn 2	1.5	1.4	5.57	5.57	0.1	No
7	Shade Barn 3	2.3	2.8	5.57	5.57	-0.5	No
8							
9							
10							
11							
12							
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40							

New Units from Expansion

	Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)	BACT Triggered?
1	Freestall #5	24.3	0.0	9.86	0.00	24.3	Yes
2	Freestall #6	24.3	0.0	9.86	0.00	24.3	Yes
3	Freestall #7	5.4	0.0	9.86	0.00	5.4	Yes
4	Shade Barn 4	1.5	0.0	5.57	0.00	1.5	No
5	Shade Barn 5	1.5	0.0	5.57	0.00	1.5	No
6	Shade Barn 6	2.3	0.0	5.57	0.00	2.3	Yes
7							
8							
9							
10							
11							
12							
13							
14							

Cow Housing - NH3 Emissions

Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)	BACT Triggered?
Freestall #1	28.9	27.8	21.13	21.13	1.1	No
Freestall #2	28.9	33.6	21.13	21.13	-4.7	No
Freestall #3	28.9	37.0	21.13	21.13	-8.1	No
Freestall #4	28.9	25.0	21.13	21.13	3.9	Yes
Shade Barn 1	2.9	2.7	10.71	10.71	0.2	No
Shade Barn 2	2.9	2.7	10.71	10.71	0.2	No
Shade Barn 3	4.4	5.4	10.71	10.71	-1.0	No

New Units from Expansion

Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)	BACT Triggered?
Freestall #5	52.1	0.0	21.13	0.00	52.1	Yes
Freestall #6	52.1	0.0	21.13	0.00	52.1	Yes
Freestall #7	11.6	0.0	21.13	0.00	11.6	Yes
Shade Barn 4	2.9	0.0	10.71	0.00	2.9	Yes
Shade Barn 5	2.9	0.0	10.71	0.00	2.9	Yes
Shade Barn 6	4.4	0.0	10.71	0.00	4.4	Yes

*Multiple emissions units (freestalls, corrals, calf hutch areas, etc.) are combined in these rows. BACT applicability has been calculated for EACH emissions unit in this row.

Cow Housing - PM10 Emissions

	Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)	BACT Triggered?
1	Freestall #1	0 4	1.8	0 27	1.37	0 0	No
2	Freestall #2	0 4	2 2	0 27	1.37	0 0	No
3	Freestall #3	0 4	2 4	0 27	1.37	-0 1	No
4	Freestall #4	0 4	1 6	0 27	1 37	0 1	No
5	Shade Barn 1	0 3	0 3	0 99	1 37	0 1	No
6	Shade Barn 2	0 3	0 3	0 99	1.37	0 1	No
7	Shade Barn 3	0 4	0 7	0 99	1.37	-0 1	No
8							
9							
10							
11							
12							
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40							

New Units from Expansion

	Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)	BACT Triggered?
1	Freestall #5	0 7	0 0	0 27	0 00	0 7	No
2	Freestall #6	0 7	0 0	0 27	0 00	0 7	No
3	Freestall #7	0 2	0 0	0 27	0 00	0 2	No
4	Shade Barn 4	0 3	0 0	0 99	0 00	0 3	No
5	Shade Barn 5	0 3	0 0	0 99	0 00	0 3	No
6	Shade Barn 6	0 4	0 0	0 99	0 00	0 4	No
7							
8							
9							
10							
11							
12							
13							
14							

*Multiple emissions units (freestalls, corrals, calf hutch areas, etc) are combined in these rows BACT applicability has been calculated for EACH emissions unit in this row

Appendix F

BACT Guidelines

San Joaquin Valley Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.7.X*

Last Update: XXXX XX, 2015

Emissions Unit: Milking Center

Pollutant	Achieved in Practice or contained in SIP	Technologically Feasible	Alternate Basic Equipment
VOC	Flush/Spray before, after, or during milking each group of cows		
Ammonia	Flush/Spray before, after, or during milking each group of cows		

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

*This is a Summary Page for this Class of Source

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline X.Y.Z

Emission Unit: Dairy Cow Housing – Free Stall and Saudi-Style Barns

Industry Type: Agricultural Operation

Equipment Rating:

Last Update:

Pollutant	Achieved in Practice or contained in SIP	Technologically Feasible	Alternate Basic Equipment
PM_{10}	- Concrete feed lanes and walkways; - Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions		
VOC	- Concrete feed lanes and walkways; - Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, Scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning lanes and walkways for support stock (heifers) at least once per day); - Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines; - Properly sloping corrals (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing corrals to maintain a dry surface; - Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions; and - Rule 4570 Measures		
Ammonia	- Concrete feed lanes and walkways; - Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, Scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning lanes and walkways for support stock (heifers) at least once per day); - Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines; - Properly sloping corrals (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing corrals to maintain a dry surface; and - Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions;		

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

***This is a Summary Page for this Class of Source - Permit Specific BACT Determinations on Next Page(s)**

San Joaquin Valley Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.7.X*

Last Update: December 18, 2013

Emissions Unit: Liquid Manure Handling at Dairies

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

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

***This is a Summary Page for this Class of Source** **4th Quarter 2016**

San Joaquin Valley Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.7.X*

Last Update: December 18, 2013

Emissions Unit: Liquid/Slurry Manure Land Application

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

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

***This is a Summary Page for this Class of Source** **4th Quarter 2016**

San Joaquin Valley Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.7.X*

Last Update: December 18, 2013

Emissions Unit: Solid Manure Land Application

Pollutant	Achieved in Practice or contained in SIP	Technologically Feasible	Alternate Basic Equipment
VOC	Rapid incorporation of solid manure into the soil after land application	1) Land Application of Solid Manure Processed by Either an Open or Enclosed Negatively-Aerated Static Pile (ASP) Vented to a biofilter (or equivalent) ≥ 80% destruction efficiency With Rapid Incorporation of the Manure Into the Soil After Land Application; 2) Land Application of Solid Manure Processed by In-Vessel/Enclosed Negatively-Aerated Static Piles vented to biofilter ≥ 80% destruction efficiency 3) Land Application of Solid Manure Processed by Open Negatively-Aerated Static Piles vented to biofilter ≥ 80% destruction efficiency 4) Land Application of Solid Manure Processed by an Open Negatively-Aerated Static Piles (ASP) (With Thick Layer of Bulking Agent or Equivalent) With Rapid Incorporation of the Manure Into the Soil After Land Application	
Ammonia	Rapid incorporation of solid manure into the soil after land application, and all animals fed in accordance with NRC or other District-approved guidelines		

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

***This is a Summary Page for this Class of Source** **4th Quarter 2016**

San Joaquin Valley Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.7.X*

Last Update: December 18, 2013

Emissions Unit: Solid Manure Handling at Dairies

Pollutant	Achieved in Practice or contained in SIP	Technologically Feasible	Alternate Basic Equipment
VOC	All animals fed in accordance with NRC or other District-approved guidelines		
Ammonia	All animals fed in accordance with NRC or other District-approved guidelines		

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

***This is a Summary Page for this Class of Source** **4th Quarter 2016**

San Joaquin Valley Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.7.X*

Last Update: 2015

Emissions Unit: Dairy Feed Storage and Handling System – Total Mixed Ration (TMR)

Pollutant	Achieved in Practice or contained in SIP	Technologically Feasible	Alternate Basic Equipment
VOC	District Rule 4570 Measures		

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

Appendix G

BACT Analysis

I. Top-Down BACT Analysis for the Milking Parlor

1. VOC Emissions

a. Step 1 - Identify all control technologies

The following option has been identified as a possible control for VOC emissions from the milking parlor:

1) Flush/spray before, after, or during milking each group of cows

Description of Control Technology

Flush/Spray Before, After, or During Milking Each Group of Cows

Almost all dairy operations utilize some type of flush or spray system to wash out the manure that's deposited in the milking parlor. The primary purpose of the flush or spray system is to maintain the minimum level of sanitation required in the milking parlor. 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 many times a day by flushing. 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 into the air. The flush water can then carry the manure and the dissolved volatile compounds to an anaerobic treatment system where they are digested by microbial activity and converted into less polluting compounds such as methane and carbon dioxide.

b. Step 2 - Eliminate technologically infeasible options

The option identified in step 1 is technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

Only one option was previously identified in step 1:

1) Flush/spray before, after, or during milking each group of cows

d. Step 4 - Cost Effectiveness Analysis

Flush/Spray Before, After, or During Milking Each Group of Cows

The applicant has proposed this option. In addition, this option is achieved in practice. A cost effectiveness analysis is therefore not required.

e. Step 5 - Select BACT

The applicant has proposed to flush/spray the milking parlor before, after, or during

milking each group of cows. The proposal satisfies BACT for this category.

I. Top-Down BACT Analysis for the Cow Housing

VOC: New Freestall Barn Areas (# 5, #6, & #7) and Shaded Barn Area (#6)
NH3: New Freestall Barn Area (#5, 6, & 7), Shade Barn Areas (#4, 5 & 6) & Existing Freestall Barn Area (#4)

1. VOC Emissions

a. Step 1 - Identify all control technologies

The following options have been identified as possible controls for VOC emissions from cow housing freestall barns and Saudi-style barns using flush cleaning:

1) Feed and Manure Management Practices
   - Concrete feed lanes and walkways;
   - Flushing feed lanes and walkways for mature cows (milk and dry cows) at least four times per day and flushing feed lanes and walkways for support stock at least once per day;
   - Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
   - Properly sloping exercise pens/corrals (minimum slope of 3% where the available space for each animal is 400 square feet or less and 1.5% where the available space for each animal is more than 400 square feet) or managing exercise pens/corrals to maintain a dry surface;
   - Scraping exercise pens/corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions; and
   - Rule 4570 measures.

Description of Control Technologies

Concrete feed lanes and walkways

Dairy cows spend a large proportion of time on the feed lanes and walkways. A significant proportion of manure is consequently deposited in these areas. The concrete lanes and walkways are necessary for an effective flush system, which in turn is a key component of management practices used for the control of VOC and ammonia emissions (see below).

Increased flushing of feed lanes and walkways

Many dairy operations use a flush system to remove manure from the feed lanes and walkways. The flush system introduces a large volume of water at the head of the paved area, and the cascading water carries the manure downslope. The required volume of flush water varies with the size and slope of the area to be flushed.

In addition to cleaning the feed lanes and walkways, the flush system also serves as an emissions control method. 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 proportion of these compounds will dissolve in the flush water instead of being emitted directly from the housing areas. The flush water then carries the manure and the dissolved volatile compounds into an anaerobic treatment system where they are digested and converted into less polluting byproducts by microbial activity.

Feed lanes and walkways are typically flushed once or twice per day in the mature cow housing areas; and as infrequently as once a week in the support stock housing areas. Flushing the lanes four times per day for mature cows and once per day for support stock will increase the frequency with which manure is removed from the housing areas, which should result in a higher percentage of soluble volatile compounds being captured in the flush water, and therefore higher control efficiency. Although the control efficiency 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 in cow housing areas, until better data becomes available.

Feeding all animals 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 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.[13] This undigested protein also produces ammonia 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 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 nutrients 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 cows in accordance with National Research Council (NRC) or other District-approved guidelines will be conservatively assumed to have a control efficiency of only 5-10% for both enteric[14] and manure VOC emissions.

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

[14] Enteric emissions are those emitted directly from the animal (primarily via belching and flatulence), due to feed digestion processes.

Properly sloping exercise pens/corrals

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

Scraping of exercise pens/corrals with a pull-type scraper

Frequent scraping of the corrals will reduce the amount of manure on the pen/corral surfaces, which will reduce VOC and ammonia emissions resulting from decomposition of this manure. This practice will also provide a uniform surface that promotes aerobic conditions on the pen/corral surface, which will reduce gaseous pollutants from this area.

b. Step 2 - Eliminate technologically infeasible options

All the options identified in step 1 are technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

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

1) Feed and Manure Management Practices
   - Concrete feed lanes and walkways;
   - Flushing feed lanes and walkways for mature cows (milk and dry cows) at least four times per day and flushing feed lanes and walkways for support stock at least once per day;
   - Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
   - Properly sloping exercise pens/corrals (minimum slope of 3% where the available space for each animal is 400 square feet or less and 1.5% where the available space for each animal is more than 400 square feet) or managing exercise pens/corrals to maintain a dry surface;
   - Scraping exercise pens/corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions; and
   - Rule 4570 measures.

d. Step 4 - Cost Effectiveness Analysis

Feed and Manure Management Practices

- Concrete feed lanes and walkways;

- Flushing feed lanes and walkways for mature cows (milk and dry cows) at least four times per day and flushing feed lanes and walkways for support stock at least once per day;
- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
- Properly sloping exercise pens/corrals (minimum slope of 3% where the available space for each animal is 400 square feet or less and 1.5% where the available space for each animal is more than 400 square feet) or managing exercise pens/corrals to maintain a dry surface;
- Scraping exercise pens/corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions; and
- Rule 4570 measures.

The applicant has proposed these options. In addition, these options are achieved in practice. A cost effectiveness analysis is therefore not required.

e. Step 5 - Select BACT

The applicant has proposed the following feed and manure management practices:

- Concrete feed lanes and walkways;
- Flushing feed lanes and walkways for mature cows (milk and dry cows) at least four times per day and flushing feed lanes and walkways for support stock at least once per day;
- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
- Properly sloping exercise pens/corrals (minimum slope of 3% where the available space for each animal is 400 square feet or less and 1.5% where the available space for each animal is more than 400 square feet) or managing exercise pens/corrals to maintain a dry surface;
- Scraping exercise pens/corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions; and
- Rule 4570 measures.

The proposal satisfies BACT for this category.

2. <u>Ammonia (NH_3) Emissions</u>

a. Step 1 - Identify all control technologies

The following options have been identified as possible controls for ammonia emissions from cow housing freestall barns using flush cleaning and open corrals:

1) Feed and Manure Management Practices

   - Concrete feed lanes and walkways;

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

Description of Control Technologies

Concrete feed lanes and walkways

Dairy cows spend a large proportion of time on the feed lanes and walkways. A significant proportion of manure is consequently deposited in these areas. The concrete lanes and walkways are necessary for an effective flush system, which in turn is a key component of management practices used for the control of VOC and ammonia emissions (see below).

Increased Flushing for feed lanes and walkways

Many dairy operations use a flush system to remove manure from the feed lanes and walkways. The flush system introduces a large volume of water at the head of the paved area, and the cascading water carries the manure downslope. The required volume of flush water varies with the size and slope of the area to be flushed.

In addition to cleaning the feed lanes and walkways, the flush system also serves as an emissions control method. Ammonia is highly soluble in water. Therefore, a large proportion of ammonia in manure will dissolve in the flush water instead of being emitted directly from the housing areas. The flush water then carries the manure and the dissolved ammonia into the liquid manure storage system, where ammonia can be sequestered until it is applied to cropland as a nitrogen fertilizer.

Feed lanes and walkways are typically flushed once or twice per day in the mature cow housing areas; and as infrequently as once a week in the support stock housing areas. Flushing the lanes four times per day for mature cows and once per day for support stock will increase the frequency with which manure is removed from the housing areas, which should result in a higher percentage of ammonia being captured in the flush water, and therefore higher control efficiency.

Feeding all animals 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 present, hence the lower the level of nitrogen the lower the level of microbial action and the lower the production of ammonia.

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 VOC 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.

Properly sloping exercise pens/corrals

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

b. Step 2 - Eliminate technologically infeasible options

All the options identified in step 1 are technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

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

1) Feed and Manure Management Practices

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

d. Step 4 - Cost Effectiveness Analysis

Feed and Manure Management Practices

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

The applicant has proposed these options. In addition, these options are achieved in practice. A cost effectiveness analysis is therefore not required.

e. Step 5 - Select BACT

The applicant has proposed the following feed and manure management practices:

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

The proposal satisfies BACT for this category.

III. Top-Down BACT Analysis for the Liquid Manure Handling System - Lagoon & Storage Pond

1. VOC Emissions

a. Step 1 - Identify all control technologies

The following options were identified as possible controls for VOC emissions from the lagoon & storage pond:

1) Aerobic treatment lagoon or mechanically aerated lagoon

2) Covered lagoon digester vented to a control device with minimum 95% control

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

Description of Control Technologies

1) Aerobic Treatment Lagoon or Mechanically Aerated Lagoon

An aerobic lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of wastewater by microbes in the presence of oxygen (O_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). This process is sometimes referred to as nitrification (especially when discussing NH_3 transformation). Complete aerobic decomposition (100% aeration) removes nearly all malodors and also virtually eliminates VOC, H_2S, and NH_3 emissions.

In completely aerated lagoons, sufficient oxygen must be provided to sustain the aerobic microorganisms. NRCS Practice Standard Code 359 specifies that naturally aerobic lagoons have a minimum surface area determined by regional climate and daily Biological Oxygen Demand (BOD_5) and requires naturally aerobic lagoons to have a maximum depth no greater than five feet. For mechanically aerated lagoons, NRCS Practice Standard Code 359 specifies that the aeration equipment shall provide a minimum of 1 pound of oxygen for each pound of daily BOD_5 loading. The mechanical aerators that provide the required oxygen may float on the lagoon surface or be submerged in the lagoon. Aeration can also be performed by injection of tiny air bubbles into the lagoon water, mixing of the lagoon water, or spraying of the water into the air. According to Dr. Ruihong Zhang, a researcher at the University of California, Davis, at least 95% VOC control can be achieved if the dissolved oxygen (DO) concentration of the liquid manure is 2.0 mg/L or more. However, the DO concentrations achieved in mechanically aerated lagoons treating manure are typically much less than this and the control efficiencies will therefore be lower.

2) Covered Lagoon Digester

Covered treatment lagoons are one type of anaerobic digester. An anaerobic digester is an enclosed basin or tank that is designed to facilitate the decomposition of wastewater by microbes in the absence of oxygen. The process of anaerobic decomposition results in the preferential conversion of organic compounds in the wastewater into methane (CH_4), carbon dioxide (CO_2), and water rather than intermediate metabolites (VOC). 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 covered lagoon anaerobic digester can be captured and then sent to a suitable combustion device. During combustion, gaseous hydrocarbons are oxidized to form CO_2 and water. The VOC 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 VOC emitted 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 some VOC will also be emitted from the storage pond and as fugitive emissions. For this analysis, the overall control efficiency is assumed to be 80% of the emissions that would have been emitted from the lagoon system.

3) Anaerobic Treatment Lagoon and Solids Removal/Separation System

An anaerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of manure by microbes in the absence of oxygen. 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 (VOC). The Natural Resources Conservation Service (NRCS) Field Office Technical Guide No. 359, Waste Treatment Lagoon, for California specifies the following criteria for the design of anaerobic treatment lagoons:

- Required volume - the minimum design volume should account for all potential sludge, treatment, precipitation, and runoff volumes.
- Treatment period - retention time of the material in the lagoon shall be the time required to provide environmentally safe utilization of waste. The minimum hydraulic retention time for a covered lagoon in the San Joaquin Valley is about 38 days.
- Waste loading shall be based on the maximum daily loading considering all waste sources that will be treated by the lagoon. The loading rate is typically based on volatile solids (VS) loading per unit of volume. The suggested loading rate for the San Joaquin Valley is 6.5-11 lb-VS/1000 ft^3/day depending on separation and type of system.
- The operating depth of the lagoon as per Guide No. 359, Waste Treatment Lagoon. Maximizing the depth of the lagoon minimizes the surface area, which in turn minimizes the cover size and cost. Increasing the lagoon depth has the following advantages:

- Minimizes surface area in contact with the atmosphere, thus reducing surface available to convection, evaporation
- Smaller surface areas provide a more favorable and stable environment for methane bacteria
- Better mixing of lagoon due to rising gas bubbles
- Requires less land
- More efficient for mechanical mixing

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

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

A properly designed anaerobic treatment lagoon will reduce the volatile solids (VS) by at least 50%. This will reduce the biological oxygen demand (BOD) and increase the efficiency at which organic compounds are converted into methane and carbon dioxide rather than VOC. Although the VS reduction is expected to be at least 50%, a conservative control efficiency of 40% will be assumed, until better data becomes available.

Solids Removal/Separation

The liquid manure handling system at Godinho Dairy includes settling basin for solids separation. Solids separation prevents excessive loading of volatile solids in lagoon treatment systems. Excessive loading of volatile solids in lagoons inhibits the activity of the methanogenic bacteria and leads to increased rates of volatile solids production. When the activity of the methanogenic bacteria is not inhibited, most of the VOCs are metabolized to simpler compounds, and the potential for VOC emissions is reduced.

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

The remaining options are ranked below according to their control effectiveness:

1) Aerobic treatment lagoon or mechanically aerated lagoon (95% control efficiency)

2) Covered lagoon digester vented to a control device (80% control efficiency)

3) Anaerobic treatment lagoon designed to meet Natural Resources Conservation Service (NRCS) standards (40% control efficiency)

4) Solids Removal/Separation

d. Step 4 - Cost Effectiveness Analysis

Aerobic Treatment Lagoon or Mechanically Aerated Lagoon

Aerobic Treatment Lagoon

NRCS Practice Standard Code 359 requires that naturally aerobic lagoons be designed to have a minimum treatment surface area as determined on the basis of daily BOD_5 loading per unit of lagoon surface. The standard specifies that the maximum loading rate of naturally aerobic lagoons shall not exceed the loading rate indicated by the NRCS Agricultural Waste Management Field Handbook (AWMFH) or the maximum loading rate according to state regulatory requirements, whichever is more stringent. According to Figure 10-30 (August 2009) of the latest version of the AWMFH, the maximum aerobic lagoon loading rate for the San Joaquin Valley is 45 - 55 lb-BOD_5/acre-day. According to Table 4-5 (March 2008) of the NRCS AWMFH, the total daily manure produced by a milk cow will have 2.9 lb-BOD_5/day. Assuming that at least 80% of the manure will be flushed to the lagoon system, the minimum lagoon surface area required for a naturally aerobic lagoon treating manure from 4,000 milk cows in the San Joaquin Valley can be calculated as follows:

BOD_5 loading (lb/day) = 4,000 milk cows x 2.9 lb-BOD_5/cow-day x 0.80
= 9,280 lb-BOD_5/day

Minimum Surface Area (acres) = 9,280 lb-BOD_5/day ÷ 55 lb-BOD_5/acre-day
= 168.7 acres

As shown above, the minimum surface area required for a naturally aerobic lagoon to treat manure from the proposed number of milk cows is 168.7 acres. This does not include the additional surface area that would be required to treat manure from support stock. Based on the space requirements alone it is clear that this option cannot reasonably be required and no further analysis is needed.

Mechanically Aerated Lagoon

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

cost of emission reductions that can be achieved from a mechanically aerated lagoon treating manure from the proposed milk cow herd.

Biological Oxygen Demand (BOD_5)

In order to effectively calculate the cost of this control option, the energy requirement for complete aeration must be determined. It should be noted that approximately 1.5 to 2.5 pounds of oxygen is required to digest 1 pound of Biological Oxygen Demand (BOD_5) with additional oxygen required for conversion of ammonia to nitrate (nitrification). It is generally accepted that at least twice the BOD should be provided for complete aeration. According to Dr. Ruihong Zhang of the University of California, Davis, 2.4 lb (1.1 kg) of oxygen per cow must be provided each day for removal of BOD and an additional 3 lb (1.4 kg) per cow for oxidation of 70% of the nitrogen.

The proposed rule specifies that an aerobic lagoon be designed and operated in accordance with NRCS Practice Standard Code 359. NRCS Practice Standard Code 359 requires that mechanically aerated lagoons use aeration equipment that provides a minimum of one pound of oxygen for each pound of daily BOD_5 loading. As discussed above, the total daily manure produced by a milk cow will have a BOD_5 of 2.9 lb/day and a lagoon handling flushed manure from 4,000 milk cows will have a loading rate of approximately 9,280 lb-BOD_5/day (4,209 kg-BOD_5/day).

Energy Requirement

Based on the data gathered in a UC Davis study on aerator performance for wastewater lagoons, aeration efficiencies for mechanical aerators ranged from 0.10 to 0.68 kg of oxygen provided per kW-hr of energy utilized. The most efficient aerator tested that had been installed in dairy lagoons had an aeration efficiency of 0.49 kg-O_2/kW-hr. These efficiency tests were performed in clean water and lower aeration efficiencies are expected in liquid manure because of the significant amount of solids that it contains. The yearly energy requirement for a mechanically aerated lagoon system treating flushed manure from 4,000 milk cows is calculated as follows:

4,209 kg-BOD_5/day ÷ (0.68 kg-O_2/kW-hr) x (365 day/year) = 2,259,242 kW-hr/year

Cost of Electricity

The cost of electricity will be based upon the average price for industrial electricity in California as of April 2018, as taken from the Energy Information Administration (EIA) website:[15]

Average cost of electricity = $0.1144/kW-hr

The electricity cost for complete aeration is calculated as follows:

[15] http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_06_b

2,259,242 kW-hr/year x $0.1144/kW-hr = $258,457/year

VOC Emissions Reductions

It will be conservatively assumed that a mechanically aerated lagoon providing 1 lb of oxygen for every 1 lb of BOD_5 loading will control 90% of the VOC emissions from the lagoon/storage pond. However, as noted above, it is generally accepted that the oxygen provided should be twice the BOD_5 loading rate for complete aeration. Thus, the actual control from providing 1 lb of oxygen for every 1 lb of BOD_5 loading is probably in the 50% range.

The annual VOC emissions reductions are calculated as:

[Number of cows] x [Lagoon/Storage Pond VOC EF (lb/cow-year)] x [Complete Aeration Control Efficiency for Lagoon/Storage Pond]
= 4,000 cows x 1.3 lb-VOC/cow-yr x 90% control
= 4,680 lb-VOC/yr

Cost of Reductions

Cost of reductions = ($258,457/year)/[(4,680 lb-VOC/year)(1 ton/2000 lb)]
= $110,451/ton

As shown above, based on the cost of electricity alone, the cost of the VOC reductions for this control option is greater than the $17,500/ton cost effectiveness threshold specified by the District's BACT policy. This control option is therefore not cost effective and will not be required.

Covered Lagoon Digester

Capital Cost for Installation

The capital cost estimates for installation of a covered lagoon digester are based on information from the United States EPA AgSTAR publication "Anaerobic Digestion Capital Costs for Dairy Farms" (May 2010)[16] and the California Energy Commission (CEC) Public Interest Energy Research (PIER) Program Dairy Methane Digester System Program Evaluation Report (Feb 2009).[17] The formula in the AgSTAR publication results in a capital cost of $1,032 per cow. This estimate excludes costs of solids separation after digestion, hydrogen sulfide removal, and utility charges including line upgrades and interconnection costs and fees. Based on information from installations in California, the CEC PIER Dairy Methane Digester Program Evaluation Report gives an average cost of $585 per cow for installation of covered lagoon anaerobic digesters (see Table 9 - Total Project Costs and Cost per Cow and per kW).

16 "Anaerobic Digestion Capital Costs for Dairy Farms" (May 2010), EPA AgSTAR http://www.epa.gov/agstar/pdf/digester_cost_fs.pdf

17 "Dairy Power Production Program – Dairy Methane System Program Evaluation Report" (February 2009). Western United Resource Development, Inc. prepared for the California Energy Commission (CEC) Public Interest Energy Research Program. (CEC-500-2009-009) http://www.energy.ca.gov/2009publications/CEC-500-2009-009/CEC-500-2009-009.PDF

For the purposes of this analysis, the more conservative capital cost of $585/cow will be used. Thus, the installation capital cost for the proposed herd of 4,000 milk cows is at least $ 2,340,000 ($585/cow x 4,000 cows).

Pursuant to the District's BACT policy, the equivalent annual cost will be calculated using the capital recovery equation, as shown below:

$$A = P \frac{i(1+i)^n}{(1+i)^n - 1}$$

Where:

A = Equivalent annual capital cost of the control equipment

P = Present value of the control equipment, including installation cost

i = Interest rate (assumed to be 10%)

n = Equipment life (assumed to be 10 years)

$A = [\$\ 2{,}340{,}000 \times 0.1(1.1)^{10}]/[(1.1)^{10}-1]$
$= \$380{,}250/\text{year}$

Potential Production of Electricity

It may be possible to offset some of the installation costs of a covered lagoon anaerobic digester with revenue from generation of electricity. Based on the information given in the CEC PIER Dairy Methane Digester Program Evaluation Report, Table 7 – Actual Generation per Cow Comparisons, California dairies that used a covered lagoon digester to produce electricity generated between 429.1 and 1,031.8 kW-hr/yr per lactating cow with an overall per facility average generation rate of 670.3 kW-hr/yr per lactating cow. This average annual generation rate is actually higher than all the facilities included in the average except one that had a very high generation rate. In addition, this average may overestimate the per-cow generation potential because the contributions of support stock to the digesters were not accounted for. However, for more conservative calculations, this average will be used to calculate the potential annual savings in electricity costs.

The potential quantity of electricity produced is calculated as follows:

Electrical Produced = 670.3 kW-hr/(milk cow-yr) x 4,000 milk cows
= 2,681,200 kW-hr/yr

Potential Cost Savings from Production of Electricity

The value of electricity generated will be calculated using the previously cited EIA rate of $0.1144/kW-hr.

Potential Cost Savings = 2,681,200 kW-hr/yr x $0.1144/kW-hr
= $ 306,729/yr

The annualized capital cost less the potential savings from electricity produced is:

= $ 380,250 - $ 306,729
= $ 73,521

VOC Emissions Reductions

The annual VOC emissions reductions are calculated as:

= [Number of cows] x [Lagoon/Storage Pond VOC EF (lb/cow-year)] x [Covered Lagoon Digester Efficiency for Lagoon/Storage Pond]

= 4,000 cows x 1.3 lb-VOC/cow-yr x 80% control
= 4,160 lb-VOC/yr

Cost of Reductions

Cost of reductions = ($ 73,521/year)/[(4,160 lb-VOC/year)(1 ton/2000 lb)]
= $35,346/ton

As shown above, based the on the installation cost alone, after offsetting this cost by potential savings from electricity produced, the cost of the VOC reductions for this control option is greater than the $17,500/ton cost effectiveness threshold specified by the District's BACT policy. This control option is therefore not cost effective and will not be required.

Anaerobic Treatment Lagoon and Solids Removal/Separation System

The applicant has proposed these options. In addition, these options are achieved in practice. Cost effectiveness analyses are therefore not required.

e. Step 5 - Select BACT

The applicant has proposed an anaerobic treatment system designed according to NRCS guidelines, and a solids removal/separation system (mechanical separator(s)). The proposal satisfies BACT for this category.

2. NH_3 Emissions

a. Step 1 - Identify all control technologies

The following option was identified as a possible control for NH_3 emissions from the lagoons & storage ponds:

1) All animals fed in accordance with NRC or other District-approved guidelines

Description of Control Technology

1) All 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, which will reduce ammonia emissions from the liquid manure in the lagoon and storage pond.

b. Step 2 - Eliminate technologically infeasible options

The option listed in Step 1 above is technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

The remaining option is listed below:

1) All animals fed in accordance with NRC or other District-approved guidelines

d. Step 4 - Cost Effectiveness Analysis

The applicant has proposed this option. In addition, this option is achieved in practice. A cost effectiveness analysis is therefore not required.

e. Step 5 - Select BACT

The applicant has proposed to feed all animals in accordance with NRC or other District-approved guidelines. The proposal satisfies BACT for this category.

IV. Top-Down BACT Analysis for the Liquid Manure Handling System – Liquid Manure Land Application

1. VOC Emissions

a. Step 1 - Identify all control technologies

The following options were identified as possible controls for VOC emissions from land application of manure:

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

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

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

Description of Control Technologies

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

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

In completely aerated lagoons, sufficient oxygen must be provided to sustain the aerobic microorganisms. NRCS Practice Standard Code 359 specifies that naturally aerobic lagoons have a minimum surface area determined by regional climate and daily Biological Oxygen Demand (BOD_5) and requires naturally aerobic lagoons to have a maximum depth no greater than five feet. For mechanically aerated lagoons, NRCS Practice Standard Code 359 specifies that the aeration equipment shall provide a minimum of 1 pound of oxygen for each pound of daily BOD_5 loading. The mechanical aerators that provide the required oxygen may float on the lagoon surface or be submerged in the lagoon. Aeration can also be performed by injection of tiny air bubbles into the lagoon water, mixing of the lagoon water, or spraying of the water into the air. According to Dr. Ruihong Zhang, a researcher at the University of California, Davis, at least 95% VOC control can be achieved if the dissolved oxygen (DO) concentration of the liquid manure is 2.0 mg/L or more. However, the DO concentrations achieved in mechanically aerated lagoons treating manure are typically much less than this and the control efficiencies will therefore be lower.

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

This practice would only allow the irrigation of liquid manure to cropland from the secondary lagoon after proper treatment has taken place in a covered lagoon/anaerobic digester. Covered treatment lagoons are one type of anaerobic digester. An anaerobic digester is an enclosed basin or tank that is designed to facilitate the decomposition of wastewater by microbes in the absence of oxygen. The process of anaerobic decomposition results in the preferential conversion of organic compounds in the wastewater into methane (CH_4), carbon dioxide (CO_2), and water rather than

intermediate metabolites (VOC). 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 VOC that remain from incomplete digestion of the volatile solids in the incoming wastewater. The small amounts of undigested solids are removed from the digester as sludge.

Assumptions:

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

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

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

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

An anaerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of manure by microbes in the absence of oxygen. The process of anaerobic decomposition results in the preferential conversion of organic compounds in the wastewater into methane (CH_4), carbon dioxide (CO_2), and water rather than intermediate metabolites (VOC).

The NRCS Field Office Technical Guide No. 359, Waste Treatment Lagoon, for California specifies the following criteria for anaerobic treatment lagoons:

- Required volume - the minimum design volume should account for all potential sludge, treatment, precipitation, and runoff volumes.
- Treatment period - retention time of the material in the lagoon shall be the time required to provide environmentally safe utilization of waste. The minimum hydraulic retention time for a covered lagoon in the San Joaquin Valley is about 38 days.

- Waste loading shall be based on the maximum daily loading considering all waste sources that will be treated by the lagoon. The loading rate is typically based on volatile solids (VS) loading per unit of volume. The suggested loading rate for the San Joaquin Valley is 6.5-11 lb-VS/1000 ft^3/day depending on separation and type of system.

- The operating depth of the lagoon as per Guide No. 359, Waste Treatment Lagoon. Maximizing the depth of the lagoon minimizes the surface area, which in turn minimizes the cover size and cost. Increasing the lagoon depth has the following advantages:

    - Minimizes surface area in contact with the atmosphere, thus reducing surface available to convection, evaporation
    - Smaller surface areas provide a more favorable and stable environment for methane bacteria
    - Better mixing of lagoon due to rising gas bubbles
    - Requires less land
    - More efficient for mechanical mixing

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

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

A properly designed anaerobic treatment lagoon will reduce the volatile solids (VS) by at least 50%. This will reduce the biological oxygen demand (BOD) and increase the efficiency at which organic compounds are converted into methane and carbon dioxide rather than VOC. Since 50% of the VS in the liquid manure will have been removed or digested in the lagoon, there will be less VS remaining in the effluent to decompose into VOC. Although, the VS reduction will be at least 50%, a conservative control efficiency of 40% will be applied to irrigation from a storage pond after an anaerobic treatment lagoon.

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

The remaining options are ranked below according to their control effectiveness:

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

d. Step 4 - Cost Effectiveness Analysis

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

The cost effectiveness analysis performed in the previous section (BACT analysis for VOC emissions from the lagoons/storage ponds) demonstrated that, based on the space requirements alone, aerobic treatment cannot reasonably be required for this project. The previous analysis also demonstrated that mechanically aerated lagoons are not cost effective. Since the emission rate from land application of manure (1.4 lb/cow-yr) is not significantly different from the emission rate from lagoons/storage ponds (1.3 lb/cow-yr), no significant change from the previous cost effectiveness determination can be expected.

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

The cost effectiveness analysis performed in the previous section (BACT analysis for VOC emissions from the lagoons/storage ponds) demonstrated that a covered lagoon digester is not cost effective. Since the emission rate from land application of manure (1.4 lb/cow-yr) is not significantly different from the emission rate from lagoons/storage ponds (1.3 lb/cow-yr), no significant change from the previous cost effectiveness determination can be expected.

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

The applicant has proposed this option. In addition, this option is achieved in practice. A cost effectiveness analysis is therefore not required.

e. Step 5 - Select BACT

The applicant has proposed irrigation of crops using liquid/slurry manure from the secondary lagoon/holding/storage pond preceded by an uncovered anaerobic treatment system designed to meet Natural Resources Conservation Service (NRCS) standards. The proposal satisfies BACT for this category.

2. NH_3 Emissions

a. Step 1 - Identify all control technologies

The following option has been identified as a possible control option for NH_3 emissions from land application of liquid manure:

1) All animals fed in accordance with NRC or other District-approved guidelines

Description of Control Technology

1) All 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, which will reduce ammonia emissions from liquid manure applied to cropland.

b. Step 2 - Eliminate technologically infeasible options

The option listed in Step 1 above is technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

The remaining option is listed below:

1) All animals fed in accordance with NRC or other District-approved guidelines

d. Step 4 - Cost Effectiveness Analysis

The applicant has proposed this option. In addition, this option is achieved in practice. A

cost effectiveness analysis is therefore not required.

e. Step 5 - Select BACT

The applicant has proposed to feed all animals in accordance with NRC or other District-approved guidelines. The proposal satisfies BACT for this category.

V. Top-Down BACT Analysis for the Solid Manure Handling Operation – Storage

1. NH_3 Emissions

a. Step 1 - Identify all control technologies

The following options were identified as possible controls for NH_3 emissions from solid manure storage:

1) All Animals Fed in Accordance With National Research Council (NRC) or other District-Approved Guidelines

Description of Control Technologies

1) All 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 solid manure.

b. Step 2 - Eliminate technologically infeasible options

There are no technologically infeasible options to eliminate from step 1.

c. Step 3 - Rank remaining options by control effectiveness

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

1) All 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 effectiveness analysis is not required.

e. Step 5 - Select BACT

The applicant has proposed to feed all animals in accordance with NRC or other District-approved guidelines. The proposal satisfies BACT for this category.

VI. Top-Down BACT Analysis for the Solid Manure Handling Operation – Land Application

1. NH_3 Emissions

a. Step 1 - Identify all control technologies

The following options were identified as possible controls for NH_3 emissions from solid manure land application:

1) Rapid incorporation of solid manure into the soil after land application, and All Animals Fed in Accordance With National Research Council (NRC) or Other District-Approved Guidelines

Description of Control Technologies

1) Rapid Incorporation of Solid Manure into the Soil After Land Application

Various types of spreading techniques, such as box spreaders, flail type spreaders, side discharge spreaders, and spinner spreaders, are used to apply solid manure to cropland. Regardless of which technique is used, this practice requires the immediate incorporation of the manure into the soil, reducing emissions and surface run-off while minimizing the loss of nitrogen into the atmosphere. Based on a study by a local Valley dairy, there is a great potential of reducing emissions by incorporating slurry manure rapidly into the soil. A similar reduction may be obtained by the rapid incorporation of solid manure. This technology is expected to yield a NH3 control efficiency ranging from 49% to upwards of 98%.[18]

2) All Animals fed in accordance with National Research Council (NRC) or other District-approved Guidelines

[18] Page 81 of "Recommendations to the San Joaquin Valley Air Pollution Control Officer Regarding Best Available Control Technology for Dairies in the San Joaquin Valley" January 31, 2006 (http://www.valleyair.org/busind/pto/dpag/dpag_idx.htm).

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

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

b. Step 2 - Eliminate technologically infeasible options

There are no technologically infeasible options to eliminate from step 1.

c. Step 3 - Rank remaining options by control effectiveness

1) Rapid Incorporation of Solid Manure into the Soil After Land Application; and All animals Fed in Accordance With National Research Council (NRC) or Other District-Approved Guidelines.

d. Step 4 - Cost Effectiveness Analysis

Rapid Incorporation of Solid Manure into the Soil After Land Application; and All animals Fed in Accordance With National Research Council (NRC) or Other District-Approved Guidelines.

These technologies/practices are currently used at multiple dairies located throughout the valley, therefore a cost effective analysis is not required.

e. Step 5 - Select BACT

The Achieved in Practice option is determined to be BACT. Therefore, BACT for this category is rapid incorporation of solid manure into the soil after land application; and all animals fed in accordance with National Research Council (NRC) or other District-approved guidelines.

VII. Top-Down BACT Analysis for Feed Storage and Handling – Silage

VOC Emissions

a. Step 1 - Identify all control technologies

The following option has been identified as a possible control for VOC emissions from

feed storage:

1) District Rule 4570 measures

Description of Control Technology

District Rule 4570 measures

District Rule 4570 requires the implementation of various management practices to reduce VOC emissions. These practices include various mitigation measures for storing silage piles, pushing feed so that it is within three feet of feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals, so the area of the feed is minimized and the feed can be consumed by the cows in a shorter time period instead of continuing to emit VOCs; beginning feeding total mixed rations within two hours of grinding and mixing rations, reducing the time that fresh feed emits VOCs; storing grain in a weatherproof storage structure or under a weatherproof covering from October through May; feeding stream-flaked, dry rolled, cracked or ground corn or other ground cereal grains; removal of uneaten wet feed from feeding areas; and preparing TMR with a minimum moisture content, which reduces VOC since most of the compounds emitted are higly soluble in water.

b. Step 2 - Eliminate technologically infeasible options

The option identified in step 1 is technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

Only one option was previously identified in step 1:

1) District Rule 4570 measures

d. Step 4 - Cost Effectiveness Analysis

District Rule 4570 Measures

The applicant has proposed this option. In addition, this option is achieved in practice. A cost effectiveness analysis is therefore not required.

e. Step 5 - Select BACT

The applicant has proposed to implement District Rule 4570 measures. The proposal satisfies BACT for this category.

VIII. Top-Down BACT Analysis for Feed Storage and Handling – Total Mixed Ration (TMR) Feeding

VOC Emissions

a. Step 1 - Identify all control technologies

The following option has been identified as a possible control for VOC emissions from TMR feeding:

2) District Rule 4570 measures

Description of Control Technology

District Rule 4570 measures

District Rule 4570 requires the implementation of various management practices to reduce VOC emissions from TMR. These practices include pushing feed so that it is within three feet of feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals, so the area of the feed is minimized and the feed can be consumed by the cows in a shorter time period instead of continuing to emit VOCs; beginning feeding total mixed rations within two hours of grinding and mixing rations, reducing the time that fresh feed emits VOCs; storing grain in a weatherproof storage structure or under a weatherproof covering from October through May; feeding stream-flaked, dry rolled, cracked or ground corn or other ground cereal grains; removal of uneaten wet feed from feeding areas; and preparing TMR with a minimum moisture content, which reduces VOC since most of the compounds emitted are higly soluble in water.

b. Step 2 - Eliminate technologically infeasible options

The option identified in step 1 is technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

Only one option was previously identified in step 1:

2) District Rule 4570 measures

d. Step 4 - Cost Effectiveness Analysis

District Rule 4570 Measures

The applicant has proposed this option. In addition, this option is achieved in practice. A cost effectiveness analysis is therefore not required.

e. Step 5 - Select BACT

The applicant has proposed to implement District Rule 4570 measures. The proposal satisfies BACT for this category.

Appendix H

RMR and AAQA Summary

San Joaquin Valley Air Pollution Control District
Risk Management Review

To:	Rupi Gill – Permit Services
From:	Cheryl Lawler – Technical Services
Date:	April 3, 2018
Facility Name:	Godinho Dairy
Location:	12710 Wilson Road, Los Banos
Application #(s):	N-6094-1-3, 2-3, 3-3, 4-3, 7-2
Project #:	N-1163277

A. RMR SUMMARY

RMR Summary						
Units	**Prioritization Score**	**Acute Hazard Index**	**Chronic Hazard Index**	**Maximum Individual Cancer Risk**	**T-BACT Required?**	**Special Permit Requirements?**
Unit 1-3 (Milk Parlor)	1.68	0.01	0.00	6.98E-07	No	No
Unit 2-3 (Cow Housing)	52.1	0.29	0.14	2.21E-06	No[3]	No
Unit 3-3 (Lagoons & Land Application)	53.8	0.02	0.01	3.07E-07	No	No
Unit 4-3 (Solid Manure Piles & Land Application)	0.00	0.01	0.00	0.00[2]	No	No
Unit 7-2 (Feed Storage & Handling)	N/A[1]	N/A[1]	N/A[1]	N/A[1]	N/A[1]	N/A[1]
Project Totals	>1	0.33	0.16	3.21E-06		
Facility Totals	>1	0.33	0.16	3.21E-06		

[1]There is no risk associated with Unit 7-2 as the District does not have an approved toxic speciation profile for dairy feed and storage handling operations.

[2]The Maximum Individual Cancer Risk was not calculated since there is no risk factor or the risk factor is so low that it has been determined to be insignificant for this type of unit.

[3]T-BACT is determined by each individual cow housing area. T-BACT will be addressed in the Conclusion Section of this report.

B. RMR REPORT

I. Project Description

Technical Services received a request on January 29, 2018, to perform a Risk Management Review (RMR) and an Ambient Air Quality Analysis (AAQA) for an existing dairy proposing increases to its milk parlor, cow housing areas, lagoons, solid manure piles, and land application emissions.

II. Analysis

Toxic emissions for the cow housing, lagoons, and milk parlor were calculated using emission factors derived from the District's evaluation of dairy research studies conducted by California colleges and universities. PM based toxic emissions for the cow housing were calculated using emission factors generated from using the worst case composite of the 1997 EPA speciation of Kern County feedlot soil. Ammonia emission rates were calculated and supplied by the processing engineer. Emission rates were input into the San Joaquin Valley APCD's Hazard Assessment and Reporting Program (SHARP). In accordance with the District's Risk Management Policy for Permitting New and Modified Sources (APR 1905, May 28, 2015), risks from the project were prioritized using the procedures in the 1990 CAPCOA Facility Prioritization Guidelines. The prioritization score for this facility was greater than 1.0 (see RMR Summary Table). Therefore, a refined health risk assessment was required. The AERMOD model was used, with the parameters outlined below and meteorological data for 2004-2008 from Los Banos to determine the dispersion factors (i.e., the predicted concentration or X divided by the normalized source strength or Q) for a receptor grid. These dispersion factors were input into the SHARP Program, which then used the Air Dispersion Modeling and Risk Tool (ADMRT) of the Hot Spots Analysis and Reporting Program Version 2 (HARP 2) to calculate the chronic and acute hazard indices and the carcinogenic risk for the project.

The following parameters were used for the review:

Analysis Parameters Unit 1-3 (Milk Parlor)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	2,284	**Release Height (m)**	1
VOC (lb/hr)	0.09	**Ammonia (lb/hr)**	0.03
VOC (lb/yr)	747	**Ammonia(lb/yr)**	256

Analysis Parameters Unit 2-3 (Freestall #1)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	3,882	**Release Height (m)**	1
VOC (lb/hr)	0.02	**VOC (lb/yr)**	197
Ammonia (lb/hr)	0.05	**Ammonia (lb/yr)**	422

Analysis Parameters Unit 2-3 (Freestall #4)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	2,904	**Release Height (m)**	1
VOC (lb/hr)	0.08	**VOC (lb/yr)**	670
Ammonia (lb/hr)	0.16	**Ammonia (lb/yr)**	1,437

Analysis Parameters Unit 2-3 (Freestall #5)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	2,923	**Release Height (m)**	1
PM10 (lb/hr)	0.03	**PM10 (lb/yr)**	247
VOC (lb/hr)	1.0	**VOC (lb/yr)**	8,874
Ammonia (lb/hr)	2.2	**Ammonia (lb/yr)**	19,015

Analysis Parameters Unit 2-3 (Freestall #6)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	4,907	**Release Height (m)**	1
PM10 (lb/hr)	0.03	**PM10 (lb/yr)**	247
VOC (lb/hr)	1.0	**VOC (lb/yr)**	8,874
Ammonia (lb/hr)	2.2	**Ammonia (lb/yr)**	19,015

Analysis Parameters Unit 2-3 (Freestall #7)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	1,694	**Release Height (m)**	1
PM10 (lb/hr)	0.01	**PM10 (lb/yr)**	55
VOC (lb/hr)	0.2	**VOC (lb/yr)**	1,972
Ammonia (lb/hr)	0.5	**Ammonia (lb/yr)**	4,226

Analysis Parameters Unit 2-3 (Shade Barn #1)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	3,203	**Release Height (m)**	1
VOC (lb/hr)	0.01	**VOC (lb/yr)**	45
Ammonia (lb/hr)	0.01	**Ammonia (lb/yr)**	86

Analysis Parameters Unit 2-3 (Shade Barn #2)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	3,784	**Release Height (m)**	1
VOC (lb/hr)	0.01	**VOC (lb/yr)**	45
Ammonia (lb/hr)	0.01	**Ammonia (lb/yr)**	86

Analysis Parameters Unit 2-3 (Shade Barn #4)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	4,012	**Release Height (m)**	1
PM10 (lb/hr)	0.01	**PM10 (lb/yr)**	99
VOC (lb/hr)	0.1	**VOC (lb/yr)**	557
Ammonia (lb/hr)	0.12	**Ammonia (lb/yr)**	1,071

Analysis Parameters Unit 2-3 (Shade Barn #5)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	5,123	**Release Height (m)**	1
PM10 (lb/hr)	0.01	**PM10 (lb/yr)**	99
VOC (lb/hr)	0.1	**VOC (lb/yr)**	557
Ammonia (lb/hr)	0.12	**Ammonia (lb/yr)**	1,071

Analysis Parameters Unit 2-3 (Shade Barn #6)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	6,014	**Release Height (m)**	1
PM10 (lb/hr)	0.02	**PM10 (lb/yr)**	149
VOC (lb/hr)	0.1	**VOC (lb/yr)**	836
Ammonia (lb/hr)	0.2	**Ammonia (lb/yr)**	1,606

Analysis Parameters Unit 3-3 (Liquid Manure Handling)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	37,623	**Release Height (m)**	0
# of Cows	2,200*	**Ammonia (lb/hr)**	1.38
		Ammonia(lb/yr)	12,050

*Used to calculate VOC TAC emissions

Analysis Parameters Unit 4-3 (Solid Manure Handling)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	11,283	**Release Height (m)**	0
Ammonia (lb/hr)	0.31	**Ammonia(lb/yr)**	2,700

Analysis Parameters (Units 3-3 & 4-3) Land Application*			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	1,452,232	**Release Height (m)**	0
Unit 3-3 Land Application Ammonia (lb/hr)	0.86	**Unit 3-3 Land Application Ammonia (lb/yr)**	7,553
Unit 4-3 Land Application Ammonia (lb/hr)	0.2	**Unit 4-3 Land Application Ammonia (lb/yr)**	1,764

*Ammonia emissions for both liquid manure and dry manure application were evaluated based on farmland application area. The risk from the type of land application was associated with its respective unit.

AAQA

In addition to the RMR, Technical Services performed modeling for the criteria pollutant PM_{10} using AERMOD. The emission rate used was 896 lbs 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	24 Hours	Annual
Net Value	4.36	1.26
Interim Significance Level	10.4[1]	2.08[1]
Result	Pass	Pass

[1]The District has decided on an interim basis to use a SIL threshold for fugitive dust sources of 10.4 $\mu g/m^3$ for the 24-hour average concentration and 2.08 $\mu g/m^3$ for the annual concentration.

III. Conclusion

Units 1-3, 3-3, 4-3 (Milk Parlor, Lagoons, Solid Manure Piles, & Land Application)

The Acute and Chronic Indices are below 1.0, and the Cancer Risk factor associated with these units is less than 1.0 in a million. **In accordance with the District's Risk Management Policy, these units are approved without Toxic Best Available Control Technology (T-BACT).**

Unit 2-3 (all Cow Housing Areas)

The Acute and Chronic Indices are below 1.0, and the Cancer Risk factor associated with all of these cow housing areas is less than 1.0 in a million. **In accordance with the District's Risk Management Policy, all the cow housing areas are 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.

The ambient air quality impacts for PM_{10} emissions from the proposed dairy modifications does not exceed the District's 24-hour or Annual interim threshold for fugitive dust sources.

IV. Attachments

A. RMR Request Form & Attachments
B. Other Project Emails
C. Prioritization
D. Risk Results
E. Facility Summary
F. AAQA Results

Appendix I

Anaerobic Treatment Lagoon Design Check

Anaerobic Treatment Lagoon Design

NRCS Guideline #359 Check

Lagoon Design Check in Accordance with NRCS Guideline #359

Proposed Lagoon Volume

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	1275	ft
Width	243	ft
Depth	11	ft
Slope	1.4	ft

(Subtract 2 feet from the actual lagoon depth for run-off or miscellaneous water.)

Primary Lagoon Volume	**3,154,404 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**	% Manure in Flush[2]	**x**	(1 - % VS Removed in Separation[3])	**=**	**Net VS Loading (lb/day)**
Milk Cows	4,000	x	17	x	71%	x	50%	=	**24,140**
Dry Cow	700	x	9.2	x	71%	x	50%	=	**2,286**
Heifer (15 to 24 months)	0	x	7.1	x	48%	x	50%	=	**0**
Heifer (7 to 14 months)	0	x	4.9	x	48%	x	50%	=	**0**
Heifer (3 to 6 months)	0	x	2.7	x	48%	x	50%	=	**0**
Calf (under 3 months)	0	x	1.0	x	100%	x	50%	=	**0**
Bulls	0	x	9.2	x	48%	x	50%	=	**0**
Total for Dairy									**26,426**

[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] The % manure was taken from Table 3-1 of the California Regional Water Quality Control Board Document "Managing Dairy Manure in the Central Valley of California", UC Davis, June 2005. This document estimated that 21-48% of the manure in open corral dairies is handled as a liquid. Therefore, as a worst case assumption, 48% will be used for all cows housed in open corrals with flush lanes. The document also estimates a range of 42-100% manure handled as a liquid in the freestalls. For freestalls without exercise pens, 100% of manure as a liquid in the flush will be used; for freestalls with exercise pens, the average of the range ((100+42)/2 = 71%) will be used. (http://groundwater.ucdavis.edu/Publications/uc-committee-of-experts-final-report%202006.pdf) Saudi style/loafing barns are hybrids between freestalls and open corrals, the percentage of manure collected on the concrete feed lanes will be averaged between the values from the cows housed in freestall barns and open corrals. Therefore the % of manure deposited on the concrete lanes is equal to 60% [(71+48)/2].

[3] Chastain, J.P., Vanotti, M. B., and Wingfield, M. M., Effectiveness of Liquid-Solid Separation For Treatment of Flushed Dairy Manure: A Case Study, Applied Engineering in Agriculture, Vol 17(3): 343-354 - This document outlines a VS removal rate of 50.1% to 70% depending on the type of separation system used, however to be conservative, a 50% VS removal will be used for all systems.

Lagoon Design Check in Accordance with NRCS Guideline #359

Minimum Treatment Volume Calculation

MTV = TVS/VSLR

Where:

MTV = Minimum Treatment Volume (ft^3)

TVS = daily Total Volatile solids Loading (lb/day) = 0.011 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	24,140	÷	0.011	=	**2,194,545**
Dry Cow	2,286	÷	0.011	=	**207,836**
Heifer (15 to 24 months)	0	÷	0.011	=	**0**
Heifer (7 to 14 months)	0	÷	0.011	=	**0**
Heifer (3 to 6 months)	0	÷	0.011	=	**0**
Calf (under 3 months)	0	÷	0.011	=	**0**
Bulls	0	÷	0.011	=	**0**
Total for Dairy					**2,402,382**

[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

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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)
VPL = total Volume of Primary Lagoon (ft^3)
MTV = Minimum Treatment Volume (ft^3)

SAV =	**VPL**	**-**	**MTV**	
SAV =	**3,154,404**	**2,402,382 =**		**752,022 (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 = MTV/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	4,000	x	2.40	ft^3	=	9,600	ft^3/day
Dry Cows	700	x	1.30	ft^3	=	910	ft^3/day
Heifers (15-24 mo)	0	x	0.78	ft^3	=	-	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	4,700					**10,510**	**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.

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Formula:

Gallon	#	x	ft3	+	ft3
Milk Cow*Day	Milk Cows		gallon		day

Total HFR:

⇨

50 ~~gal~~	4000 ~~milk cows~~	x	ft3	+	10,510	ft3		
~~milk cow * day~~			7.48 ~~gal~~			day		
				=	37,248.0	ft3/day		

Formula:

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

HRT:

⇨

2,402,382 ~~ft3~~	/	day	=		=	64.4969901	days
		37,248.0 ~~ft3~~					

Appendix J

QNEC

Quarterly Net Emissions Change (QNEC)

The Quarterly Net Emissions Change is used to complete the emission profile screen for the District's PAS database. The QNEC shall be calculated as follows:

QNEC = PE2 - PE1, where:

QNEC = Quarterly Net Emissions Change for each emissions unit, lb/qtr
PE2 = Post-Project Potential to Emit for each emissions unit, lb/qtr
PE1 = Pre-Project Potential to Emit for each emissions unit, lb/qtr

The quaterly PE values are calculated as follows: PE (lb/yr) ÷ 4 (qtr/yr)

Using the annual PE2 and PE1 values previously calculated, the QNEC (lb/qtr) for each permit unit is shown below:

	Milking Parlor					
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	0	0	1,600	547
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	4.4	1.5
Quarterly Net Emissions Change (lb/qtr) 1:	0.0	0.0	0.0	0.0	186.8	63.9
2:	0.0	0.0	0.0	0.0	186.8	63.9
3:	0.0	0.0	0.0	0.0	186.8	63.9
4:	0.0	0.0	0.0	0.0	186.8	63.9

	Cow Housing					
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	1,791	0	43,340	92,008
Daily PE2 (lb/day)	0.0	0.0	5.2	0.0	118.6	251.8
Quarterly Net Emissions Change (lb/qtr) 1:	0.0	0.0	-408.8	0.0	5,067.3	10,755.8
2:	0.0	0.0	-408.8	0.0	5,067.3	10,755.8
3:	0.0	0.0	-408.8	0.0	5,067.3	10,755.8
4:	0.0	0.0	-408.8	0.0	5,067.3	10,755.8

	Liquid Manure Handling						
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Annual PE2 (lb/yr)	0	0	0	0	6,045	41,910	2,573
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	16.5	114.8	7.1
Quarterly Net Emissions Change (lb/qtr) 1:	0.0	0.0	0.0	0.0	93.7	3,340.4	0.0
2:	0.0	0.0	0.0	0.0	93.7	3,340.4	0.0
3:	0.0	0.0	0.0	0.0	93.7	3,340.4	0.0
4:	0.0	0.0	0.0	0.0	93.7	3,340.4	0.0

	Solid Manure Handling					
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	0	0	1,446	9,577
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	3.9	26.2
Quarterly Net Emissions Change (lb/qtr) 1:	0.0	0.0	0.0	0.0	88.0	754.3
2:	0.0	0.0	0.0	0.0	88.0	754.3
3:	0.0	0.0	0.0	0.0	88.0	754.3
4:	0.0	0.0	0.0	0.0	88.0	754.3

	Feed Storage and Handling					
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	0	0	53,616	0
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	146.8	0.0
Quarterly Net Emissions Change (lb/qtr) 1:	0.0	0.0	0.0	0.0	7,326.3	0.0
2:	0.0	0.0	0.0	0.0	7,326.3	0.0
3:	0.0	0.0	0.0	0.0	7,326.3	0.0
4:	0.0	0.0	0.0	0.0	7,326.3	0.0