San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

OCT 08 2013

George J. Silva
GJ Silva Dairy Inc.
3107 S. Prairie Flower Rd.
Turlock, CA 95380

Re: Notice of Preliminary Decision - Authority to Construct
Facility Number: N-5763
Project Number: N-1130087

Dear Mr. Silva:

Enclosed for your review and comment is the District's analysis of GJ Silva Dairy Inc.'s application for an Authority to Construct for the expansion of an existing dairy operation from a maximum herd capacity of 1,216 mature cows, 1,400 support stock (heifers and bulls), and 475 calves; to a maximum herd capacity of 2,583 mature cows, 910 support stock (heifers and bulls), and 500 calves, at 3107 S. Prairie Flower Road in Turlock.

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. Jonah Aiyabei of Permit Services at (559) 230- 5910.

Sincerely,

David Warner
Director of Permit Services

DW:jka

Enclosures

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

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Executive Director/Air Pollution Control Officer

Northern Region
4800 Enterprise Way
Modesto, CA 95356-8718
Tel: (209) 557-6400 FAX: (209) 557-6475

Central Region (Main Office)
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Southern Region
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Bakersfield, CA 93308-9725
Tel: 661-392-5500 FAX: 661-392-5585

Newspaper notice for publication in Modesto Bee and for posting on valleyair.org

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NOTICE OF PRELIMINARY DECISION
FOR THE PROPOSED ISSUANCE OF
AN AUTHORITY TO CONSTRUCT

NOTICE IS HEREBY GIVEN that the San Joaquin Valley Unified Air Pollution Control District solicits public comment on the proposed issuance of Authority to Construct to GJ Silva Dairy Inc. for the expansion of an existing dairy operation from a maximum herd capacity of 1,216 mature cows, 1,400 support stock (heifers and bulls), and 475 calves; to a maximum herd capacity of 2,583 mature cows, 910 support stock (heifers and bulls), and 500 calves, at 3107 S. Prairie Flower Road in Turlock.

The analysis of the regulatory basis for this proposed action, Project #N-1130087, is available for public inspection at http://www.valleyair.org/notices/public_notices_idx.htm and at any District office. For additional information, please contact the District at (559) 230-6000. Written comments on this project must be submitted by November 12, 2013 to **DAVID WARNER, DIRECTOR OF PERMIT SERVICES, SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT, 1990 EAST GETTYSBURG AVENUE, FRESNO, CA 93726.**

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

Facility Name:	GJ Silva Dairy Inc.	Date:	October 1, 2013
Mailing Address:	3107 S. Prairie Flower Rd. Turlock, CA 95380	Engineer:	Jonah Aiyabei
		Lead Engineer:	Martin Keast
Contact Person:	Joe Ramos		
Telephone:	(209) 765-7626		
Fax:	(209) 669-1889		
E-Mail:	jramos@fragservices.com		
Application #(s):	N-5763-1-5, -2-5, -3-5, -4-3, and -9-3		
Project #:	N-1130087		
Deemed Complete:	July 24, 2013		

I. Proposal

GJ Silva Dairy Inc. requests Authority to Construct (ATC) permits for expanding the dairy from the current capacity of 1,000 milk cows not to exceed a combined total of 1,216 mature cows (milk and dry); 1,400 support stock (heifers); and 475 calves (0-3 months) to 2,320 milk cows not to exceed a combined total of 2,583 mature cows (milk and dry); 910 support stock (heifers and bulls); and 500 calves (0-3 months). The additional animals will be housed in the existing dairy structures since the dairy reduced its capacity under Project N-1060330 to populate a previously owned dairy located at 3303 South Washington Rd. that was contiguous to this facility.

II. Applicable Rules

Rule 2010 Permits Required (12/17/92)
Rule 2201 New and Modified Stationary Source Review Rule (4/21/11)
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 (CAF) (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 facility is located at 3107 S. Prairie Flower Rd in Turlock, CA. The equipment is not located within 1,000 feet of the outer boundary of a K-12 school. Therefore, the public notification requirement of California Health and Safety Code 42301.6 is not applicable to this project.

IV. Process Description

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

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

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

Cow Housing

All of the milk cows are housed in freestall barns with flush lanes and will continue to be housed in freestall barns after completion of this project. In a freestall barn, the cows are grouped in large pens with free access to feed bunks, water, and stalls for resting. A standard freestall barn design has a feed alley in the center of the barn separating two feed bunks on each side. The freestall barn feed lanes and walkways will be flushed four times daily.

Dry cows will continue to be housed in open corrals with flushed lanes. An open corral is a large open area where cows are confined with unlimited access to feed and water. The open corrals at this dairy include structures that provide shade for the animals. Calves (under 3 months) are housed in individual calf hutches with a flush system. There are no mature bulls housed onsite at the dairy sites. Open corrals feed lanes and walkways will be flushed twice per day.

Milking Parlor (Center)

The milking parlor is a separate building, apart from the lactating cow confinement. The milking parlor is designed to facilitate changing the groups of cows milked and to allow workers access to the cows during milking. A holding area confines the cows that are ready for milking. The

holding area is covered with open sides and is part of the milking parlor, which in turn, is located in the immediate vicinity of the cow housing. The milking parlor is flushed or sprayed down immediately after, or during the milking of each group of cows.

The facility currently includes a double-20 parallel milking parlor and a double-20 stall herringbone hospital milking parlor. The lactating cows are milked two times per day in the milking parlors.

Liquid Manure Handling System:

The liquid manure handling system consists of three mechanical separators, seven settling basins, and four storage ponds. The freestall feed lanes and walkways are flushed four times per day. The open corral feed lanes and walkways are flushed twice per day.

Solids Separation:

The liquid manure handling system at this dairy includes three mechanical separators and three settling basins for solids separation.

Solids separation removes material from the waste stream that would prematurely fill a lagoon or storage pond. The efficiency of treatment would be significantly lower without separation, resulting in more odors and potentially more VOC emissions from the liquid manure handling system. Most of the separated solids are fibrous materials that lead to excessive sludge buildup or the formation of crusts on the surface of the storage ponds, both of which interfere with pumping operations. Separation reduces the land area required when designing a liquid manure treatment system since the volume to be treated is less. As a final benefit, the separated solids may be recycled and used for soil amendments, re-feeding, bedding, etc.

Settling Basins

The dairy flushes manure to gravity settling basins. 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. Liquid manure enters the structure and slowly drains through the solids in the structure to dewater at a face. The liquids from the settling basins will gradually drain to the treatment lagoons. Solids remaining in the settling basins are left to dry and then are removed. The separated solids will either be immediately incorporated into cropland or stored for use as fertilizer or bedding in the freestalls.

Mechanical Separators:

Liquid manure from all flushed areas of the dairy is collected at a central location, from where it will be pumped up onto mechanical screen separators for solids separation prior to entering the lagoon system. A mechanical separator may achieve a solids removal rate of 20-50%.

Conveyors will pile the solids onto the concrete stacking pad. The pad will be sloped to ensure drainage of any remaining liquid. The separated solids will be removed from the stacking pad on a weekly basis. The solids are generally spread out in thin layers to dry. The dried solids are then piled up for storage, and used as needed for bedding in the freestalls.

Anaerobic Treatment Lagoon

GJ Silva Dairy Inc. is proposing to convert two existing storage ponds to an anaerobic treatment lagoon system. The conversion to an anaerobic treatment lagoon will require that the secondary lagoon be utilized to store the effluent from the primary lagoon. The effluent from only the secondary lagoon will be used for irrigation purposes. In addition, this anaerobic treatment system will be maintained and operated to meet the anaerobic treatment lagoon criteria listed below. An anaerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of manure by microbes in the absence of oxygen. This process of anaerobic decomposition results in the preferential conversion of organic compounds in the manure into methane, carbon dioxide, and water rather than intermediate metabolites (VOCs). The National Resource Conservation Service (NRCS) California Field Office Technical Guide Code 359 - Waste Treatment Lagoon specifies the following criteria for anaerobic treatment lagoons:

1) Minimum treatment volume - The minimum design volume must account for all potential sludge, treatment, precipitation, and runoff volumes;

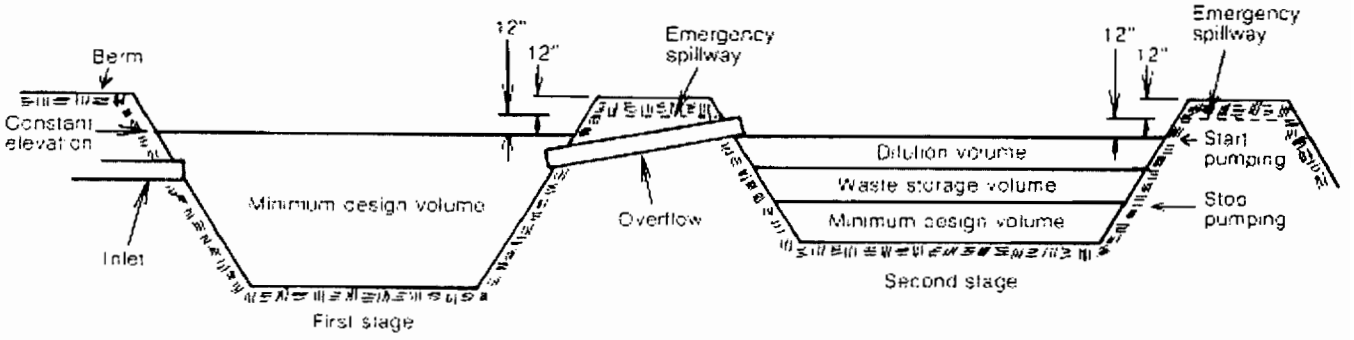
2) Minimum hydraulic retention time – The retention time of the material in the lagoon must be adequate to provide environmentally safe utilization of waste;

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

4) Minimum operating depth of at least 12 feet. Maximizing the depth of the lagoon has the following advantages: 1) The surface area in contact with the atmosphere is minimized, which will reduce volatilization of air pollutants; 2) The smaller surface area reduces the effects of the environment on the lagoon, which provides a more stable and favorable environment for anaerobic bacteria; 3) There is better mixing of lagoon due to rising gas bubbles; and 4) A deeper lagoon requires less land for the required treatment volume.

The anaerobic treatment lagoon system consists of two stages, a treatment lagoon (primary lagoon, Pond 2) and a storage pond (secondary lagoon). The effluent from the treatment lagoon (1,062' x 412' x 12') overflows into the storage pond/secondary lagoon (Ponds 1 and 3), which is designed for liquid storage. The liquid level of the storage pond/secondary lagoon fluctuates and can be emptied when necessary. Effluent from the storage pond is used for the

irrigation of cropland. All the liquid manure at the dairy is pumped to the anaerobic treatment lagoon system.



Storage Pond/Secondary Lagoon

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

Solid Manure Handling:

The solid manure will be immediately applied and incorporated into cropland at the dairy within 2 hours of land application. The separated solids will be dried and used as fertilizer or as bedding in the freestalls or removed from the facility. The applicant proposes to cover the separated solid piles with weatherproof coverings from October through May, so that the solids will remain dry until it is ready to be used.

Feed Handing and Storage:

Dry feed or feed additives may be stored outdoors on stacking pads or in commodity barns. Commodity barns are permanent weatherproof structures with a roof and at least three walled sides. The fourth side is usually left open to allow access for feed equipment. Commodity barns are effective in preventing exposure of stored feed and feed additives to wind, rain, or other type of unwanted contamination.

Silage is fermented, high-moisture stored feed. It is fermented and stored in a process called *ensilage*, *ensiling* or *silaging*, and is usually made from grass crops, including corn, wheat, and alfalfa, using the entire green plant (not just the grain). Silage is made either by placing cut green vegetation in a silo, by piling it in a large heap covered with plastic sheet, or by wrapping large bales in plastic film.

V. Equipment Listing

Pre-Project Equipment Description:

N-5763-1-3: 1,000 COW MILKING OPERATION WITH ONE DOUBLE-20 STALL PARALLEL MILKING PARLOR AND ONE DOUBLE-20 STALL HERRINGBONE HOSPITAL BARN MILKING PARLOR

N-5763-2-3: COW HOUSING - 1,000 MILKCOWS, 216 DRYCOWS, 1,400 LARGE HEIFERS (15-24 MONTHS OLD), 475 CALVES (UNDER 3 MONTHS) HOUSED IN FREESTALLS AND OPEN CORRALS WITH FLUSH/SCRAPE SYSTEM; INCLUDES A CALF HOUSING

N-5763-3-3: LIQUID MANURE HANDLING SYSTEM CONSISTING OF 3 MECHANICAL SEPARATORS; 7 SETTLING BASINS; 4 STORAGE PONDS; MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION

N-5763-4-1: SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; WINDROW PILE COMPOSTING; SOLID MANURE APPLICATION TO LAND AND HAULED OFFSITE

N-5763-9-1: FEED STORAGE AND HANDLING CONSISTING OF COMMODITY BARNS AND SILAGE PILES

Proposed Modification:

Expand the dairy to 2,320 milk cows not to exceed a combined total of 2,583 mature cows (milk and dry); 910 support stock (heifers and bulls); and 500 calves (0-3 months); convert two storage ponds into a two stage anaerobic treatment lagoon system

N-5763-1-5: MODIFICATION OF 1,000 COW MILKING OPERATION WITH ONE DOUBLE-20 PARALLEL MILKING PARLOR (40 STALLS) AND ONE DOUBLE-20 HERRINGBONE HOSPITAL BARN MILKING PARLOR (40 STALLS): INCREASE THE NUMBER OF MILK COWS TO 2,320

N-5763-2-5: MODIFICATION OF COW HOUSING - 1,000 MILK COWS HOUSED IN FREESTALLS WITH FLUSH SYSTEM; 216 DRY COWS AND 1,400 TOTAL SUPPORT STOCK (HEIFERS) HOUSED IN OPEN CORRALS WITH FLUSH SYSTEM; AND 475 CALVES (0-3 MONTHS) HOUSED IN CALF HUTCHES WITH SCRAPE SYSTEM: INCREASE THE HERD CAPACITY TO 2,320 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 2,583 MATURE COWS (MILK AND DRY); 910 SUPPORT STOCK (HEIFERS AND BULLS); AND 500 CALVES (0-3 MONTHS)

N-5763-3-5: MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF 3 MECHANICAL SEPARATORS; 7 SETTLING BASINS; 4 STORAGE PONDS; MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION: CONVERT

STORAGE PONDS NUMBER 2, 1, AND 3 INTO A TWO-STAGE ANAEROBIC TREATMENT LAGOON SYSTEM WITH POND 2 AS ANAEROBIC TREATEMENT LAGOON AND PONDS 1 AND 3 AS STORAGE PONDS; CORRECT NUMBER OF SETTLING BASINS TO THREE

N-5763-4-3: MODIFICATION OF SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; WINDROW PILE COMPOSTING; SOLID MANURE APPLICATION TO LAND: INCREASE THE HERD CAPACITY TO 2,320 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 2,583 MATURE COWS (MILK AND DRY); 910 SUPPORT STOCK (HEIFERS AND BULLS); AND 500 CALVES (0-3 MONTHS)

N-5763-9-3: MODIFICATION OF FEED STORAGE AND HANDLING CONSISTING OF COMMODITY BARNS AND SILAGE PILES: INCREASE THE HERD CAPACITY TO 2,320 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 2,583 MATURE COWS (MILK AND DRY); 910 SUPPORT STOCK (HEIFERS AND BULLS); AND 500 CALVES (0-3 MONTHS)

Post Project Equipment Description:

N-5763-1-5: 2,320 COW MILKING OPERATION WITH ONE DOUBLE-20 PARALLEL MILKING PARLOR (40 STALLS) AND ONE DOUBLE-20 HERRINGBONE HOSPITAL BARN MILKING PARLOR (40 STALLS)

N-5763-2-5: COW HOUSING - 2,320 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 2,583 MATURE COWS (MILK AND DRY); 910 SUPPORT STOCK (HEIFERS AND BULLS); AND 500 CALVES (0-3 MONTHS); AND 12 FREESTALLS WITH FLUSH/SCRAPE SYSTEM

N-5763-3-5: LIQUID MANURE HANDLING SYSTEM CONSISTING OF THREE MECHANICAL SEPARATORS; THREE SETTLING BASINS; ONE ANAEROBIC TREATMENT LAGOON (1,062X412X12) AND TWO STORAGE PONDS; MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION

N-5763-4-3: SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; WINDROW PILE COMPOSTING; SOLID MANURE APPLICATION TO LAND AND/OR HAULED OFFSITE

N-5763-9-3: FEED STORAGE AND HANDLING CONSISTING OF COMMODITY BARNS AND SILAGE PILES

VI. Emission Control Technology Evaluation

PM_{10}, VOC, and NH_3 are the major pollutants of concern from dairy operations.

Gaseous pollutant emissions at a dairy result from the ruminant digestive processes (enteric emissions), from the decomposition and fermentation of feed, and also from decomposition of

organic material in dairy manure. Volatile Organic Compounds (VOCs) are formed as intermediate metabolites when organic matter in manure degrades. Ammonia volatilization is the result of the microbial decomposition of nitrogenous compounds in manure. The quantity of enteric emissions depends directly on the number and types of cows. The quantity of emissions from manure decomposition depends on the amount of manure generated, which also depends on the number and types of cows. Therefore, the total herd size and composition is the critical factor in quantifying emissions from a dairy.

Various management practices are used to control emissions at this dairy. Some of these practices are discussed below:

Milking Parlor (N-5763-1)

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.

Cow Housing (N-5763-2)

All the milk cows for will be housed in freestall barns with concrete lanes. Particulate matter emissions from freestall barns are greatly reduced 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. All heifers are housed in open corrals with flush lanes. Manure, which is a source of emissions, will be removed from the freestall and corral lanes by flushing. 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. The lanes and walkways in the freestalls will be flushed four times per day and the lanes and walkways in the corrals for the heifers and lanes in the calf hutches will be flushed twice per day.

All heifers are housed in open corrals with shade structures. Providing shade for the animals reduces movement and unnecessary activity during hot weather, which reduces PM_{10} emissions. The surfaces of exercise corrals from the corrals will be scraped in the morning hours on a weekly basis except during wet conditions. Frequent scraping of the corrals will reduce the amount of dry manure on the corral surfaces that may be pulverized by the cows' hooves and emitted as PM_{10}. This practice will also reduce the chance of anaerobic conditions developing in the manure pack of the corral surface, potentially reducing VOC emissions.

Liquid Manure Handling System (N-5763-3)

Anaerobic Treatment Lagoon:

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

GJ Silva Dairy proposes to convert the liquid manure handling system to an anaerobic treatment lagoon, which consists of a two-stage anaerobic lagoon treatment system designed in accordance with the specifications set forth in NRCS practice standard 359. A properly designed and operated anaerobic treatment lagoon system will reduce VOC emissions because the organic compounds in the manure will be mostly converted into methane, carbon dioxide, and water rather than a significant amount of VOCs. A two-stage anaerobic treatment lagoon system also has an air pollution benefit over single lagoon systems. Odorous emissions are reduced with a two-stage system since the primary lagoon has a constant treatment volume, which promotes more efficient anaerobic digestion. The proposed anaerobic treatment lagoon meets the design requirements (see design check in Appendix D).
Solids Separation:

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

Covered Lagoon Anaerobic Digester:

Pursuant to Section 5.3 of the Settlement Agreement (9/20/2004) between the District and the Western United Dairyman and the Alliance of Western Milk Producers Inc., installation of an anaerobic digester will only be required if this technology is proven effective in reducing emissions and is required by the final Dairy BACT Guideline.[1] The applicant has agreed to install a lagoon cover if it is required. The proposed lagoon system has been designed so that it can be retrofitted with a cover and converted to a covered lagoon digester meeting the specifications set forth in NRCS practice standard 365 – Anaerobic Digester – Ambient Temperature. If an anaerobic digester is required by the final Dairy BACT Guideline, the applicant shall submit the details of the proposed covered lagoon anaerobic digester system and combustion device to the District and shall install the system in accordance with the timeframes and procedures established by the APCO in the Dairy BACT Guideline.

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

Solid Manure Handling (N-5763-4)

Based on the information currently available, emissions from solid manure applied to cropland are expected to be small. However, to ensure that any possible emissions are minimized, this dairy will be required to incorporate solid manure applied to cropland immediately (within two hours) after application. Immediate incorporation of the manure into the soil will reduce any volatilization of gaseous pollutants, including ammonia and VOC. Reduction in gaseous emissions is achieved by minimizing the amount of time that the manure is exposed to the atmosphere. Once manure has been incorporated into the soil, VOC is absorbed onto particles of soil providing the opportunity for the VOC to be oxidized into carbon dioxide and water[2].

Feed Storage and Handling (N-5763-9)

All animals housed at will be fed in accordance with National Research Council (NRC) guidelines using routine nutritional analysis for rations. Feeding the cows in accordance with NRC guidelines minimizes undigested protein and other undigested nutrients in the manure, which would emit NH_3 and VOCs upon decomposition. Refused feed will be removed from the feed lanes on a daily basis to minimize gaseous emissions from decomposition. The surface area of silage exposed to the atmosphere will be minimized by enclosing silage or covering it with tarps, except for the face of the pile where feed is being removed.

VII. General Calculations

A. Assumptions

- Potential to Emit for the dairy will be based on the maximum design capacity of the number and types of cows at the dairy.
- Only emissions from the lagoons/storage ponds, emergency IC engines, and gasoline dispensing operation at the dairy will be used to determine if the facility is a major source since these units are considered to be the only sources of non-fugitive emissions at dairies.
- All milk cows will be housed in freestall with a flush system. The dry cows and support stock will be housed in open corrals with flush system and shade structures. The calves will be house in on-ground calf hutches with flush system
- 16.7% PM_{10} control efficiency applied for dry cows housed in shaded corrals. 8.3% PM_{10} control efficiency applied for support stock housed in shaded corrals.
- All mitigation measures are expected to result in VOC emission reductions. A conservative 10% control efficiency will be applied to all mitigation measures unless specifically noted.
- An anaerobic treatment lagoon designed in accordance with the NRCS Guideline (359) has the potential of reducing significant amount of emissions. Although VOC emission reductions are expected to be high, to be conservative, a control efficiency of 40% will

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

be applied to this mitigation measure for both the lagoon(s) and land application until better data becomes available.

- All H_2S emissions from the dairy will be allocated to the lagoon/storage of the liquid manure handling permit unit (N-5763-3).
- The mitigation measures chosen will also have a reduction in ammonia emissions. However, due to limited data, these reductions will not be quantified at this time.

B. Emission Factors

PM_{10}, VOC, NH_3, and H_2S

The dairy emissions calculation spreadsheet in Appendix A list the PM_{10}, VOC, NH_3, and H_2S (lagoon/storage ponds only) emission factors for the animals at the dairy. These emission factors will be used to calculate the pre and post-project PM_{10}, VOC, NH_3, and H_2S emissions from the dairy expansion.

C. Calculations

1. Pre-Project Potential to Emit (PE1)

Pre-Project Potential to Emit (PE_1) for the dairy will be based on the maximum design capacity for each type of cow at the dairy and the controls required and proposed by the dairy.

All emission calculations for this project are included in the dairy emissions calculation spreadsheet in Appendix A. The summary of the Pre-Project emissions are shown in the table below:

Pre-Project Potential to Emit (PE1)								
	PM_{10}		VOC		NH_3		H_2S	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
N-5763-1-3	0	0	1.2	420	0.5	190	0	0
N-5763-2-3	45.5	16,599	50.4	18,384	218.6	79,777	0	0
N-5763-3-3	0	0	12.1	4,461	70.1	25,621	6.0	2,231
N-5763-4-1	0	0	2.5	883	14.1	5,125	0	0
N-5763-9-1	0	0	122.8	44,810	0	0	0	0

2. Post Project Potential to Emit (PE2)

Post-Project Potential to Emit (PE2) for the dairy based on the maximum design capacity for each type of cow at the dairy and the controls required and proposed by the dairy.

All emission calculations for this project are included in the dairy emissions calculation

spreadsheet in Appendix A. The summary of the Post-Project emissions are shown in the table below:

Post-Project Potential to Emit (PE2)								
	PM_{10}		VOC		NH_3		H_2S	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
N-5763-1-5	0	0	2.7	974	1.2	441	0	0
N-5763-2-5	36.6	13,350	82.7	30,212	396.2	144,597	0	0
N-5763-3-5	0	0	12.2	4,433	127.2	46,415	6.0	2,231
N-5763-4-3	0	0	4.0	1,468	25.3	9,283	0	0
N-5763-9-3	0	0	142.1	51,867	0	0	0	0

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

Pursuant to District Rule 2201, the SSPE1 is the Potential to Emit (PE) from all units with valid Authorities to Construct (ATC) or Permits to Operate (PTO) at the Stationary Source and the quantity of Emission Reduction Credits (ERC) which have been banked since September 19, 1991 for Actual Emissions Reductions (AER) that have occurred at the source, and which have not been used on-site. The SSPE1 for this facility is as summarized in the following table:

Pre-Project Stationary Source Potential to Emit [SSPE1] (lb/year)						
	NO_X	SO_X	PM_{10}	CO	VOC	NH_3
N-5763-1-3	0	0	0	0	420	190
N-5763-2-3	0	0	16,599	0	18,384	79,777
N-5763-3-3	0	0	0	0	4,461	25,621
N-5763-4-1	0	0	0	0	883	5,125
N-5763-8-0	620	8	12	134	50	0
N-5763-9-1	0	0	0	0	44,810	0
N-5763-11-0	0	0	0	0	276	0
N-5763-12-0	93	0	3	27	14	0
Pre-Project SSPE (SSPE1)	**713**	**8**	**16,614**	**161**	**69,298**	**110,713**

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

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

Post-Project Stationary Source Potential to Emit [SSPE2] (lb/year)						
	NO_X	SO_X	PM_{10}	CO	VOC	NH_3
N-5763-1-5	0	0	0	0	974	441
N-5763-2-5	0	0	13,350	0	30,212	144,597
N-5763-3-5	0	0	0	0	4,433	46,415
N-5763-4-3	0	0	0	0	1,468	9,283
N-5763-8-0	620	8	12	134	50	0
N-5763-9-3	0	0	0	0	51,867	0
N-5763-11-0	0	0	0	0	276	0
N-5763-12-0	93	0	3	27	14	0
Post-Project SSPE (SSPE2)	**713**	**8**	**13,365**	**161**	**89,294**	**200,736**

5. Major Source Determination

Rule 2201 Major Source Determination:

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

- any ERCs associated with the stationary source
- Emissions from non-road IC engines (i.e. IC engines at a particular site at the facility for less than 12 months)
- Fugitive emissions, except for the specific source categories specified in 40 CFR 51.165

(2) A major stationary source of air pollutants or any group of stationary sources as defined in section 302 of the Act, that directly emits, or has the potential to emit, 100 tpy or more of any air pollutant (including any major source of fugitive emissions of any such pollutant, as determined by rule by the Administrator). The fugitive emissions of a stationary source shall not be considered in determining whether it is a major stationary source for the purposes of section 302(j) of the Act, unless the source belongs to one of the following categories of stationary source: (i) Coal cleaning plants (with thermal dryers); (ii) Kraft pulp mills; (iii) Portland cement plants; (iv) Primary zinc smelters; (v) Iron and steel mills; (vi) Primary aluminum ore reduction plants; (vii) Primary copper smelters; (viii) Municipal incinerators capable of charging more than 250 tons of refuse per day; (ix) Hydrofluoric, sulfuric, or nitric acid plants; (x) Petroleum refineries; (xi) Lime plants; (xii) Phosphate rock processing plants; (xiii) Coke oven batteries; (xiv) Sulfur recovery plants; (xv) Carbon black plants (furnace process); (xvi) Primary lead smelters; (xvii) Fuel conversion plants; (xviii) Sintering plants; (xix) Secondary metal production plants; (xx) Chemical process plants; (xxi) Fossil-fuel boilers (or combination thereof) totaling more than 250 million British thermal units per hour heat input; (xxii) Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels; (xxiii) Taconite ore processing plants; (xxiv) Glass fiber processing plants; (xxv) Charcoal

production plants; (xxvi) Fossil-fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input; or (xxvii) Any other stationary source category which, as of August 7, 1980, is being regulated under section 111 or 112 of the Act.

Because agricultural operations do not fall under any of the specific source categories listed above, fugitive emissions are not counted when determining if an agricultural operation is a major source. 40 CFR 71.2 defines fugitive emissions as "those emissions which could not reasonably pass through a stack, chimney, vent, or other functionally-equivalent opening."

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

Milking Center

The mechanical system for the milking parlors can be utilized to capture the gases emitted from the milking parlors, however in order to capture all of the gases, and to keep an appropriate negative pressure throughout the system, the holding area would also need to be entirely enclosed. No facility currently encloses the holding area since cows are continuously going in and out of the barn throughout the day. The capital required to enclose this large area would also be significant. Since the holding area is primarily kept open, the District cannot reasonably demonstrate that emissions can pass through a stack, chimney, vent, or other functionally equivalent opening.

Cow Housing

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

Manure storage Areas

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

Land Application

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

Feed Handling and Storage

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

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

The following tables show the non-fugitive Pre-Project and Post-Project Stationary

Source Potential to Emit for the dairy:

Non-Fugitive Pre-Project Stationary Source Potential to Emit [SSPE1] (lb/year)					
	NO_X	SO_X	PM_{10}	CO	VOC
N-5763-3-3 – Lagoon Only	0	0	0	0	2,132
N-5763-8-0 – IC engine	620	8	12	134	50
N-5763-11-0 – GDO	0	0	0	0	276
N-5763-12-0 – IC engine	93	0	3	27	14
Non-Fugitive SSPE1	**713**	**8**	**15**	**161**	**2,472**

Non-Fugitive Post-Project Stationary Source Potential to Emit [SSPE2] (lb/year)					
	NO_X	SO_X	PM_{10}	CO	VOC
N-5763-3-5 – Lagoon Only	0	0	0	0	2,132
N-5763-8-0 – IC engine	620	8	12	134	50
N-5763-11-0 – GDO	0	0	0	0	276
N-5763-12-0 – IC engine	93	0	3	27	14
Non-Fugitive SSPE2	**713**	**8**	**15**	**161**	**2,472**

Rule 2201 Major Source Determination (lb/year)					
	NO_X	SO_X	PM_{10}	CO	VOC
Facility emissions pre-project	**620**	**8**	**12**	**134**	**2,472**
Facility emissions post-project	**620**	**8**	**12**	**134**	**2,472**
Major Source Threshold	20,000	140,000	140,000	200,000	20,000
Major Source?	No	No	No	No	No

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

Rule 2410 Major Source Determination:

The facility or the equipment evaluated under this project is not listed as one of the categories specified in 40 CFR 52.21 (b)(1)(i). Therefore the following PSD Major Source thresholds are applicable.

PSD Major Source Determination (tons/year)							
	NO2	VOC	SO2	CO	PM	PM10	CO2e
Estimated Facility PE before Project Increase	0.4	34.6	0.004	0.08	16.6	8.3	12,189
PSD Major Source Thresholds	250	250	250	250	250	250	100,000

PSD Major Source Determination (tons/year)							
	NO2	VOC	SO2	CO	PM	PM10	CO2e
PSD Major Source ? (Y/N)	N	N	N	N	N	N	N

As shown above, the facility is not an existing major source for PSD for at least one pollutant. Therefore the facility is not an existing major source for PSD.

6. Baseline Emissions (BE)

The BE calculation (in lb/year) is performed on a pollutant-by-pollutant basis to determine the amount of offsets required, where necessary, when the SSPE1 is greater than the offset threshold. This project is exempt from offsets pursuant to Rule 2201, Section 4.6.9. Therefore, BE calculations are not required.

7. SB 288 Major Modification

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

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

8. Federal Major Modification

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

Since this facility is not a Major Source for any pollutants, this project does not constitute a Federal Major Modification. Additionally, since the facility is not a major source for PM_{10} (140,000 lb/year), it is not a major source for PM2.5 (200,000 lb/year).

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

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

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

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

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

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

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

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

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

The facility or the equipment evaluated under this project is not listed as one of the categories specified in 40 CFR 52.21 (b)(1)(i). Therefore the following PSD Major Source thresholds are applicable:

PSD Major Source Determination: Potential to Emit (tons/year)							
	NO2	VOC	SO2	CO	PM	PM10	CO2e
Total PE from New and Modified Units	0	44	0	0	13.4	6.7	26,625
PSD Major Source threshold	250	250	250	250	250	250	100,000
New PSD Major Source?	N	N	N	N	N	N	N

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

10. Quarterly Net Emissions Change (QNEC)

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

VIII. Compliance

Rule 1070 Inspections

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

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

Rule 2010 Permits Required

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

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

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

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. Unless specifically exempted by Rule 2201, BACT shall be required for the following actions*:

a. Any new emissions unit with a potential to emit exceeding two pounds per day,

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

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

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

As discussed in Section I above, there are no new emissions units associated with this project. Therefore BACT for new units with PE > 2 lb/day purposes is not triggered.

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

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

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

AIPE = PE2 – HAPE

Where,

AIPE = Adjusted Increase in Permitted Emissions, (lb/day)
PE2 = Post-Project Potential to Emit, (lb/day)
HAPE = Historically Adjusted Potential to Emit, (lb/day)

HAPE = PE1 x (EF2/EF1)

Where,

PE1 = The emissions unit's PE prior to modification or relocation, (lb/day)
EF2 = The emissions unit's permitted emission factor for the pollutant after modification or relocation. If EF2 is greater than EF1 then EF2/EF1 shall be set to 1
EF1 = The emissions unit's permitted emission factor for the pollutant before the modification or relocation

AIPE = PE2 – (PE1 * (EF2 / EF1))

N-5763-1-5: Milking Operation

From Dairy Emissions Calculation Spreadsheet (Appendix A)		
Pollutant	AIPE (lb/day)	BACT Required (> 2.0 lb/day)
VOC	1.5	No
NH_3	0.7	No

N-5763-2-5: Cow Housing

From Dairy Emissions Calculation Spreadsheet (Appendix A)		
Pollutant	AIPE (lb/day)	BACT Required (> 2.0 lb/day)
PM_{10}	(8.7)	No
VOC	32.3	Yes
NH_3	177.6	Yes

N-5763-3-5: Liquid Manure Handling

Lagoon/Storage Pond:

From Dairy Emissions Calculation Spreadsheet (Appendix A)		
Pollutant	AIPE (lb/day)	BACT Required (> 2.0 lb/day)
VOC	2.4	Yes
NH_3	27.2	Yes
H_2S	0	No

Land Application:

From Dairy Emissions Calculation Spreadsheet (Appendix A)		
Pollutant	AIPE (lb/day)	BACT Required (> 2.0 lb/day)
VOC	2.5	Yes
NH_3	29.6	Yes

N-5763-4-3: Solid Manure Handling

From Dairy Emissions Calculation Spreadsheet (Appendix A)		
Pollutant	AIPE (lb/day)	BACT Required (> 2.0 lb/day)
VOC	1.6	No
NH_3	11.3	Yes

N-5763-9-3: Feed - TMR

From Dairy Emissions Calculation Spreadsheet (Appendix A)		
Pollutant	AIPE (lb/day)	BACT Required (> 2.0 lb/day)
VOC	19.3	Yes

d. SB 288/Federal Major Modification

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

2. Top-Down BACT Analysis

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

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

Cow Housing and Feed TMR

VOC: 1) Concrete feed lanes and walkways for all cows.

2) Freestall feed lanes and walkways flushed four times per day and feed lanes and walkways in the corrals and hutches for the remaining animals flushed at least two times per day.

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

4) Uneaten feed re-fed or removed from feed lanes on a daily basis to prevent decomposition.

5) All open corrals adequately sloped to promote drainage (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal).

6) Weekly scraping of freestall exercise pens and open corrals using a pull-type scraper in the morning hours except when prevented by wet conditions.

Cow Housing

NH_3: 1) Concrete feed lanes and walkways for all cows.

2) Freestall feed lanes and walkways for milk cows flushed four times per day and feed lanes and walkways in the corrals and hutches for the remaining animals flushed at least two times per day.

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

4) All open corrals adequately sloped to promote drainage (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal).

5) Weekly scraping of freestall exercise pens and open corrals using pull-type scraper in the morning hours except when prevented by wet conditions.

Liquid Manure Handling System

Lagoon & Storage Pond

VOC: 1) Two-stage anaerobic treatment lagoon designed according to NRCS guidelines.
2) Installation of an anaerobic digester contingent upon the final dairy BACT guideline.

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

Land Application

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

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

Solid Manure Handling

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

B. Offsets

Sources that are subject to federal NSR are required to offset the emissions they increase by providing emission reductions. This is generally done with emission reduction credits, or ERCs. There are strict federal requirements for ERCs that can be used to offset emissions increases under NSR. The emission reductions must be (1) real, (2) permanent, (3) quantifiable, (4) enforceable, and (5) surplus. Over time, EPA policies and court determinations have established fairly rigorous definitions and tests for each of these terms.

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

To date, California air districts have not succeeded in gaining EPA approval to issue ERCs for agricultural activities. This has been the case even for reductions from on-the-farm equipment that is similar to traditional stationary sources. Therefore, ERCs will not be granted, nor will offsets be required for agricultural sources until the District has adopted the needed regulations, and EPA has approved those regulations and incorporated them into the SIP.

C. Public Notification

1. Applicability

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

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

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

b. PE > 100 lb/day

Applications which include a new emissions unit with a PE greater than 100 pounds during any one day for any pollutant will trigger public noticing requirements. There are no new emissions units associated with this project. Therefore public noticing is not required for this project for PE > 100 lb/day.

c. Offset Threshold

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

Offset Thresholds				
Pollutant	SSPE1 (lb/year)	SSPE2 (lb/year)	Offset Threshold	Public Notice Required?
NO_X	713	713	20,000 lb/year	No
SO_X	8	8	54,750 lb/year	No
PM_{10}	16,614	13,365	29,200 lb/year	No
CO	161	161	200,000 lb/year	No
VOC	69,298	89,294	20,000 lb/year	No

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

d. SSIPE > 20,000 lb/year

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

SSIPE Public Notice Thresholds					
Pollutant	SSPE2 (lb/year)	SSPE1 (lb/year)	SSIPE (lb/year)	SSIPE Public Notice Threshold	Public Notice Required?
NO_x	713	713	0	20,000 lb/year	No
SO_x	8	8	0	20,000 lb/year	No
PM_{10}	13,365	16,614	-3,249	20,000 lb/year	No
CO	161	161	0	20,000 lb/year	No
VOC	89,294	69,298	19,996	20,000 lb/year	No
NH_3	200,736	110,713	90,023	20,000 lb/year	Yes
H_2S	2,231	2,231	0	20,000 lb/year	No

As demonstrated above, the SSIPE for NH3 is greater than 20,000 lb/year; therefore public noticing for SSIPE purposes is required.

2. Public Notice Action

As discussed above, public noticing is required for this project for SSIPE for NH3 greater than 20,000 lb/year. Therefore, public notice documents will be submitted to the California Air Resources Board (CARB) and a public notice will be published in a local newspaper of general circulation prior to the issuance of the ATC for this equipment.

D. Daily Emission Limits (DELs)

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

For dairies, the DEL is satisfied based on the number and types of cows at the dairy. The number and types of cows are listed in the permit equipment description for the Cow Housing (N-5763-2).

The following conditions will also be placed on the permits to enforce the DELs:

Cow Housing

- The total number of cattle housed at this dairy at any one time shall not exceed any

of the following limits: 2,320 milk cows not to exceed a combined total of 2,583 mature cows (milk and dry); 910 support stock (heifers and bulls); and 500 calves (0-3 months). [District Rule 2201]

Liquid Manure Handling System

Since emissions from the liquid manure handling system depend on the amount of manure handled, the following condition will be placed on the permit:

- The liquid manure handling system shall handle flush manure from no more than 2,320 milk cows not to exceed a combined total of 2,583 mature cows (milk and dry); 910 support stock (heifers and bulls); and 500 calves (0-3 months). [District Rule 2201]

E. Compliance Assurance

1. Source Testing

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

2. Monitoring

Based on guidelines from the University of Idaho in a document entitled "*Dairy Odor Management and Control Practices*"[3] and the requirements of District Rule 4570, the following monitoring conditions will be placed on the permit for cow housing:

- Inspection for potholes and similar sources of emissions shall be performed on a monthly basis. A record of these inspections shall be maintained. [District Rule 2201]
- Firm, stable soil that is not easily eroded shall be used for the exercise pen and corral surfaces. [District Rule 2201]
- A supply of dry fill soil shall be kept on site in order to fill areas where erosion and gouging occurs. [District Rule 2201]
- Clean rainfall runoff shall be diverted around exercise pen and corral surfaces to reduce the amount of water that is potentially retained on these surfaces. [District Rule 2201]

3. Recordkeeping

Recordkeeping is required to demonstrate compliance with the public notification and daily emission limit requirements of Rule 2201. In general, recordkeeping for the milking parlor and the liquid manure handling system are satisfied with the records that must be kept to demonstrate compliance with the numbers and types of cows listed in the permit

[3] http://courses.ag.uidaho.edu/bae/bae404/Dairy%20Odor%20Mgmt.pdf

equipment description for the cow housing. The following conditions will be placed on the ATC permits:

Cow Housing

The following condition will be placed on the ATC for the Cow Housing Permit:

- Permittee shall maintain a record of the number of animals of each production group at the facility and shall maintain quarterly records of any changes to this information. Such records may include DHIA monthly records, milk production invoices, ration sheets or periodic inventory records. [District Rules 2201 and 4570]

Additional recordkeeping is required by Rule 4570, as shown on the draft ATCs.

Liquid Manure Handling System

To ensure that the lagoon system is designed and operating properly, the following condition will be placed on the ATC for the Liquid Manure Handling System:

- Permittee shall maintain records of design specifications and calculations for the Anaerobic Treatment Lagoon system in order to demonstrate that the system has been designed and is operating in accordance with the applicable National Resource Conservation Service (NRCS) technical guide. [District Rule 2201]

Additional recordkeeping is required by Rule 4570, as shown on the draft ATCs.

4. Reporting

No reporting is required to demonstrate compliance with Rule 2201.

F. Ambient Air Quality Analysis (AAQA)

Section 4.14.1 of this Rule requires that an ambient air quality analysis (AAQA) be conducted for the purpose of determining whether a new or modified stationary source will cause or make worse a violation of an air quality standard. The Technical Services Division of the SJVAPCD conducted the required analysis. Refer to Appendix E of this document for the AAQA summary sheet.

The proposed location is in a non-attainment area for PM_{10} State standards. The levels of significance, from 40 CFR Part 51.165 (b)(2), as well as the District's Interim Significance Level for the State's AAQS, are shown in the following table titled 'Significance Levels'. The increase in the ambient PM_{10} concentration due to the proposed project is shown on the table titled 'Calculated Contribution':

Significance Levels					
Pollutant	Significance Levels ($\mu g/m^3$) – District's Interim Significance Level for the State's AAQS				
	Annual Avg.	24 hr Avg.	8 hr Avg.	3 hr Avg.	1 hr Avg.
PM_{10}	N/A	10.4	N/A	N/A	N/A

Calculated Contribution				
Pollutant	Calculated Contributions ($\mu g/m^3$)			
	24 hr Avg.	8 hr Avg.	3 hr Avg.	1 hr Avg.
PM_{10}	5.6	N/A	N/A	N/A

As shown in the preceding tables, modeling results indicated that the calculated increase in the ambient PM_{10} concentration due to the proposed dairy project did not exceed the District significance level. The project is therefore approvable.

Rule 2520 Federally Mandated Operating Permits

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

Rule 2550 Federally Mandated Preconstruction Review for Major Sources of Air Toxics

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

Under Rule 2550, newly constructed facilities or reconstructed units or sources4 at existing facilities would be 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 Maximum Achievable Control Technology.

The federal Clean Air Act lists 189 substances as potential HAPs (Clean Air Act Section 112(b)(1)). Based on the current emission factor for dairies, the following table outlines the HAPs expected to be emitted at dairies. Since this dairy is complying with Best Available Control Technology (BACT) emissions control requirements, many of the pollutants listed below are expected to be reduced significantly; however, no control is being applied in the

[4] Reconstruction" is defined as a change that costs 50 percent of the cost of constructing a new unit or source like the one being rebuilt.

emissions estimates in order to calculate worst-case emissions. Please note that a conclusion that MACT requirements are triggered would necessarily involve consideration of controlled emissions levels. The following is a list of HAPs generated at dairies including the associated emission factor:

Hazardous Air Pollutant Emissions		
HAP	**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
Eythylbenzene	0.003	
o-Xylene	0.005	
1,2-Dibromo-3chloropropane	0.011	
1,2,4-Trichlorobenzene	0.025	
Napthalene	0.012	
Hexachlorobutadiene	0.012	
Formaldehyde	0.005	
Acetaldehyde	0.029	
Chloroform	0.017	California State University Fresno (CSUF) - *Monitoring and Modeling of ROG at California Dairies*, 2005
Styrene	0.01	
Vinyl acetate[5]	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[6]	0.162	
Cadmium	0.009	Air Resources Board's Profile No. 423, Livestock Operations Dust
Hexavalent Chromium	0.004	
Nickel	0.026	
Arsenic	0.005	
Cobalt	0.003	
Lead	0.033	
Total	**1.828**	

Although some of the pollutants listed above may have been misidentified as HAPs due to similarities of many compounds consisting of very similar spikes (as measured through the gas Chromatograph Mass Spectroscopy–GCMS), all of these pollutants will be used in calculating the worst-case HAP emissions. Since this dairy is complying with all of the Best Available Control Technology (BACT) requirements and Rule 4570 mitigation measures, many of the

[5] 0.01 + 0.07 = 0.08 lb/hd-yr
[6] 0.012 + 0.15 = 0.162 lb/hd-yr

pollutants listed above are expected to be mitigated, however, no control is being applied to these factors at this time in order to calculate the worst-case emissions. The emission calculations are shown below:

HAP Emissions						
Category	**Number of cows**		**Emission Factor lb/hd-yr[7]**		**lb/yr**	**tons/yr**
Milking Cow	2320	x	1.828	=	4,241	2.1
Dry Cow	263	x	1.123	=	295	0.1
Heifer (15-24 mo)	910	x	0.786	=	715	0.4
Heifer (7-14 mo)	0	x	0.686	=	0	0.0
Heifer (4-6 mo)	0	x	0.621	=	0	0.0
Calf (under 3 mo)	500	x	0.584	=	292	0.1
Bulls	0	x	1.123	=	0	0.0
Total				=	**5,543**	**2.7**

As shown above, each individual HAP is expected to be below 10 tons per year and total HAP emissions are expected to be below 25 tons per year. The largest individual HAP would be methanol, at 2 tons per year (2.7 tons/yr x (1.35 lb-methanol/1.828 lb-HAPs)). Therefore, this facility will not be a major air toxics source and the provisions of Rule 2550 do not apply.

There are several recently completed and ongoing research studies that that will be considered in future revisions of the current emission factors for dairies, including the recent study conducted by Dr. Mitloehner in a study entitled "Dairy Cow Measurements of Volatile Fatty Acids, Amine, Phenol, and Alcohol Emissions Using an Environmental Chamber" completed in 2006. These studies have not been fully vetted or reviewed in the context of establishing standardized emission factors. For instance, although Dr. Mitloehner indicates a high methanol emissions rate from fresh manure in the cited study, in the same report he also indicates that the flushing of manure may significantly reduce alcohol emissions, including methanol.

Future review of these studies may indeed result in a change in the current emission factors and/or control efficiencies for various practices and controls, but until that scientific review process is complete and the District has had opportunity to consider public comment on any proposed changes, the premature, and therefore potentially flawed, use of such emissions data would be inconsistent with good governance and good science.

Rule 4101 Visible Emissions

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

[7] The emission factor has been adjusted for each type of cow based on the ratio of amount of manure generated for each cow.

than, Ringelmann 1 or 20% opacity.

Pursuant to section 4.12, emissions subject to or specifically exempt from Regulation VIII (Fugitive PM10 Prohibitions) are exempt from Rule 4101.

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

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

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

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

Rule 4102 Nuisance

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

California Health & Safety Code 41700 (Health Risk Assessment)

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

An HRA is not required for a project with a total facility prioritization score of less than one. According to the Technical Services Memo for this project (**Appendix E)**, the total facility prioritization score including this project was greater than one. Therefore, an HRA was required to determine the short-term acute and long-term chronic exposure from this project. The cancer risk for this project is shown in the table below:

HRA Summary		
Unit	Cancer Risk	T-BACT Required
N-5763-1-5	0.79 per million	No
N-5763-2-5	2.66 per million	Yes
N-5763-3-5	N/A	No

Discussion of T-BACT

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

For this project T-BACT is triggered for PM_{10} emissions from milk cow housing. T-BACT is satisfied with BACT for PM_{10}, which is freestall housing (see Appendix C). Compliance with the District's Risk Management Policy is therefore expected.

Rule 4550 Conservation Management Practices

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

Pursuant to Section 5.1, effective on and after July 1, 2004, an owner/operator shall implement the applicable CMPs selected pursuant to Section 6.2 for each agricultural operation site.

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

The facility received District approval for its CMP plan on August 16, 2013. Continued compliance with the requirements of District Rule 4550 is expected.

Rule 4570 Confined Animal Facilities (CAF)

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

The facility is in compliance with the requirements of the rule. To ensure ongoing compliance, the mitigation measures that the applicant has selected for the dairy will be incorporated into the ATCs issued under this project.

California Health & Safety Code 42301.6 (School Notice)

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

California Environmental Quality Act (CEQA)

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

Pollution Control District (District) adopted its *Environmental Review Guidelines* (ERG) in 2001. The basic purposes of CEQA are to:

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

The County of Stanislaus (County) is the public agency having principal responsibility for approving the project. As such, the County served as the Lead Agency (CCR §15367). In approving the project, the Lead Agency prepared and adopted a Negative Declaration. The Lead agency filed a Notice of Determination, stating that the environmental document was adopted pursuant to the provisions of CEQA and concluding that the project would not have a significant effect on the environment.

The District is a Responsible Agency for the project because of its discretionary approval power over the project via its Permits Rule (Rule 2010) and New Source Review Rule (Rule 2201), (CCR §15381). As a Responsible Agency the District complies with CEQA by considering the environmental document prepared by the Lead Agency, and by reaching its own conclusion on whether and how to approve the project (CCR §15096).

The District has considered the Lead Agency's environmental document. Furthermore, the District has conducted an engineering evaluation of the project, this document, which demonstrates that Stationary Source emissions from the project would be below the District's thresholds of significance for criteria pollutants. Thus, the District finds that through a combination of project design elements, compliance with applicable District rules and regulations, and compliance with District air permit conditions, project specific stationary source emissions will have a less than significant impact on air quality. The District does not have authority over any of the other project impacts and has, therefore, determined that no additional findings are required (CEQA Guidelines §15096(h)).

IX. Recommendation

Compliance with all applicable rules and regulations is expected. Pending a successful NSR Public Noticing period, issue ATCs N-5763-1-5, -2-5, -3-5, -4-3, and -9-3; subject to the permit conditions shown on the drafts in Appendix F.

X. Billing Information

Annual Permit Fees			
Permit Number	Fee Schedule	Fee Description	Annual Fee
N-5763-1-5	3020-06	Miscellaneous – Milking operation	$105.00
N-5763-2-5	3020-06	Miscellaneous – Cow housing	$105.00
N-5763-3-5	3020-06	Miscellaneous – Liquid manure	$105.00
N-5763-4-3	3020-06	Miscellaneous – Solid manure	$105.00
N-5763-9-3	3020-06	Miscellaneous – Feed handling	$105.00

XI. Appendices

A: Emissions Calculations
B: Current PTOs
C: BACT Analysis
D: Lagoon Design Analysis
E: RMR & AAQA Summary
F: Draft ATCs

Appendix A

Emissions Calculations

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

Pre-Project Dairy Information

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

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

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

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

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

Pre-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals	% of Corrals That are Shaded
Milk Cows	1,000				1,000	
Dry Cows	216				216	100
Support Stock (Heifers and Bulls)					0	100
Large Heifers			1,400		1,400	
Medium Heifers					0	
Small Heifers					0	
Bulls					0	

	Calf Hutches				Calf Corrals			
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	Total # of Calves	% of Corrals That are Shaded
Calves			475				475	

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

Total Herd Summary

Total Milk Cows	1,000
Total Mature Cows	1,216
Support Stock (Heifers and Bulls)	1,400
Total Calves	475
Total Dairy Head	3,091

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

Pre-Project Silage Information

Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	1	30	170
Alfalfa			
Wheat	2	24	150

Post-Project Dairy Information

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

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

Calves should be entered separately from support stock.

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

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

Post-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals	% of Corrals That are Shaded
Milk Cows	2,320				2,320	
Dry Cows			263		263	100
Support Stock (Heifers and Bulls)					0	100
Large Heifers			910		910	100
Medium Heifers					0	100
Small Heifers					0	
Bulls					0	

	Calf Hutches				Calf Corrals			
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	Total # of Calves	% of Corrals That are Shaded
Calves			500				500	

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

Total Herd Summary

Total Milk Cows	2,320
Total Mature Cows	2,583
Support Stock (Heifers and Bulls)	910
Total Calves	500
Total Dairy Head	3,993

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

Post-Project Silage Information

Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	1	30	170
Alfalfa			
Wheat	2	24	150

This spreadsheet serves only as a resource to calculate potential emissions from dairies, and may not reflect the final emissions used by the District due to parameters not addressed in this spreadsheet and/or omissions from the spreadsheet. Any other permittable equipment (e.g. IC engines, gasoline tanks, etc.) at a facility will need to be calculated separately. All final calculations used in permitting projects will be conducted by District staff.

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

Milking Parlor				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	Control Efficiency	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Enteric Emissions Mitigations		
x	x	Feed according to NRC guidelines	5%	5%
		Total Control Efficiency	5%	5%
		Milking Parlor Floor Mitigations		
x	x	Feed according to NRC guidelines	10%	10%
x	x	Flush or hose milk parlor immediately prior to, immediately after, or during each milking. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF.	0%	0%
		Total Control Efficiency	10%	10%

Cow Housing				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Enteric Emissions Mitigations		
x	x	Feed according to NRC guidelines	5%	5%
		Total Control Efficiency	5%	5%
		Corrals/Pens Mitigations		
x	x	Feed according to NRC guidelines	5%	5%
x	x	Inspect water pipes and troughs and repair leaks at least once every seven days. Note: If selected for dairies > 999 milk cows, CE is already included in EF.	0%	0%
x	x	Clean manure from corrals at least four times per year with at least 60 days between cleaning, or clean corrals at least once between April and July and at least once between September and December. Note: If selected for dairies > 999 milk cows, CE is already included in EF.	0%	0%
x	x	Scrape, vacuum, or flush concrete lanes in corrals at least once every day for mature cows and every seven days for support stock, or clean concrete lanes such that the depth of manure does not exceed 12 inches at any point or time.	10%	10%
x	x	Implement one of the following: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 sq ft or less and slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 sq ft; 2) maintain corrals to ensure proper drainage preventing water from standing more than 48 hrs; 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface. Note: If selected for dairies > 999 milk cows, CE already included in EF.	0%	0%
		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.	0%	0%
x	x	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.	5%	5%
		Clean manure from under corral shades at least once every 14 days, when weather permits access into corral. Note: If selected for dairies > 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.	0%	0%
		Install shade structure so that the structure has a North/South orientation. Note: If selected for dairies > 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.	0%	0%
x	x	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	18.78%	18.78%
		Bedding Mitigations		
x	x	Feed according to NRC guidelines	5%	5%
		Use non-manure-based bedding and non-separated solids based bedding for at least 90% of the bedding material, by weight, for freestalls (e.g. rubber mats, almond shells, sand, or waterbeds).	0%	0%
x	x	For a large dairy only (1,000 milk cows or larger) - Remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every 7 days.	10%	10%
		For a medium dairy only (500 to 999 milk cows) - Remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every 14 days.	0%	0%
		Total Control Efficiency	14.50%	14.50%
		Lanes Mitigations		
x	x	Feed according to NRC guidelines	5%	5%
x	x	Pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers. Note: No control efficiency at this time.	0%	0%
x	x	Flush, scrape, or vacuum freestall flush lanes immediately prior to or after, or during each milking; or flush or scrape freestall flush lanes at least 3 times per day.	10%	10%
		Have no animals in exercise pens or corrals at any time.	0%	0%
		Total Control Efficiency	14.50%	14.50%

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

Solid Manure Handling				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Solid Manure Storage Mitigations		
x	x	Feed according to NRC guidelines	5%	5%
		Within 72 hours of removal from housing, either a) remove dry manure from the facility, or b) cover dry manure outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed 24 hours per event.	0%	0%
		Total Control Efficiency	5.00%	5.00%
		Separated Solids Piles Mitigations		
x	x	Feed according to NRC guidelines	5%	5%
x	x	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	14.50%	14.50%
		Solid Manure Land Application Mitigations		
x	x	Feed according to NRC guidelines	5%	5%
x	x	Incorporate all solid manure within 72 hours of land application. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF.	0%	0%
		Only apply solid manure that has been treated with an anaerobic treatment lagoon, aerobic lagoon or digester system.	0%	0%
		Apply no solid manure with a moisture content of more than 50%	0%	0%
		Total Control Efficiency	5.00%	5.00%

Silage and TMR				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Corn/Alfalfa/Wheat Silage Mitigations		
x	x	1. Utilize a sealed feed storage system (e.g. Ag-Bag) for bagged silage, or 2. Cover the surface of silage piles, except for the area where feed is being removed from the pile, with a plastic tarp that is at least 5 mils thick (0.005 inches), multiple plastic tarps with a cumulative thickness of at least 5 mils (0.005 inches), or an oxygen barrier film covered with a UV resistant material within 72 hours of last delivery of material to the pile, and implement one of the following: a) build silage piles such that the average bulk density is at least 44 lb/cu-ft for corn silage and 40 lb/cu-ft for other silage types, as measured in accordance with Section 7.10 of Rule 4570, b) when creating a silage pile, adjust filling parameters to assure a calculated average bulk density of at least 44 lb/cu-ft for corn silage and at least 40 lb/cu-ft for other silage types, using a spreadsheet approved by the District, c) harvest silage crop at > or = 65% moisture for corn; and >= 60% moisture for alfalfa/grass and other silage crops; manage silage material delivery such that no more than 6 inches of materials are uncompacted on top of the pile; and incorporate the applicable Theoretical Length of Chop (TLC) and roller opening for the crop being harvested. Implement two of the following: 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%	39%
		Total Control Efficiency*	39.00%	39.00%

*Assumes 25% control for density mitigation measures and 10% each for the two optional measures, resulting in an overall control of 39%. The same conservative control efficiency will be applied to the sealed feed storage system (Ag-Bag).

		TMR Mitigations		
x	x	Push feed so that it is within 3 feet of feedlane fence within 2 hrs of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the cows.	10%	10%
x	x	Begin feeding total mixed rations within 2 hrs of grinding and mixing rations. Note: If selected for dairies > 999 milk cows, control efficiency already included in EF.	0%	0%
		Feed steam-flaked, dry rolled, cracked or ground corn or other ground cereal grains.	0%	0%
x	x	Remove uneaten wet feed from feed bunks within 24 hrs after then end of a rain event.	10%	10%
		For total mixed rations that contain at least 30% by weight of silage, feed animals total mixed rations that contain at least 45% moisture.	0%	0%
		Total Control Efficiency	19.00%	19.00%

lb/hd-yr Dairy Emissions Factors

			Milk Cows				Dry Cows				Large Heifers (15 to 24 months)				Medium Heifers (7 to 14 months)				Small Heifers (3 to 6 months)				Calves (0 - 3 months)				Bulls			
			Uncontrolled		EF1	EF2	Uncontrolled		EF1	EF2	Uncontrolled		EF1	EF2	Uncontrolled		EF1	EF2	Uncontrolled		EF1	EF2	Uncontrolled		EF1	EF2	Uncontrolled		EF1	EF2
			<1000 milk cows	≥1000 milk cows			<1000 milk cows	≥1000 milk cows			<1000 milk cows	≥1000 milk cows			<1000 milk cows	≥1000 milk cows			<1000 milk cows	≥1000 milk cows			<1000 milk cows	≥1000 milk cows			<1000 milk cows	≥1000 milk cows		
Milking Parlor	VOC	Enteric Emissions in Milking Parlors	0.43	0.41	0.39	0.39	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
		Milking Parlor Floor	0.04	0.03	0.03	0.03	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
		Total	**0.47**	**0.44**	**0.42**	**0.42**	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
	NH3	**Total**	**0.19**	**0.19**	**0.19**	**0.19**	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
Cow Housing	VOC	Enteric Emissions in Cow Housing	3.89	3.69	3.51	3.51	2.33	2.23	2.12	2.12	1.81	1.71	1.63	1.63	1.23	1.17	1.11	1.11	0.69	0.65	0.62	0.62	0.32	0.31	0.30	0.30	1.10	1.04	0.99	0.99
		Corrals/Pens	10.00	6.60	5.36	5.36	5.40	3.59	2.92	2.92	4.20	2.76	2.24	2.24	2.85	1.88	1.53	1.53	1.60	1.04	0.85	0.85	0.75	0.50	0.41	0.41	2.55	1.67	1.36	1.36
		Bedding	1.05	1.00	0.86	0.86	0.57	0.54	0.47	0.47	0.44	0.42	0.36	0.36	0.30	0.28	0.24	0.24	0.17	0.16	0.14	0.14	0.08	0.08	0.06	0.06	0.27	0.25	0.21	0.21
		Lanes	0.84	0.80	0.68	0.68	0.45	0.44	0.37	0.37	0.35	0.33	0.29	0.29	0.24	0.23	0.19	0.19	0.13	0.13	0.11	0.11	0.06	0.06	0.05	0.05	0.21	0.20	0.17	0.17
		Total	**15.78**	**12.09**	**10.41**	**10.41**	**8.75**	**6.80**	**5.88**	**5.88**	**6.81**	**5.22**	**4.51**	**4.51**	**4.62**	**3.56**	**3.07**	**3.07**	**2.59**	**1.98**	**1.71**	**1.71**	**1.22**	**0.95**	**0.82**	**0.82**	**4.13**	**3.16**	**2.73**	**2.73**
	NH3	**Total**	**53.30**	**53.30**	**53.30**	**53.30**	**27.00**	**27.00**	**27.00**	**27.00**	**14.00**	**14.00**	**14.00**	**14.00**	**10.00**	**10.00**	**10.00**	**10.00**	**7.60**	**7.60**	**7.60**	**7.60**	**2.20**	**2.20**	**2.20**	**2.20**	**19.40**	**19.40**	**19.40**	**19.40**
Liquid Manure Handling	VOC	Lagoons/Storage Ponds	1.52	1.30	1.24	0.74	0.82	0.71	0.67	0.40	0.64	0.54	0.52	0.31	0.43	0.37	0.35	0.21	0.24	0.21	0.20	0.12	0.11	0.10	0.09	0.06	0.40	0.33	0.31	0.19
		Liquid Manure Land Application	1.84	1.40	1.33	0.80	0.89	0.76	0.72	0.43	0.69	0.58	0.56	0.33	0.47	0.40	0.38	0.23	0.26	0.22	0.21	0.13	0.12	0.11	0.10	0.06	0.42	0.35	0.33	0.20
		Total	**3.16**	**2.70**	**2.57**	**1.54**	**1.71**	**1.47**	**1.40**	**0.83**	**1.33**	**1.13**	**1.07**	**0.64**	**0.90**	**0.77**	**0.73**	**0.44**	**0.51**	**0.43**	**0.41**	**0.24**	**0.24**	**0.21**	**0.19**	**0.12**	**0.82**	**0.68**	**0.65**	**0.39**
	NH3	Lagoons/Storage Ponds	8.20	8.20	8.20	8.20	4.20	4.20	4.20	4.20	2.20	2.20	2.20	2.20	1.50	1.50	1.50	1.50	1.20	1.20	1.20	1.20	0.35	0.35	0.35	0.35	3.00	3.00	3.00	3.00
		Liquid Manure Land Application	8.90	8.90	8.90	8.90	4.50	4.50	4.50	4.50	2.30	2.30	2.30	2.30	1.70	1.70	1.70	1.70	1.30	1.30	1.30	1.30	0.37	0.37	0.37	0.37	3.23	3.23	3.23	3.23
		Total	**17.10**	**17.10**	**17.10**	**17.10**	**8.70**	**8.70**	**8.70**	**8.70**	**4.50**	**4.50**	**4.50**	**4.50**	**3.20**	**3.20**	**3.20**	**3.20**	**2.50**	**2.50**	**2.50**	**2.50**	**0.72**	**0.72**	**0.72**	**0.72**	**6.23**	**6.23**	**6.23**	**6.23**
Solid Manure Handling	VOC	Solid Manure Storage	0.16	0.15	0.14	0.14	0.09	0.08	0.08	0.08	0.07	0.06	0.06	0.06	0.05	0.04	0.04	0.04	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.04	0.04	0.04	0.04
		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	0.31	0.31	0.21	0.18	0.17	0.17	0.16	0.14	0.13	0.13	0.11	0.09	0.09	0.09	0.06	0.05	0.05	0.05	0.03	0.03	0.02	0.02	0.10	0.08	0.06	0.08
		Total	**0.61**	**0.54**	**0.51**	**0.51**	**0.33**	**0.29**	**0.28**	**0.28**	**0.26**	**0.23**	**0.21**	**0.21**	**0.17**	**0.15**	**0.14**	**0.14**	**0.10**	**0.09**	**0.08**	**0.08**	**0.05**	**0.04**	**0.04**	**0.04**	**0.16**	**0.14**	**0.13**	**0.13**
	NH3	Solid Manure Storage	0.95	0.95	0.95	0.95	0.48	0.48	0.48	0.48	0.25	0.25	0.25	0.25	0.18	0.18	0.18	0.18	0.13	0.13	0.13	0.13	0.04	0.04	0.04	0.04	0.35	0.35	0.35	0.35
		Separated Solids Piles	0.38	0.38	0.38	0.38	0.19	0.19	0.19	0.19	0.10	0.10	0.10	0.10	0.07	0.07	0.07	0.07	0.05	0.05	0.05	0.05	0.02	0.02	0.02	0.02	0.14	0.14	0.14	0.14
		Solid Manure Land Application	2.09	2.09	2.09	2.09	1.06	1.06	1.06	1.06	0.55	0.55	0.55	0.55	0.39	0.39	0.39	0.39	0.30	0.30	0.30	0.30	0.09	0.09	0.09	0.09	0.76	0.76	0.76	0.76
		Total	**3.42**	**3.42**	**3.42**	**3.42**	**1.73**	**1.73**	**1.73**	**1.73**	**0.90**	**0.90**	**0.90**	**0.90**	**0.64**	**0.64**	**0.64**	**0.64**	**0.48**	**0.48**	**0.48**	**0.48**	**0.15**	**0.15**	**0.15**	**0.15**	**1.25**	**1.25**	**1.25**	**1.25**

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

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

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

PM_{10} Emission Factors (lb/hd-yr)

Type of Cow	Dairy EF	Source
Cows in Freestalls	1.37	Based on a Summer 2003 study by Texas A&M ASAE at a West Texas Dairy
Milk/Dry in Corrals	5.46	Based on a Summer 2003 study by Texas A&M ASAE at a West Texas Dairy
Heifers/Bulls in Open Corrals	10.55	Based on a USDA/UC Davis report quantifying dairy and feedlot emissions in Tulare & Kern Counties (April '01)
Calf (under 3 mo.) open corrals	1.37	SJVAPCD
Calf on-ground hutches	0.343	SJVAPCD (75% control efficiency)
Calf above-ground flushed	0.069	SJVAPCD (95% control efficiency)
Calf above-ground scraped	0.206	SJVAPCD (85% control efficiency)

Pre-Project Potential to Emit (PE1)

Pre-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals	% of Corrals That are Shaded
Milk Cows	1,000	0	0	0	1,000	0
Dry Cows	216	0	0	0	216	100
Support Stock (Heifers and Bulls)	0	0	0	0	0	100
Large Heifers	0	0	1,400	0	1,400	0
Medium Heifers	0	0	0	0	0	0
Small Heifers	0	0	0	0	0	0
Bulls	0	0	0	0	0	0

	Calf Hutches				Calf Corrals			
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	Total # of Calves	% of Corrals That are Shaded
Calves	0	0	475	0	0	0	475	0

Silage Information

Feed Type	Maximum # Open Piles	Maximum Height (ft)	Maximum Width (ft)	Open Face Area (ft^2)
Corn	1	30	170	3,790
Alfalfa	0	0	0	
Wheat	2	24	150	5,272

Milking Parlor

Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	1.2	420	0.5	190

Cow Housing

Cow	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	28.5	10,410	146.0	53,300	3.8	1,370
Dry Cows	3.5	1,270	16.0	5,832	0.8	296
Support Stock (Heifers and Bulls)	0.0	0	0.0	0	0.0	0
Large Heifers	17.3	6,314	53.7	19,600	40.5	14,770
Medium Heifers	0.0	0	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0	0.0	0
Calves	1.1	390	2.9	1,045	0.4	163
Bulls	0.0	0	0.0	0	0.0	0
Total	**50.4**	**18,384**	**218.6**	**79,777**	**45.5**	**16,599**

Liquid Manure Handling

Cow	VOC		NH3		H2S*	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	7.0	2,570	46.8	17,100	5.2	1,902
Dry Cows	0.8	302	5.1	1,879	0.3	110
Support Stock (Heifers and Bulls)	0.0	0	0.0	0	0	0
Large Heifers	4.1	1,498	17.3	6,300	0.5	200
Medium Heifers	0.0	0	0.0	0	0	0
Small Heifers	0.0	0	0.0	0	0	0
Calves	0.2	90	0.9	342	0	18
Bulls	0.0	0	0.0	0	0	0
Total	**12.1**	**4,461**	**70.1**	**25,621**	**6**	**2,231**

Solid Manure Handling

Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	1.4	510	9.4	3,420
Dry Cows	0.2	60	1.0	374
Support Stock (Heifers and Bulls)	0.0	0	0.0	0
Large Heifers	0.8	294	3.5	1,260
Medium Heifers	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0
Calves	0.1	19	0.2	71
Bulls	0.0	0	0.0	0
Total	**2.5**	**883**	**14.1**	**5,125**

Feed Handling and Storage

	Daily PE (lb-VOC/day)	Annual PE (lb-VOC/yr)
Corn Emissions	23.6	8,614
Alfalfa Emissions	0.0	0
Wheat Emissions	41.5	15,147
TMR	57.7	21,049
Total	**122.8**	**44,810**

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 all other permits:

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.

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

Calculations for silage emissions:

Annual PE = (EF1) 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 (EF1) 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.

Notes:

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

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	1.2	0.5	0.0
Cow Housing	0.0	0.0	45.5	0.0	50.4	218.6	0.0
Liquid Manure	0.0	0.0	0.0	0.0	12.1	70.1	6.0
Solid Manure	0.0	0.0	0.0	0.0	2.5	14.1	0.0
Feed Handling	0.0	0.0	0.0	0.0	122.8	0.0	0.0
Total	**0.0**	**0.0**	**45.5**	**0.0**	**189.0**	**303.3**	**6.0**

Major Source Emissions (lb/yr)

Permit	NOx	SOx	PM10	CO	VOC	NH3
Milk Parlor	0	0	0	0	0	0
Cow Housing	0	0	0	0	0	0
Liquid Manure	0	0	0	0	2,147	0
Solid Manure	0	0	0	0	0	0
Feed Handling	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**2,147**	**0**

Total Annual Pre-Project Potential to Emit (lb/yr)

Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	420	190	0
Cow Housing	0	0	16,599	0	18,384	79,777	0
Liquid Manure	0	0	0	0	4,461	25,621	2,231
Solid Manure	0	0	0	0	883	5,125	0
Feed Handling	0	0	0	0	44,810	0	0
Total	**0**	**0**	**16,599**	**0**	**68,958**	**110,713**	**2,231**

Post-Project Potential to Emit (PE2)

Post-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals	% of Corrals That are Shaded
Milk Cows	2,320	0	0	0	2,320	0
Dry Cows	0	0	263	0	263	100
Support Stock (Heifers and Bulls)	0	0	0	0	0	100
Large Heifers	0	0	910	0	910	100
Medium Heifers	0	0	0	0	0	100
Small Heifers	0	0	0	0	0	0
Bulls	0	0	0	0	0	0

	Calf Hutches				Calf Corrals			
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	Total # of Calves	% of Corrals That are Shaded
Calves	0	0	500	0	0	0	500	0

Silage Information

Feed Type	Maximum # Open Piles	Maximum Height (ft)	Maximum Width (ft)	Open Face Area (ft^2)
Corn	1	30	170	3,790
Alfalfa	0	0	0	
Wheat	2	24	150	5,272

Milking Parlor

Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	2.7	974	1.2	441

Cow Housing

Cow	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	66.2	24,151	338.8	123,656	8.7	3,178
Dry Cows	4.2	1,546	19.5	7,101	3.3	1,196
Support Stock (Heifers and Bulls)	0.0	0	0.0	0	0.0	0
Large Heifers	11.2	4,104	34.9	12,740	24.1	8,804
Medium Heifers	0.0	0	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0	0.0	0
Calves	1.1	410	3.0	1,100	0.5	172
Bulls	0.0	0	0.0	0	0.0	0
Total	**82.7**	**30,212**	**396.2**	**144,597**	**36.6**	**13,350**

Liquid Manure Handling

Cow	VOC		NH3		H2S	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	9.8	3,573	108.7	39,672	5.2	1,902
Dry Cows	0.6	218	6.3	2,288	0.3	110
Support Stock (Heifers and Bulls)	0.0	0	0.0	0	0	0
Large Heifers	1.6	582	11.2	4,095	0.5	200
Medium Heifers	0.0	0	0.0	0	0	0
Small Heifers	0.0	0	0.0	0	0	0
Calves	0.2	60	1.0	360	0	18
Bulls	0.0	0	0.0	0	0	0
Total	**12.2**	**4,433**	**127.2**	**46,415**	**6**	**2,231**

Solid Manure Handling

Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	3.2	1,183	21.7	7,934
Dry Cows	0.2	74	1.2	455
Support Stock (Heifers and Bulls)	0.0	0	0.0	0
Large Heifers	0.5	191	2.2	819
Medium Heifers	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0
Calves	0.1	20	0.2	75
Bulls	0.0	0	0.0	0
Total	**4.0**	**1,468**	**25.3**	**9,283**

Feed Handling and Storage

	Daily PE (lb-VOC/day)	Annual PE (lb-VOC/yr)
Corn Emissions	23.6	8,614
Alfalfa Emissions	0.0	0
Wheat Emissions	41.5	15,147
TMR	77.0	28,106
Total	**142.1**	**51,867**

Calculations for milking parlor:

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

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

Calculations for all other permits:

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

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

Calculations for silage emissions:

Annual PE = (EF2) x (area 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 (EF2) 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.

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	2.7	1.2	0.0
Cow Housing	0.0	0.0	36.6	0.0	82.7	396.2	0.0
Liquid Manure	0.0	0.0	0.0	0.0	12.2	127.2	6.0
Solid Manure	0.0	0.0	0.0	0.0	4.0	25.3	0.0
Feed Handling	0.0	0.0	0.0	0.0	142.1	0.0	0.0
Total	**0.0**	**0.0**	**36.6**	**0.0**	**243.7**	**549.9**	**6.0**

Major Source Emissions (lb/yr)

Permit	NOx	SOx	PM10	CO	VOC	NH3
Milk Parlor	0	0	0	0	0	0
Cow Housing	0	0	0	0	0	0
Liquid Manure	0	0	0	0	2,132	0
Solid Manure	0	0	0	0	0	0
Feed Handling	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**2,132**	**0**

Total Annual Post-Project Potential to Emit (lb/yr)

Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	974	441	0
Cow Housing	0	0	13,350	0	30,212	144,597	0
Liquid Manure	0	0	0	0	4,433	46,415	2,231
Solid Manure	0	0	0	0	1,468	9,283	0
Feed Handling	0	0	0	0	51,867	0	0
Total	**0**	**0**	**13,350**	**0**	**88,955**	**200,736**	**2,231**

Quarterly Net Emissions Change (QNEC)

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

QNEC = PE2 - PE1, where:

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

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

Milking Parlor					
	PE2 (lb/yr)	PE2 (lb/qtr)	PE1 (lb/yr)	PE1 (lb/qtr)	QNEC (lb/qtr)
NOx	0	0.0	0	0.0	0.0
SOx	0	0.0	0	0.0	0.0
PM10	0	0.0	0	0.0	0.0
CO	0	0.0	0	0.0	0.0
VOC	974	244	420	105	139
NH3	441	110	190	48	63

Cow Housing					
	PE2 (lb/yr)	PE2 (lb/qtr)	PE1 (lb/yr)	PE1 (lb/qtr)	QNEC (lb/qtr)
NOx	0	0	0	0	0
SOx	0	0	0	0	0
PM10	13,350	3,337	16,599	4,150	-812
CO	0	0	0	0	0
VOC	30,212	7,553	18,384	4,596	2,957
NH3	144,597	36,149	79,777	19,944	16,205

Liquid Manure					
	PE2 (lb/yr)	PE2 (lb/qtr)	PE1 (lb/yr)	PE1 (lb/qtr)	QNEC (lb/qtr)
NOx	0	0	0	0	0
SOx	0	0	0	0	0
PM10	0	0	0	0	0
CO	0	0	0	0	0
VOC	4,433	1,108	4,461	1,115	-7
NH3	46,415	11,604	25,621	6,405	5,198
H2S	2,231	558	2,231	558	0

Solid Manure					
	PE2 (lb/yr)	PE2 (lb/qtr)	PE1 (lb/yr)	PE1 (lb/qtr)	QNEC (lb/qtr)
NOx	0	0	0	0	0
SOx	0	0	0	0	0
PM10	0	0	0	0	0
CO	0	0	0	0	0
VOC	1,468	367	883	221	146
NH3	9,283	2,321	5,125	1,281	1,040

Feed Storage and Handling					
	PE2 (lb/yr)	PE2 (lb/qtr)	PE1 (lb/yr)	PE1 (lb/qtr)	QNEC (lb/qtr)
NOx	0	0	0	0	0
SOx	0	0	0	0	0
PM10	0	0	0	0	0
CO	0	0	0	0	0
VOC	51,867	12,967	44,810	11,203	1,764
NH3	0	0	0	0	0

Adjusted Increase in Permitted Emissions

Milking Parlor

VOC Emissions

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	2.7	1.2	0.42	0.42	1.5
				Total	1.5

NH3 Emissions

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	1.2	0.5	0.19	0.19	0.7
				Total	0.7

Cow Housing

VOC Emissions

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	66.2	28.5	10.41	10.41	37.7
Dry Cows	4.2	3.5	5.88	5.88	0.7
Support Stock (Heifers and Bulls)	0.0	0.0	4.51	4.51	0.0
Large Heifers	11.2	17.3	4.51	4.51	-6.1
Medium Heifers	0.0	0.0	3.07	3.07	0.0
Small Heifers	0.0	0.0	1.71	1.71	0.0
Calves	1.1	1.1	0.82	0.82	0.0
Bulls	0.0	0.0	2.73	2.73	0.0
				Total	32.3

NH3 Emissions

NH3	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	338.8	146.0	53.30	53.30	192.8
Dry Cows	19.5	16.0	27.00	27.00	3.5
Support Stock (Heifers and Bulls)	0.0	0.0	14.00	14.00	0.0
Large Heifers	34.9	53.7	14.00	14.00	-18.8
Medium Heifers	0.0	0.0	10.00	10.00	0.0
Small Heifers	0.0	0.0	7.60	7.60	0.0
Calves	3.0	2.9	2.20	2.20	0.1
Bulls	0.0	0.0	19.40	19.40	0.0
				Total	177.6

PM10 Emissions

PM10	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows (Freestalls)	8.7	3.8	1.37	1.37	5.0
Milk Cows (Shaded Corrals)	0.0	0.0	4.55	4.55	0.0
Milk Cows (Unshaded Corrals)	0.0	0.0	5.46	5.46	0.0
Dry Cows (Freestalls)	0.0	0.6	1.37	1.37	-0.6
Dry Cows (Shaded Corrals)	3.3	0.0	4.55	4.55	3.3
Dry Cows (Unshaded Corrals)	0.0	0.0	5.46	5.46	0.0
Support Stock (Freestalls)	0.0	0.0	1.37	1.37	0.0
Support Stock (Shaded Corrals)	0.0	0.0	9.67	9.67	0.0
Support Stock (Unshaded Corrals)	0.0	0.0	10.55	10.55	0.0
Large Heifers (Freestalls)	0.0	0.0	1.37	1.37	0.0
Large Heifers (Shaded Corrals)	24.1	0.0	9.67	9.67	24.1
Large Heifers (Unshaded Corrals)	0.0	40.5	10.55	10.55	-40.5
Medium Heifers (Freestalls)	0.0	0.0	1.37	1.37	0.0
Medium Heifers (Shaded Corrals)	0.0	0.0	9.67	9.67	0.0
Medium Heifers (Unshaded Corrals)	0.0	0.0	10.55	10.55	0.0
Small Heifers (Freestalls)	0.0	0.0	1.37	1.37	0.0
Small Heifers (Shaded Corrals)	0.0	0.0	9.67	9.67	0.0
Small Heifers (Unshaded Corrals)	0.0	0.0	10.55	10.55	0.0
Calves (Shaded Corrals)	0.0	0.0	1.26	1.26	0.0
Calves (Unshaded Corrals)	0.0	0.0	1.37	1.37	0.0
Calves (O-G Hutches)	0.5	0.4	0.343	0.343	0.0
Calves (A-G Flushed)	0.0	0.0	0.069	0.069	0.0
Calves (A-G Scraped)	0.0	0.0	0.206	0.206	0.0
Bulls (Freestalls)	0.0	0.0	1.37	1.37	0.0
Bulls (Shaded Corrals)	0.0	0.0	9.67	9.67	0.0
Bulls (Unshaded Corrals)	0.0	0.0	10.55	10.55	0.0
				Total	-8.7

Liquid Manure Handling

VOC Emissions - Lagoon/Storage Pond(s)

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	4.7	3.4	0.74	1.24	2.7
Dry Cows	0.3	0.4	0.40	0.67	0.1
Support Stock (Heifers and Bulls)	0.0	0.0	0.31	0.52	0.0
Large Heifers	0.8	2.0	0.31	0.52	-0.4
Medium Heifers	0.0	0.0	0.21	0.35	0.0
Small Heifers	0.0	0.0	0.12	0.20	0.0
Calves	0.1	0.1	0.06	0.09	0.0
Bulls	0.0	0.0	0.19	0.31	0.0
				Total	2.4

VOC Emissions - Land Application

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	5.1	3.6	0.80	1.33	2.9
Dry Cows	0.3	0.4	0.43	0.72	0.1
Support Stock (Heifers and Bulls)	0.0	0.0	0.33	0.56	0.0
Large Heifers	0.8	2.1	0.33	0.56	-0.5
Medium Heifers	0.0	0.0	0.23	0.38	0.0
Small Heifers	0.0	0.0	0.13	0.21	0.0
Calves	0.1	0.1	0.06	0.10	0.0
Bulls	0.0	0.0	0.20	0.33	0.0
				Total	2.5

NH3 Emissions - Lagoon/Storage Pond(s)

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	52.1	22.5	8.20	8.20	29.6
Dry Cows	3.0	2.5	4.20	4.20	0.5
Support Stock (Heifers and Bulls)	0.0	0.0	2.20	2.20	0.0
Large Heifers	5.5	8.4	2.20	2.20	-2.9
Medium Heifers	0.0	0.0	1.50	1.50	0.0
Small Heifers	0.0	0.0	1.20	1.20	0.0
Calves	0.5	0.5	0.35	0.35	0.0
Bulls	0.0	0.0	3.00	3.00	0.0
				Total	27.2

NH3 Emissions - Land Application

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	56.6	24.4	8.90	8.90	32.2
Dry Cows	3.2	2.7	4.50	4.50	0.5
Support Stock (Heifers and Bulls)	0.0	0.0	2.30	2.30	0.0
Large Heifers	5.7	8.8	2.30	2.30	-3.1
Medium Heifers	0.0	0.0	1.70	1.70	0.0
Small Heifers	0.0	0.0	1.30	1.30	0.0
Calves	0.5	0.5	0.37	0.37	0.0
Bulls	0.0	0.0	3.23	3.23	0.0
				Total	29.6

H2S Emissions - Lagoon/Storage Pond(s)

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	5.2	5.2	0.82	0.82	0.0
Dry Cows	0.3	0.3	0.42	0.42	0.0
Support Stock (Heifers and Bulls)	0.0	0.0	0.22	0.22	0.0
Large Heifers	0.5	0.5	0.22	0.22	0.0
Medium Heifers	0.0	0.0	0.15	0.15	0.0
Small Heifers	0.0	0.0	0.12	0.12	0.0
Calves	0.0	0.0	0.04	0.04	0.0
Bulls	0.0	0.0	0.30	0.30	0.0
				Total	0.0

Solid Manure Handling

VOC Emissions - Solid Manure Storage

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	0.9	0.4	0.14	0.14	0.5
Dry Cows	0.1	0.0	0.08	0.08	0.1
Support Stock (Heifers and Bulls)	0.0	0.0	0.06	0.06	0.0
Large Heifers	0.1	0.2	0.06	0.06	-0.1
Medium Heifers	0.0	0.0	0.04	0.04	0.0
Small Heifers	0.0	0.0	0.02	0.02	0.0
Calves	0.0	0.0	0.01	0.01	0.0
Bulls	0.0	0.0	0.04	0.04	0.0
				Total	0.5

VOC Emissions - Separated Solids Piles

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	0.3	0.1	0.05	0.05	0.2
Dry Cows	0.0	0.0	0.03	0.03	0.0
Support Stock (Heifers and Bulls)	0.0	0.0	0.02	0.02	0.0
Large Heifers	0.1	0.1	0.02	0.02	0.0
Medium Heifers	0.0	0.0	0.01	0.01	0.0
Small Heifers	0.0	0.0	0.01	0.01	0.0
Calves	0.0	0.0	0.00	0.00	0.0
Bulls	0.0	0.0	0.02	0.02	0.0
				Total	0.2

VOC Emissions - Land Application

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	2.0	0.9	0.31	0.31	1.1
Dry Cows	0.1	0.1	0.17	0.17	0.0
Support Stock (Heifers and Bulls)	0.0	0.0	0.13	0.13	0.0
Large Heifers	0.3	0.5	0.13	0.13	-0.2
Medium Heifers	0.0	0.0	0.09	0.09	0.0
Small Heifers	0.0	0.0	0.05	0.05	0.0
Calves	0.0	0.0	0.02	0.02	0.0
Bulls	0.0	0.0	0.08	0.08	0.0
				Total	0.9

NH3 Emissions - Solid Manure Storage

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	6.0	2.6	1.0	1.0	3.4
Dry Cows	0.3	0.3	0.5	0.5	0.0
Support Stock (Heifers and Bulls)	0.0	0.0	0.3	0.3	0.0
Large Heifers	0.6	1.0	0.3	0.3	-0.4
Medium Heifers	0.0	0.0	0.2	0.2	0.0
Small Heifers	0.0	0.0	0.1	0.1	0.0
Calves	0.1	0.1	0.0	0.0	0.0
Bulls	0.0	0.0	0.4	0.4	0.0
				Total	3.0

NH3 Emissions - Separated Solids Piles

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	2.4	1.0	0.4	0.4	1.4
Dry Cows	0.1	0.1	0.2	0.2	0.0
Support Stock (Heifers and Bulls)	0.0	0.0	0.1	0.1	0.0
Large Heifers	0.2	0.4	0.1	0.1	-0.2
Medium Heifers	0.0	0.0	0.1	0.1	0.0
Small Heifers	0.0	0.0	0.1	0.1	0.0
Calves	0.0	0.0	0.0	0.0	0.0
Bulls	0.0	0.0	0.1	0.1	0.0
				Total	1.2

NH3 Emissions - Land Application

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	13.3	5.7	2.1	2.1	7.6
Dry Cows	0.8	0.6	1.1	1.1	0.2
Support Stock (Heifers and Bulls)	0.0	0.0	0.6	0.6	0.0
Large Heifers	1.4	2.1	0.6	0.6	-0.7
Medium Heifers	0.0	0.0	0.4	0.4	0.0
Small Heifers	0.0	0.0	0.3	0.3	0.0
Calves	0.1	0.1	0.1	0.1	0.0
Bulls	0.0	0.0	0.8	0.8	0.0
				Total	7.1

Feed Storage and Handling

VOC Emissions - Silage

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Corn Silage	23.6	23.6	21,155	21,155	0.0
Alfalfa Silage	0.0	0.0	10,649	10,649	0.0
Wheat Silage	41.5	41.5	26,745	26,745	0.0
				Total	0.0

VOC Emissions - TMR

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
TMR	77.0	57.7	10,575	10,575	19.3
				Total	19.3

Total Change in Emissions

Total Daily Change in Emissions (lb/day)

	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0.0	0.0	0.0	0.0	1.5	0.7	0.0
Cow Housing	0.0	0.0	-8.9	0.0	32.3	177.6	0.0
Liquid Manure	0.0	0.0	0.0	0.0	0.1	57.1	0.0
Solid Manure	0.0	0.0	0.0	0.0	1.5	11.2	0.0
Feed Handling	0.0	0.0	0.0	0.0	19.3	0.0	0.0
Total	0.0	0.0	-8.9	0.0	54.7	246.6	0.0

Total Annual Change in Emissions (lb/yr)

	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	554	251	0
Cow Housing	0	0	-3,249	0	11,828	64,820	0
Liquid Manure	0	0	0	0	-27	20,794	0
Solid Manure	0	0	0	0	585	4,156	0
Feed Handling	0	0	0	0	7,057	0	0
Total	0	0	-3,249	0	19,997	90,023	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	-15	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	-15	0	0

Greenhouse Gas Emissions

Uncontrolled GHG Emission Factors (lbs-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	1.6	--	151.6	21
Large Heifers	110.4	110.4	1.6	--	151.6	21
Medium Heifers	110.4	110.4	1.6	--	100.5	21
Small Heifers	110.4	110.4	1.6	--	100.5	21
Calves	--	--	--	--	--	--
Bulls*	110.4	110.4	1.6	--	151.6	21

Uncontrolled GHG Emission Factors (lbs-hd/yr)					
Animal Type	N2O (Anaerobic Treatment Lagoon	N2O (manure spreading)	N2O (solid manure storage)	N2O (enteric)	N2O equivalent multiplier for N2O
Milk Cows	1.5	0	2.6	0	310
Dry Cows	1.5	0	2.6	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 Suppot 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= [N20 anearobic treatment lagoon + N2O manure spreading + N20 solid manure storage + N2O enteric] x 310 x 0.9072 metric tons/short tons ÷ 2000 lb/ton

Pre-Project: Does the facility have an anaerobic treatment lagoon? no
Post-Project: Does the facility have an anaerobic treatment lagoon? yes

Pre-Project CO2 Equivalent Emission Factors from Animal Type (metric tons-hd/yr)			
Animal Type	CO2e for CH4	CO2e for N2O	CO2e Total
Milk Cows	5.8	0.4	6.2
Dry Cows	5.8	0.4	6.2
Support Stock	2.5	0.0	2.5
Large Heifers	2.5	0.0	2.5
Medium Heifers	2.0	0.0	2.0
Small Heifers	2.0	0.0	2.0
Calves	0.0	0.0	0.0
Bulls	2.5	0.0	2.5

Post-Project CO2 Equivalent Emission Factors from Animal Type (metric tons-hd/yr)			
Animal Type	CO2e for CH4	CO2e for N2O	CO2e Total
Milk Cows	7.8	0.6	8.4
Dry Cows	7.8	0.6	8.4
Support Stock	2.5	0.2	2.7
Large Heifers	2.5	0.2	2.7
Medium Heifers	2.0	0.2	2.2
Small Heifers	2.0	0.2	2.2
Calves	0.0	0.0	0.0
Bulls	2.5	0.2	2.7

Pre-Project Total GHG Emissions			
Animal Type	Herd Size (hd)	CO2e (metric tons-hd/yr)	CO2e Total (metric tons/yr)
Milk Cows	1,000	6.2	6,200
Dry Cows	216	6.2	1,339
Support Stock	0	2.5	0
Large Heifers	1,400	2.5	3,500
Medium Heifers	0	2.0	0
Small Heifers	0	2.0	0
Calves	475	0.0	0
Bulls	0	2.5	0
		Total	**11,039**
		Total (short tons/yr)	**12,168**

Post-Project Total GHG Emissions			
Animal Type	Herd Size (hd)	CO2e (metric tons-hd/yr)	CO2e Total (metric tons/yr)
Milk Cows	2,320	8.4	19,488
Dry Cows	263	8.4	2,209
Support Stock	0	2.7	0
Large Heifers	910	2.7	2,457
Medium Heifers	0	2.2	0
Small Heifers	0	2.2	0
Calves	500	0.0	0
Bulls	0	2.7	0
		Total	**24,154**
		Total (short tons/yr)	**26,625**

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	6200	19488	13,288
Dry Cows	1339	2209	870
Support Stock	0	0	0
Large Heifers	3500	2457	-1,043
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	**13,115**
		Total (short tons/yr)	**14,457**

Appendix B

Current PTOs

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

Permit to Operate

FACILITY: N-5763 **EXPIRATION DATE:** 12/31/2014

LEGAL OWNER OR OPERATOR: GJ SILVA DAIRY INC
MAILING ADDRESS: 3107 S PRAIRIE FLOWER RD
TURLOCK, CA 95380

FACILITY LOCATION: 3107 S PRAIRIE FLOWER RD
TURLOCK, CA 95380

FACILITY DESCRIPTION: DAIRY

The Facility's Permit to Operate may include Facility-wide Requirements as well as requirements that apply to specific permit units.

This Permit to Operate remains valid through the permit expiration date listed above, subject to payment of annual permit fees and compliance with permit conditions and all applicable local, state, and federal regulations. This permit is valid only at the location specified above, and becomes void upon any transfer of ownership or location. Any modification of the equipment or operation, as defined in District Rule 2201, will require prior District approval. This permit shall be posted as prescribed in District Rule 2010.

Seyed Sadredin
Executive Director / APCO

David Warner
Director of Permit Services

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San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: N-5763-1-3 **EXPIRATION DATE:** 12/31/2014

EQUIPMENT DESCRIPTION:
1,000 COW MILKING OPERATION WITH ONE DOUBLE-20 STALL PARALLEL MILKING PARLOR AND ONE DOUBLE-20 STALL HERRINGBONE HOSPITAL BARN MILKING PARLOR

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. 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]
4. The milking parlor shall be flushed or sprayed down immediately after, or during the milking of each group of cows. [District Rules 2201 and 4570]
5. Permittee shall provide verification that milking parlors are flushed or hosed down immediately after, or during each milking. [District Rules 2201 and 4570]
6. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]
7. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: N-5763-2-3 **EXPIRATION DATE:** 12/31/2014

EQUIPMENT DESCRIPTION:
COW HOUSING - 1,000 MILKCOWS, 216 DRYCOWS, 1,400 LARGE HEIFERS (15-24 MONTHS OLD), 475 CALVES (UNDER 3 MONTHS) HOUSED IN FREESTALLS AND OPEN CORRALS WITH FLUSH/SCRAPE SYSTEM; INCLUDES A CALF HOUSING

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. 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]
4. The total number of cattle housed at the Prairie Flower Rd section of this dairy at any one time shall not exceed any of the following: 1,000 Holstein milk cows; 216 dry cows; 1,400 heifers; and 475 calves (under 3 months). [District Rule 2201]
5. Milk cows at the Prairie Flower Rd section of this dairy shall be housed in freestall barns. [District Rule 2201]
6. The feed lanes and walkways for milk cows at this dairy shall be flushed at least four times per day. [District Rules 2201 and 4570]
7. Permittee shall flush freestalls more frequently than the milking schedule. [District Rule 4570]
8. Permittee shall maintain an operating plan that requires freestalls be flushed more frequently than the milking schedule and that requires the feed lanes and walkways for the milk cows to be flushed at least four times per day. [District Rules 2201 and 4570]
9. Milk cows at this dairy shall be fed in accordance with the National Research Council (NRC) guidelines. [District Rule 2201]
10. For milk cows, 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]
11. Open corrals and exercise pens for milk cows shall be scraped weekly using a pull-type scraper in the morning hours, except when this is prevented by wet conditions. Pens/open corrals shall be sufficiently groomed to maintain a dry surface, except during periods of rainy weather. [District Rule 2201]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

12. Permittee shall maintain records of the frequency of scraping and manure removal from open corrals and exercise pens for milk cows. [District Rule 2201]
13. Firm, stable, and not easily eroded soils shall be used for the exercise pens. [District Rule 2201]
14. A supply of fill soil shall be kept on site in order to fill areas where erosion and gouging occurs. This will help fill areas where puddles may form. This fill soil shall be covered with a tarp. [District Rule 2201]
15. Clean rainfall runoff shall be diverted around exercise pens to reduce the amount of water that is potentially detained on the corral surface. [District Rule 2201]
16. Permittee shall groom (rake, harrow, scrape, or grade) bedding in freestalls at least once every fourteen (14) days. [District Rule 4570]
17. Permittee shall record the date that bedding in freestalls is raked, harrowed, scraped or graded at least once every fourteen (14) days. [District Rule 4570]
18. Permittee shall clean concreted areas such that the depth of animal waste does not exceed twelve (12) inches at any point or time, except for in-corral mounding. [District Rule 4570]
19. Permittee shall measure and document the depth of manure on the concrete lanes at least once every ninety (90) days. [District Rule 4570]
20. Permittee shall maintain corrals/pens to ensure drainage and prevent water from standing more than forty-eight (48) hours after a storm. [District Rule 4570]
21. Permittee shall maintain sufficient records to demonstrate that corrals/pens are maintained to ensure drainage and prevent water from standing for more than forty-eight (48) hours after a storm. [District Rule 4570]
22. Permittee shall install all shade structures uphill of any slope in the corral. [District Rule 4570]
23. Permittee shall scrape or flush feed aprons in corrals at least once every seven (7) days. [District Rule 4570]
24. Permittee shall record the date that feed aprons in corrals are scraped or flushed. [District Rule 4570]
25. Permittee shall install floats on the troughs or use another method approved by the APCO, ARB, and EPA to ensure that the water in the troughs does not overflow or spill onto an earthen ground. [District Rule 4570]
26. Permittee shall inspect water pipes and troughs and repair leaks at least once every fourteen (14) days. [District Rule 4570]
27. Permittee shall record the date that water pipes and troughs are inspected and leaks are repaired. [District Rule 4570]
28. Permittee shall maintain weekly records of the number of cows at the Prairie Flower Rd section of the dairy in each of the following categories: milk cows; dry cows; heifers; baby calves (0-3 months); and mature bulls. [District Rule 2201]
29. Permittee shall maintain a record of the number of animals of each species and production group at the facility and shall maintain quarterly records of any changes to this information. [District Rule 4570]
30. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]
31. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: N-5763-3-3 **EXPIRATION DATE:** 12/31/2014

EQUIPMENT DESCRIPTION:
LIQUID MANURE HANDLING SYSTEM CONSISTING OF 3 MECHANICAL SEPARATORS; 7 SETTLING BASINS; 4 STORAGE PONDS; MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. 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]
4. The liquid manure handling system shall handle flush manure from no more than 3,100 milk cows, 416 dry cows, 3,137 heifers, and 475 calves (0-3 months). [District Rule 2201]
5. Permittee shall remove solids from the waste system with a solid separator system, prior to the waste entering the lagoon. [District Rule 4570]
6. Permittee shall not allow liquid animal waste 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 animal waste does 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]
9. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: N-5763-4-1 **EXPIRATION DATE:** 12/31/2014

EQUIPMENT DESCRIPTION:
SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; WINDROW PILE COMPOSTING; 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. 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]
4. Permittee shall cover dry separated solids outside the pens with a weatherproof covering from October through May, except for times, not to exceed twenty-four (24) hours per event, when wind events remove the covering. [District Rule 4570]
5. Permittee shall maintain records, such as manufacturer warranties or other documentation, demonstrating that the weatherproof covering over solid animal waste and/or 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]
6. Permittee shall maintain records to demonstrate dry separated solids outside the pens are covered with a weatherproof covering from October through May. [District Rule 4570]
7. Permittee shall not apply solid animal waste with a moisture content of more than 50%. [District Rule 4570]
8. Permittee shall maintain records of the moisture content of the solid animal waste each time solid animal waste is land applied. [District Rule 4570]
9. Moisture content shall be determined using test Methods for the examination of compost and Composting (TMECC) Method 3.09 or any other alternative test method approved by the APCO, ARB, and EPA. [District Rule 4570]
10. All records shall be kept and maintained for a minimum of five (5) years and shall be made available to the APCO, ARB and EPA upon request. [District Rule 4570]
11. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: N-5763-9-1 **EXPIRATION DATE:** 12/31/2014

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

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. 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]
4. Milk cows at this dairy shall be fed in accordance with the National Research Council (NRC) guidelines. [District Rule 2201]
5. For milk cows, 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]
6. Permittee shall remove feed from the area where animals stand to eat feed at least once every fourteen (14) days. [District Rule 4570]
7. Permittee shall maintain records of dates when feed was removed from the area where animals stand to eat. [District Rule 4570]
8. Permittee shall remove spilled feed from the area where feed equipment travels at least once every fourteen (14) days. [District Rule 4570]
9. Permittee shall maintain records of dates when spilled feed was removed from the area where feed equipment travels. [District Rule 4570]
10. Permittee shall remove uneaten wet feed from feed bunks within twenty-four (24) hours of a rain event. [District Rule 4570]
11. Permittee shall maintain records of when uneaten wet feed was removed from feed bunks. [District Rule 4570]
12. Permittee shall store grain in a weatherproof storage structure from October through May. [District Rule 4570]
13. Permittee shall maintain records when grain is stored in a weatherproof storage structure from October through May. [District Rule 4570]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

14. Permittee shall cover all silage piles, except for the area where feed is being removed from the pile. [District Rule 4570]
15. All runoff and leachate from silage and commodity pads shall be directed to the lagoon or other wastewater treatment system. [District Rules 2201 and 4570]
16. 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]
17. 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]

Appendix C

BACT Analysis

TOP-DOWN BACT ANALYSIS

Pursuant to Section 5.2 of the Settlement Agreement between the District and the Western United Dairyman and the Alliance of Western Milk Producers Inc., signed September 20, 2004, "*... the District will not make any Achieved in Practice BACT determinations for individual dairy permits or for the dairy BACT guidance until the final BACT guidance has been adopted by the APCO....*".[7] Therefore, a cost effectiveness analysis will be performed for all the technologies, which have not been proposed by the applicant.

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

I. Pollutants Emitted from Dairies

1. PM_{10} Emissions:

The National Ambient Air Quality Standards currently regulate concentrations of particulate matter with a mass median diameter of 10 micrometers or less (PM_{10}). Studies have shown that particles in the smaller size fractions contribute most to human health effects.

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

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

2. VOC Formation and Emissions from Manure:

Volatile Organic Compounds (VOCs) result from ruminant digestive processes and are formed as intermediate metabolites when organic matter manure decomposes. Under aerobic conditions, any VOCs formed in the manure are rapidly oxidized to carbon dioxide and water. Under anaerobic conditions, complex organic compounds are microbially decomposed to volatile organic acids and other volatile organic compounds, which in turn

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

are mostly converted to methane and carbon dioxide by methanogenic bacteria. When the activity of the methanogenic bacteria is not inhibited, virtually all of the VOCs are metabolized to simpler compounds, and the potential for VOC emissions is minimized. However, the inhibition of methane formation results in a buildup of VOCs in the manure and ultimately to volatilization to the air. Inhibition of methane formation typically is caused by low temperatures or excessive loading rates, which both create an imbalance between the populations of microorganisms responsible for the formation of VOC and methane. VOC emissions will vary with temperature because the rate of VOC formation, reduction to methane, and volatilization and the solubility of individual compounds vary with temperature.[8] VOC emissions from manure and the associated field application site can be minimized by a properly designed and operated stabilization process (such as an anaerobic treatment lagoon). In contrast, VOC emissions will be higher from storage tanks, ponds, overloaded anaerobic lagoons, and the land application sites associated with these systems.

3. Ammonia Emissions:

When sulfur dioxide and nitrogen oxides are present, ammonia is a precursor for the secondary formation of $PM_{2.5}$ in the atmosphere. Ammonia reacts with sulfuric and nitric acids, which are produced from sulfur dioxide and nitrogen oxides in the ambient air, to form ammonium sulfate, ammonium nitrate, and other fine particulates.[9] Exposure to high levels of ammonia can cause irritation to the skin, throat, lungs, and eyes.

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

The potential for ammonia volatilization exists wherever manure is present, and ammonia will be emitted from confinement buildings, open lots, stockpiles, anaerobic lagoons, and land application from both wet and dry handling systems. The rate of ammonia volatilization is influenced by a number of factors including the concentrations of nitrogenous compounds in the manure, temperature, air velocity, surface area, moisture, and pH. Because of its high solubility in water, the loss of ammonia to the atmosphere will be more rapid when drying of manure occurs. However, there may be little difference in total ammonia emissions between solid and liquid manure handling systems if liquid manure is

[8] EPA Document "Emissions from Animal Feeding Operations" (Draft, August 15, 2001), pg. 2-10
[9] Workshop Review Draft for EPA Regional Priority AFO Science Question Synthesis Document - Air Emission Characterization and Management, pg. 2

stored over extended periods of time prior to land application.[10]

4. Hydrogen Sulfide Emissions:

Hydrogen Sulfide (H2S) is produced from the decomposition of organic matter under anaerobic conditions. In the absence of oxygen, sulfur reducing bacteria in the manure lagoons reduce sulfate ions in the manure into sulfide. Aqueous sulfide exists in three different forms: molecular (un-dissociated) hydrogen sulfide (H2S) and the bisulfide (HS-) and sulfide (S2-) ions. In aqueous solutions molecular H2S exists in equilibrium with the bisulfide (HS-) and sulfide (S2-) ions but only molecular H2S, not the ionized forms, can be transferred across the gas-liquid interface and emitted to the atmosphere. The fractional amount of the form of sulfide present in solution is largely influenced by pH; with the molecular H2S form being favored in acidic conditions (pH<7) and ionic forms being favored in basic conditions (pH>7).

In a dairy, the conditions for the production of Hydrogen Sulfide exist in small amounts such as wet spots in corrals, manure piles and separated solids piles. However, the most significant source is the liquid manure lagoons and storage ponds.

II. Top Down BACT Analysis for the Cow Housing Permit Unit (N-5763-2)

1. BACT Analysis for VOC Emissions from the Cow Housing and Feed (Total Mixed Ration):

Total Mixed Ration (TMR) refers to feed (silage, grains, oils, minerals, and other additives) that has been mixed per the applicable feeding guidelines and spread out in the feed bunks for consumption by the cattle. Because cattle are fed in the housing areas, BACT for TMR emissions must be considered joint with BACT for housing as it would not be practical to control emissions TMR separately.

a. Step 1 - Identify all control technologies

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

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

1) Enclosed freestalls vented to an incinerator - Entire herd (≈93%; 95% Capture, 98% Control of 100% of cow housing emissions)
2) Enclosed freestalls vented to an incinerator - Mature cows only (≈79% overall control

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

of entire housing; 95% capture, 98% Control of 85% of cow housing emissions[11])

3) Enclosed freestalls vented to a biofilter - Entire herd (≈76%; 95% Capture, 80% Control of 100% of cow housing emissions)
4) Enclosed freestalls vented to a biofilter - Mature cows only (≈65% overall control of entire housing; 95% Capture, 80% Control of 85% of cow housing emissions[12])
5) Feed and Manure Management Practices (≈22%)
   - Concrete feed lanes and walkways for all cows
   - Freestall feed lanes and walkways for milk cows and dry cows flushed four times per day (≈18% for total emissions from cow housing; 47% for emissions from manure) and feed lanes and walkways in the corrals for the remaining animals flushed at least two times per day
   - All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations. (5% of total emissions from dairy cows)
   - Uneaten feed re-fed to the animals or removed from feed lanes on a daily basis to prevent decomposition.
   - All open corrals adequately sloped to promote drainage (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal.
   - Weekly scraping of freestall exercise pens and open corrals using pull-type scraper in the morning hours except when prevented by wet conditions.
   - Rule 4570 mitigation measures.

Description of Control Technologies

1) Enclosed Freestall Barns vented to an incinerator capable of achieving 98% control

In a freestall barn, cows are grouped in large pens with free access to feed bunks, water, and stalls for resting. In the mild climate of the San Joaquin Valley, the typical freestall barn is an open structure (roof but no sides). The primary freestall design consists of a roof that provides shade with all sides open to allow air to flow through, which in turn keeps the cows cool. No enclosed freestall barns that were installed at a California dairy could be identified. However, partially enclosed freestall barns are available. These include tunnel-ventilated freestall barns, which are fairly common in the southern and eastern parts of the United States, and greenhouse barns. Greenhouse barns use a lightweight, galvanized steel tube frame to support one or two layers of a

[11] Emissions from cow housing (N-5763-2-5) is equal to 30,212 lb/hd-yr for all cows, while emissions from mature cows is equal to 25,697 lb/hd-yr. Therefore, mature cows represent 85% of the emissions from the cow housing (25,697 lb/hd-yr/30,212 lb/hd-yr). The overall control efficiency can then be calculated as follows: 95% Capture x 98% Control x 85% of emissions = 79% overall control efficiency from entire cow housing.

[12] The overall control efficiency can be calculated as follows: 95% Capture x 80% Control x 85% of emissions = 65% overall control efficiency.

commercial-grade plastic film as covering. The most common use for these structures is as heated chambers for growing plants. Although the potential to enclose cows in a barn exist, the feasibility of reasonably collecting the biogas through a stack, chimney, or vent remains in question considering the extremely large amounts of airflow going through the barns needed to keep the cows cool. The airflow requirements will be even higher in the San Joaquin valley, where temperatures reach in excess of 110 degrees in the dry summer. Although the feasibility of such a technology is in question, it will be considered in this analysis. If the gases can be properly captured and sent to a control device, then those gases may be either incinerated or treated in a biofilter (see biofilter discussed in the option below). It is assumed that 95% of the gasses emitted from the freestall barns will be captured by the mechanical ventilation system and that 98% of the captured VOCs will be eliminated by thermal incineration[13]; therefore the total control for VOCs from the freestall barns = 0.95 x 0.98 = 93%.

2) Enclosed Freestall Barns vented to a biofilter capable of achieving 80% control

As stated above, the mechanical ventilation system of a completely enclosed freestall barn may be utilized to capture the gases emitted from the cow housing permit unit. The captured VOC emissions may then be sent to a biofilter. A biofilter is a device for removing contaminants from a gas in which the gas is passed through a media that supports microbial activity by which the pollutants are degraded by biological oxidation. In the biofiltration process, live bacteria biodegrade organic contaminants and ammonia into carbon dioxide, nitrogen and water. Bacterial cultures (microorganisms that typically consist of several species coexisting in a colony) that use oxygen to biodegrade organics are called aerobic cultures. These bacteria are found in soil, peat, compost and natural water bodies including ponds, lakes, rivers and oceans. They are environmentally friendly and non-harmful to humans unless ingested.

Since biofilters rely on living organisms to function, the temperature, moisture content, and pH of the filter media should be monitored to ensure optimum operating conditions. The filter media also needs to be replaced periodically because of deterioration. It is assumed that 95% of the gasses emitted from the cow housing area will be captured by the mechanical ventilation system and that a properly functioning biofilter will eliminate 80% of the captured VOCs[14]; therefore, the total control for VOCs from the cow housing permit unit = 0.95 x 0.80 = 76%.

3) Feed and Manure Management Practices

Concrete Feed Lanes and Walkways

Dairy animals spend a large amount of time on the feed lanes and walkways. Constructing these areas of concrete will reduce particulate matter emissions by having

[13] OAQPS Control Cost Manual, 4th Edition, EPA 450/3-90-006, January 1990, page 3-8.
[14] According to the SCAQMD Rule 1133.2 final staff report (page 18) "Technology Assessment Report states a well-designed, well operated, and well-maintained biofilter is capable of achieving 80% destruction efficiency for VOC and NH_3."

the animals spend more time on a paved surface rather than dry dirt. The concrete lanes and walkways create an avenue for the flush system. The flush system will further reduce particulate matter emissions and will also reduce VOC and ammonia emissions (see below). Although concrete feed lanes and walkways are necessary for an effective flush system, they do not individually reduce emissions of gaseous pollutants, therefore, no VOC control efficiency will be assigned for this practice.

Increased Flushing for feed lanes and walkways

Many dairy operations use a flush system to remove manure from the corral and freestall feed lanes and walkways. The flush system introduces a large volume of water at the head of the paved area of the corrals or freestalls, and the cascading water removes the manure. The required volume of flush water varies with the size and slope of the area to be flushed. The freestall and corral lanes for milk and dry cows are typically flushed twice per day, but the flushing frequency can vary between one to four times per day. The lanes for support stock are usually flushed once per day or less frequently.

In addition to cleaning the corral and freestall feed lanes and walkways, the flush system also serves as an emission control for reducing PM_{10}, VOC, and ammonia emissions. The manure deposited in the lanes, which is a source of VOC emissions, is removed from the cow housing area by the flush system. Many of the VOCs emitted from fresh cow manure, such as alcohols (ethanol and methanol) and many Volatile Fatty Acids (VFAs), are highly soluble in water. Therefore, a large percentage of these compounds will dissolve in the flush water and will not be emitted from the cow housing permit unit. The flush water can then carry the manure and the dissolved volatile compounds to an anaerobic treatment lagoon or other manure stabilization process for treatment.

It must be noted that the flush system will only control the VOCs emitted from the manure; it will have little or no effect on enteric emissions produced from the cows' digestive processes. As stated above, the feed lanes and walkways in the cow housing areas are typically flushed twice per day. Flushing the lanes four times per day will increase the frequency that manure is removed from the cow housing permit unit and should result in a higher percentage of soluble volatile compounds being dissolved in the flush. Based on calculations given in the final DPAG report[15], flushing the freestall lanes four times per day will be assumed to have a control efficiency of 47% for VOCs emitted from manure until better data becomes available. This control efficiency only applies to the manure and does not apply to the enteric emissions generated from the cows themselves. However, in order to be conservative, a 10% control efficiency will be applied at this time.

[15] "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).

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

Nutritional management of dairy feed is routinely practiced to improve milk production and herd health. The potential for VOC emissions can be reduced by reducing the quantity of undigested nutrients in the manure. Many of the VOCs emitted from Confined Animal Facilities, including dairies, originate from the decomposition of undigested protein in animal waste.[16] 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, ammonia, and hydrogen sulfide. The latest National Research Council (NRC) guidelines for the selection of an optimal bovine diet should be followed to the maximum extent possible. The diet recommendations made in this publication seek to achieve the maximum uptake of protein by the animal and the minimum carryover of nitrogen into the manure.

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

Refused feed re-fed to the animals or removed from feed lanes on a daily basis to prevent decomposition.

Removing or re-feeding refused feed from the feed lanes on a daily basis will minimize gaseous emissions from decomposition. The feed that is removed must be properly disposed of to ensure that the emissions are not just relocated to another area of the dairy. Although this practice is expected to reduce emissions from the cow housing permit unit, there is not sufficient research to estimate the emissions reductions and no VOC control efficiency will be assigned for this practice.

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

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

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

from this area.

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) Enclosed freestalls vented to an incinerator (≈93%; 95% Capture, 98% Control)
2) Enclosed freestalls vented to a biofilter (≈76%; 95% Capture, 80% Control)
3) Enclosed freestalls vented to an incinerator - Mature cows only (≈79% overall control of entire housing; 95% capture, 98% Control of 85% of cow housing emissions)
4) Enclosed freestalls vented to a biofilter - Mature cows only (≈65% overall control of entire housing; 95% Capture, 80% Control of 85% of cow housing emissions)
5) Feed and Manure Management Practices (≈22%)
   - Concrete feed lanes and walkways for all cows
   - Freestall feed lanes and walkways for milk cows and dry cows flushed four times per day (≈18% for total emissions from cow housing; 47% for emissions from manure) and feed lanes and walkways in the corrals for the remaining animals flushed at least two times per day
   - All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations. (5% of total emissions from dairy cows)
   - Uneaten feed re-fed or removed from feed lanes on a daily basis to prevent decomposition.
   - All open corrals adequately sloped to promote drainage (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal.
   - Weekly scraping of freestall exercise pens and open corrals using pull-type scraper in the morning hours except when prevented by wet conditions.
   - Rule 4570 mitigation measures.

d. Step 4 - Cost Effectiveness Analysis

Thermal and Catalytic Incineration:

The following cost analysis demonstrates that the cost of natural gas alone, not including any capital costs, causes catalytic incineration to exceed the District VOC cost effective threshold. The temperature required for catalytic incineration is 600°F. The temperature required for thermal incineration is 1,400°F. Since the fuel requirements

and fuel cost for thermal incineration are greater than catalytic incineration, the following analysis also demonstrates that thermal incineration would not be cost effective.

Required Airflow Rate of the Freestall Barns

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

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

The minimum summer ventilation rate listed for mature cows is 500 cfm per cow. However, according to the University of Minnesota publication and Cornell University's publication "Natural or Tunnel Ventilation of Freestall Structures: What is Right for Your Dairy Facility?" the required airflow rate in the summer increases to 1,000 cfm per cow if tunnel ventilation is used to provide additional cooling.[17]

The climate in the San Joaquin Valley is characterized by relatively mild winters and hot summers. Because of the warmer climate, it is expected that tunnel ventilation or a similar system would need to be employed in an enclosed freestall barn to prevent excessive heat stress. Additionally, tunnel ventilation systems, which operate with negative pressure inside the freestall barns, are more representative of the types of systems that would be required to capture and control emissions. Although the summer air requirement of 1,000 cfm per cow for tunnel ventilation is more representative of the airflow requirements in a completely enclosed freestall barn located in the San Joaquin Valley, for worst-case calculation purposes, the following average year round airflow requirement will be assumed: mature cows – 335 cfm/cow (average of 170 and 500 cfm per cow); support stock – 130 cfm/cow (average of 80 and 180 cfm per cow); calves – 75 cfm (average of 50 and 100 cfm per cow).

The analysis below is for the entire herd:

As discussed in the evaluation, the post-project herd capacity consists of the following: 2,320 milk cows; 263 dry cows; 910 support stock (heifers and bulls); and 500 calves

[17] Improving Mechanical Ventilation in Dairy Barns, J.P. Chastain, http://www.bae.umn.edu/extens/aeu/aeu3.html and Natural or Tunnel Ventilation of Freestall Structures: What is Right for Your Dairy Facility?, C.A. Gooch, http://www.ansci.cornell.edu/tmplobs/doc225.pdf)

(under 3 months). Enclosed freestalls will be evaluated as a housing alternative for all animals at this dairy.

The total required airflow rate for housing for these animals in freestalls is calculated as follows:

Category	# of cows	cfm/cow	min/hr	ft^3/hr
Milk cow	2,320	335	60	46,632,000
Dry cow	263	335	60	5,286,300
Support stock	910	130	60	7,098,000
Calves	500	75	60	2,250,000
Total				**61,266,300**

Fuel Requirement for Thermal Incineration

The gas leaving the freestall barns will be principally air, with a volumetric specific heat of 0.0194 Btu/scf-°F under standard conditions.

Natural Gas Requirement = (flow)(Cp_{Air})(ΔT)(1-HEF)

Where:

Flow (Q) = exhaust flow rate of VOC the freestall barns
Cp_{Air} = specific heat of air: 0.0194 Btu/scf - °F
ΔT = increase in the ternperature of the contaminated air stream required for catalytic oxidation to occur (It will be assumed that the air stream would increase in ternperature from 100 °F to 600 °F.)
HEF = heat exchanger factor: 0.7

Natural Gas Requirement for Thermal Incineration

= (61,266,300 scf/hr)(0.0194 Btu/scf-°F)(600°F - 100°F)(1-0.7)
= **178,284,933 Btu/hr**

Fuel Cost for Thermal Incineration:

The cost for natural gas will be based upon the average spot market contract price (industrial) for June 2013 taken from the Energy Information Administration website (http://tonto.eia.doe.gov/dnav/ng/ng_sum_lsum_dcu_SCA_m.htm).
Average Cost for natural gas = $6.99/MMBtu

The oxidizer is assumed to operate 12 hours per day and 365 days per year.

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

178,284,933 Btu/hr x 1 MMBtu/10^6 Btu x 12 hr/day x 365 day/year x $6.99/MMBtu
= **$5,458,407/year**

VOC Emission Reductions for Thermal Incineration

The annual VOC Emission Reductions for housing all animals in enclosed freestall barns and venting the barns to an incinerator are calculated as follows:

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

Type of cow	# of cows	EF- lbs/hd-yr	CE	lbs-VOC/yr
Milk cow	2,320	9.92	93%	21,403
Dry cow	263	5.61	93%	1,372
Support stock	910	4.3	93%	3,639
TMR	3,993	8.046	93%	29,879
Total				**56,293**

Cost of VOC Emission Reductions

Cost of reductions = ($5,458,407/year)/((56,293 lb-VOC/year)(1 ton/2000 lb))
= **$193,928/ton of VOC reduced**

As shown above, the natural gas cost alone for thermal or catalytic incineration would cause the cost of the VOC reductions to be greater than the $17,500/ton cost effectiveness threshold of the District BACT policy. Additional costs such as the cost of constructing freestalls for all support stock, enclosing all freestalls, and the cost of installing and operating a cooling system for cow comfort would make it even less cost effective to install this technology. The equipment is therefore not cost effective and is being removed from consideration at this time.

The analysis below is for Mature Cows only:

As discussed in the evaluation, the expansion will consist of the following number of mature cows: 2,583 mature cows (2,320 milk cows and 263 dry cows). The milk cows are proposed to be housed in freestalls and dry cows housed in corrals with loafing barns. Enclosed freestalls will be evaluated as a housing alternative for the mature cows.

The total required airflow rate for housing for these animals in freestalls is calculated as follows:

Type of cow	# of cows	cfm/cow	min/hr	ft^3/hr
Milk cow	2,320	335	60	46,632,000
Dry cow	263	335	60	5,286,300
Total				**51,918,300**

Fuel Requirement for Thermal Incineration

The gas leaving the freestall barns will be principally air, with a volumetric specific heat

of 0.0194 Btu/scf-°F under standard conditions.

Natural Gas Requirement = (flow)(Cp_{Air})(ΔT)(1-HEF)

Where:

Flow (Q) = exhaust flow rate of VOC the freestall barns
Cp_{Air} = specific heat of air: 0.0194 Btu/scf - °F
ΔT = increase in the temperature of the contaminated air stream required for catalytic oxidation to occur (It will be assumed that the air stream would increase in temperature from 100°F to 600°F).
HEF = heat exchanger factor: 0.7

Natural Gas Requirement for Thermal Incineration

= (51,918,300 scf/hr)(0.0194 Btu/scf - °F)(600 °F - 100 °F)(1-0.7)
= **151,082,253 Btu/hr**

Fuel Cost for Thermal Incineration:

The cost for natural gas will be based upon the average spot market contract price (industrial) for June 2013 taken from the Energy Information Administration website (http://tonto.eia.doe.gov/dnav/ng/ng_sum_lsum_dcu_SCA_m.htm).

Average Cost for natural gas = $6.99/MMBtu

The oxidizer is assumed to operate 12 hours per day and 365 days per year.

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

151,082,253 Btu/hr x 1 MMBtu/10^6 Btu x 12 hr/day x 365 day/year x $6.99/MMBtu
= **$4,625,564/year**

VOC Emission Reductions for Thermal Incineration

The annual VOC Emission Reductions for housing all animals in enclosed freestall barns and venting the barns to an incinerator are calculated as follows:

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

Category	# of cows	EF- lbs/hd-yr	CE	lbs-VOC/yr
Milk cow	2,320	12.4	93%	26,754
Dry cow	263	8.2	93%	2,006
TMR	2,583	8.046	93%	19,328
Total				**48,088**

Cost of VOC Emission Reductions

Cost of reductions = ($4,625,564/year)/((48,088 lb-VOC/year)(1 ton/2000 lb))
= **$192,379/ton of VOC reduced**

As shown above, the natural gas cost alone for thermal or catalytic incineration would cause the cost of the VOC reductions to be greater than the $17,500/ton cost effectiveness threshold of the District BACT policy. Additional costs such as the cost of constructing freestalls for dry cows, enclosing all freestalls, and the cost of installing and operating a cooling system for cow comfort would make it even less cost effective to install this technology. The equipment is therefore not cost effective and is being removed from consideration at this time.

Biofiltration:

Biofiltration is a method of reducing pollutants in which exhaust air that contains contaminants is blown through a media (e.g., soil, compost, wood chips) that supports a microbial population. The microbes utilize the pollutants such as VOCs and ammonia as nutrients and oxidize the compounds as they pass through the filter.

The following cost analysis demonstrates that the cost of biofiltration exceeds the District cost effective threshold. Biofiltration can control both VOC and ammonia emissions. Although, this technology can control both pollutants, a cost effective threshold has not been established for ammonia. Therefore, only achieved-in-practice options will be considered for ammonia at this time and a multi-pollutant cost effective analysis for VOC and ammonia will not be performed.

Cost of Biofiltration

The cost estimate for a biofiltration system is taken from the United States EPA Report "Using Bioreactors to Control Air Pollution"[18]. The cost is largely dependent on the airflow rate that the filter must handle. According to University of Minnesota, Biofilters used to treat ventilating air exhausted from a livestock building should be sized to treat the maximum ventilation rate, which is typically the warm weather rate. The EPA report gives a range of $2.35 - $37.06 per cfm for the initial construction of a biofilter. As shown above in the thermal/catalytic incineration section, the following average year round airflow requirements will be assumed for worst-case purposes (based on the averages from the Minnesota's publication "Improving Mechanical Ventilation in Dairy Barns"[18]. See discussion on page 18 of this BACT analysis): mature cows – 335 cfm/cow (average of 170 and 500 cfm per cow); large heifers – 130 cfm/cow (average of 80 and 180 cfm per cow); small and medium heifers - 95 cfm/cow (average of 60 and 130 cfm per cow); baby calves – 75 cfm (average of 50 and 100 cfm per cow).

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

The analysis below is for the entire herd:

As discussed in the evaluation, the expansion consists of the following: 2,320 milk cows; 263 dry cows; 910 support stock (heifers and bulls); and 500 calves (under 3 months). Enclosed freestalls will be evaluated as a housing alternative for all animals at this dairy.

The total maximum airflow entering the biofilter from the enclosed freestalls for these animals is calculated as follows:

Category	# of cows	cfm/cow	cfm
Milk cow	2,320	335	777,200
Dry cow	263	335	88,105
Support stock	910	130	118,300
Calves	500	75	37,500
Total			**1,021,105**

Capital Cost

The cost estimate for the biofilter includes the costs of the fans, media, plenum, engineering, and labor but does not include installation of the required ductwork. As stated above, the United States EPA Report gives a capital cost range of between $2.35 per cfm and $37.06 per cfm. In general, the lower cost per cfm is associated with a higher flow rate. To be conservative, a median cost of $19.71 per cfm will be assumed in this cost analysis.

The capital cost of the biofilter is calculated as follows:

$19.71 cfm x 1,021,105 cfm = $20,125,980

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

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

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

$$A = [\$20,125,980 \times 0.1(1.1)^{10}]/[(1.1)^{10}-1]$$
$$= \mathbf{\$3,275,411/year}$$

VOC Emission Reductions for Biofiltration

The annual VOC Emission Reductions for enclosed freestalls vented to a biofilter are calculated as follows:

[Number of cows] x [Uncontrolled Cow Housing VOC EF (lb/cow-year)] x [Overall Control Efficiency]

Category	# of cows	EF- lbs/hd-yr	CE	lbs-VOC/yr
Milk cow	2,320	12.4	76%	21,864
Dry cow	263	8.2	76%	1,639
Support stock	910	5.7	76%	3,942
Calves	500	4.3	76%	1,634
TMR	3993	8.046	76%	24,417
Total				**53,496**

Cost of VOC Emission Reductions

Cost of reductions = ($3,275,411/year)/((53,496 lb-VOC/year)(1 ton/2000 lb))
= **$122,454/ton of VOC reduced**

As shown above, the capital cost alone for a biofilter would cause the cost of the VOC reductions to be greater than the $17,500/ton cost effectiveness threshold of the District BACT policy. Additional costs such as the cost of constructing freestalls for all support stock, enclosing all freestalls, and the cost of installing and operating a cooling system for cow comfort would make it even less cost effective to install this technology. Therefore, this option is not cost effective and is being removed from consideration at this time.

The analysis below is for Mature Cows only:

As discussed in the evaluation, the expansion will consist of the following number of mature cows: 2,583 mature cows (2,320 Holstein milk cows and 263 dry cows). Enclosed freestalls will be evaluated as a housing alternative for the mature cows.

The total maximum airflow entering the biofilter from the enclosed freestalls is calculated as follows:

Type of cow	# of cows	cfm/cow	cfm
Milk cow	2,320	350	812,000
Dry cow	263	350	92,050
Total			**904,050**

Capital Cost

The cost estimate for the biofilter includes the costs of the fans, media, plenum, engineering, and labor but does not include installation of the required ductwork. As

stated above, the United States EPA Report gives a capital cost range of between $2.35 per cfm and $37.06 per cfm. In general, the lower cost per cfm is associated with a higher flow rate. To be conservative, a median cost of $19.71 per cfm will be assumed in this cost analysis.

The capital cost of the biofilter is calculated as follows:

$19.71/cfm x 904,050 cfm = **$17,818,826**

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

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

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

$$A = [\$17,818,826 \times 0.1(1.1)^{10}]/[(1.1)^{10}-1]$$
$$= \mathbf{\$2,899,931/year}$$

VOC Emission Reductions for Biofiltration

The annual VOC Emission Reductions for enclosed freestalls vented to a biofilter are calculated as follows:

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

Category	# of cows	EF- lbs/hd-yr	CE	lbs-VOC/yr
Milk cow	2,320	12.4	76%	21,864
Dry cow	263	8.2	76%	1,639
TMR	2,583	8.046	76%	15,795
Total				**39,298**

Cost of VOC Emission Reductions

Cost of reductions = ($2,899,931/year)/((39,298 lb-VOC/year)(1 ton/2000 lb))
= **$147,587/ton of VOC reduced**

As shown above, the capital cost alone for a biofilter would cause the cost of the VOC

reductions to be greater than the $17,500/ton cost effectiveness threshold of the District BACT policy. Additional costs such as the cost of constructing freestalls for dry cows, enclosing all freestalls, and the cost of installing and operating a cooling system for cow comfort would make it even less cost effective to install this technology. Therefore, this option is not cost effective and is being removed from consideration at this time.

Feed and Manure Management Practices:

- Concrete feed lanes and walkways for all cows
- Freestall feed lanes and walkways for milk cows and dry cows flushed four times per day and feed lanes and walkways in the corrals for the remaining animals flushed at least two times per day
- All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.
- Uneaten feed re-fed to animals or removed from feed lanes on a daily basis to prevent decomposition.
- All open corrals adequately sloped to promote drainage (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal.
- Weekly scraping of freestall exercise pens and open corrals using pull-type scraper in the morning hours except when prevented by wet conditions
- Rule 4570 mitigation measures.

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

e. Step 5 - Select BACT

The facility is proposing concrete feed lanes and walkways; to flush the freestall feed lanes and walkways for the milk cows four times per day and to flush the corral feed lanes and walkways for the remaining animals two times per day; open corrals adequately sloped to promote drainage; to feed all animals in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations; to re-feed or remove refused feed from feed lanes on a daily basis to prevent decomposition; and to scrape open corrals and freestall exercise pens weekly with a pull-type scraper except during wet conditions, which satisfies the BACT requirements.

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

housing permit.

2. BACT Analysis for NH_3 Emissions from the Cow Housing:

a. Step 1 - Identify all control technologies

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

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

1) Feed and Manure Management Practices
   - Concrete feed lanes and feed walkways for all cows
   - Freestall feed lanes and walkways for milk cows flushed four times per day and feed lanes and walkways in the corrals for the remaining animals flushed at least two times per day
   - All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.
   - All open corrals adequately sloped to promote drainage (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal.
   - Weekly scraping of freestall exercise pens and open corrals using pull-type scraper in the morning hours except when prevented by wet conditions

Description of Control Technologies

1) Feed and Manure Management Practices

Concrete Feed Lanes and Walkways
Dairy animals spend a large amount of time on the feed lanes and walkways. Constructing these areas of concrete will reduce particulate matter emissions by having the animals spend more time on a paved surface rather than dry dirt. The concrete lanes and walkways create an avenue for the flush system. The flush system will further reduce particulate matter emissions and will also reduce 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 corral and

freestall feed lanes and walkways. The flush system introduces a large volume of water at the head of the paved area of the corrals or freestalls, and the cascading water removes the manure. The required volume of flush water varies with the size and slope of the area to be flushed. The freestall and corral lanes for milk and dry cows are typically flushed twice per day, but the flushing frequency can vary between one to four times per day. The lanes for support stock are usually flushed once per day or less frequently.

In addition to cleaning the corral and freestall feed lanes and walkways, the flush system also serves as an emission control for reducing PM_{10}, VOC, and ammonia emissions. The manure deposited in the lanes, which is also a source of NH_3 emissions, is removed from the cow housing area by the flush system. Ammonia has a high affinity for water and is highly soluble in water. Therefore, a large portion of ammonia will be flushed away with the flush water and will not be emitted from the cow housing permit unit.

Animals fed in accordance with (NRC) or other District-approved Guidelines
Nutritional management of dairy feed is routinely practiced to improve milk production and herd health. The potential for ammonia emissions can be reduced by reducing the amount of undigested nitrogen compounds in the manure. The level of microbial action in the manure corresponds to the level of organic nitrogen content in the manure; the lower the level of nitrogen the lower the level of microbial action and the lower the production of ammonia and VOCs.

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

Weekly Scraping of Exercise Pens and Open Corrals with a Pull-Type Scraper
Frequent scraping the freestall exercise pens and corrals will reduce the amount of manure on the corral surfaces, which will reduce VOC and ammonia emissions resulting from decomposition of this manure. This practice will also provide a uniform surface that promotes aerobic conditions on the corral surface, which will reduce gaseous pollutants from this area.

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) Feed and Manure Management Practices

- Concrete feed lanes and feed walkways for all cows
- Freestall feed lanes and walkways for milk cows flushed four times per day and feed lanes and walkways in the corrals for the remaining animals flushed at least two times per day
- All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.
- All open corrals adequately sloped to promote drainage (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal.
- Weekly scraping of freestall exercise pens and open corrals using pull-type scraper in the morning hours except when prevented by wet conditions

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The facility is proposing concrete feed lanes and feed walkways; to flush the freestall feed lanes and walkways for the milk cows four times per day and to flush the corral feed lanes and walkways for the remaining animals two times per day; open corrals adequately sloped to promote drainage; to feed all animals in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations; and to scrape open corrals and freestall exercise pens weekly with a pull-type scraper except during wet conditions, which satisfies the BACT requirements.

Additionally, District Rule 2201 defines BACT as including the most stringent emission limitation or control technique, including process and equipment changes, that has been found by the APCO to be cost effective and technologically feasible for such class or category of sources or for a specific source. The District has found that the mitigation measures required by District Rule 4570 are technologically feasible for confined animal facilities and the applicant has proposed these options. Although District Rule 4570 is only intended to reduce VOC emissions, many of these measures also reduce ammonia emissions. Therefore, in addition to the BACT requirements determined in the Top-Down BACT Analysis above, implementation of the mitigation measures that the applicant has selected to comply with Rule 4570 will also be required as part of BACT for NH_3 emissions from the cow housing permit.

3. BACT Analysis for PM_{10} Emissions from Milk Cow Housing:

a. Step 1 - Identify all control technologies

The following options were identified as controls for PM_{10} emissions:

1) Design and Management Practices
   - Freestall barn housing
   - Concrete feed lanes and walkways
   - Frequent flushing

Description of Control Technologies:

Freestall barn housing is an effective PM10 control measure because cows will spend majority of their time on paved surfaces under the barn rather than on loose dirt. Additionally, misters used for cooling cows, as well as frequent flushing of the feed lanes and walkways, create a moist environment that significantly decreases particulate matter emissions.

b. Step 2 - Eliminate technologically infeasible options

All the proposed control measures are technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

1) Design and Management Practices
   - Freestall barn housing
   - Concrete feed lanes and walkways
   - Frequent flushing

d. Step 4 - Cost Effectiveness Analysis

The applicant has proposed all the control options listed above; hence a cost-effectiveness analysis is not required.

e. Step 5 - Select BACT

The facility has proposed freestall barn housing for the milk cows; including concrete feed lanes and walkways and frequent flushing. The proposed control measures satisfy BACT for PM10 emissions.

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

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

a. Step 1 - Identify all control technologies

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

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

1) Aerobic Treatment Lagoon – mechanical aeration to achieve a dissolved oxygen concentration of 2.0 mg/L (≈95%; based information provided by Dr. Ruihong Zhang of UC Davis)

2) Covered Lagoon Anaerobic Digester with biogas collected and vented to a destruction device such as an internal combustion engine or flare, and treated waste discharged into a secondary lagoon or storage pond. (≈75%) (Note: not required unless required by the final Dairy BACT Guideline)

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

Description of Control Technologies

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

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

Sufficient oxygen must be provided to sustain the aerobic microorganisms in completely aerated lagoons. Lagoons can be considered completely aerobic if sufficient oxygen is provided to achieve a dissolved oxygen (DO) content of 2.0 mg/L or more. Oxygen is typically provided by mechanical aerators. These aerators may float on the lagoon surface or be submerged in the lagoon. Aeration can also be performed by injection of

tiny air bubbles into the lagoon water, mixing of the lagoon water, or spraying of the water into the air. According to Dr. Ruihong Zhang, a researcher at the University of California, Davis, at least 95% VOC control can be achieved if the dissolved oxygen (DO) content of the liquid manure is 2.0 mg/L or more. A major disadvantage of completely aerated lagoons is the enormous cost of the energy required to run the aerators continuously. Because of this, it has been determined that completely aerated lagoons are not cost effective options for dairy facilities at the present time.

2) Covered Lagoon Anaerobic Digester

Pursuant to Section 5.3 of the Settlement Agreement (9/20/2004) between the District and the Western United Dairyman and the Alliance of Western Milk Producers Inc., installation of an anaerobic digester will only be required if this technology is proven effective in reducing emissions and is required by the final Dairy BACT Guideline[1].

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 (VOCs). The gas generated by this process is known as biogas, waste gas or digester gas. In addition to methane and carbon dioxide, biogas also contains small amounts of Nitrogen (N_2), Oxygen (O_2), Hydrogen Sulfide (H_2S), and Ammonia (NH_3). Biogas will also include trace amounts of various Volatile Organic Compounds (VOCs) that remain from incomplete digestion of the volatile solids in the incoming wastewater. The small amounts of undigested solids that remain after digestion are removed from the digester as sludge. Because biogas is mostly composed of methane, the main component of natural gas, the gas produced in the digester can be cleaned to remove H_2S and other impurities and used as fuel. The captured biogas can be combusted in a flare or may be sent to a boiler or internal combustion engine, where the gas can be used to generate useful heat or electrical energy.

As stated above, the gas generated in the covered lagoon can be captured and then sent to a suitable combustion device. Combustion (thermal incineration) is a generally accepted, well-established VOC control technique. During combustion, gaseous hydrocarbons are oxidized to form CO_2 and water. The VOCs emitted from the liquid manure in the covered lagoon can be reduced by 95% with the use of an appropriate combustion device. Therefore, installation of the digester will lower the total VOCs emitted from the liquid manure from the liquid manure handling system. Although the control efficiency of the gas captured from the primary lagoon is expected to be 95% or more, the overall control efficiency is expected to be less since VOCs will also be emitted from the storage pond and as fugitive emissions. The overall control efficiency is assumed to be 75% of the emissions that would have been emitted from the lagoon and storage pond.

3) Anaerobic Treatment Lagoon

An anaerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of manure by microbes in the absence of oxygen. The process of anaerobic decomposition results in the preferential conversion of organic compounds in the wastewater into methane (CH_4), carbon dioxide (CO_2), and water rather than intermediate metabolites (VOCs). The National Resource Conservation Service (NRCS) California Field Office Technical Guide Code 359 - Waste Treatment Lagoon specifies criteria for the design of anaerobic treatment lagoons. A properly designed anaerobic treatment lagoon will reduce the Volatile Solids (VS) by at least 50% and will reduce the biological oxygen demand (BOD), which will result in greater efficiency in degrading compounds that contain carbon into methane and carbon dioxide rather than VOCs. Although, the VS reduction is expected to be at least 50%, a conservative control efficiency of 40% will be assumed for anaerobic treatment lagoons, until better data becomes available.

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) Aerobic Treatment Lagoon – mechanical aeration to achieve a dissolved oxygen concentration of 2.0 mg/L (≈95%)
2) Covered Lagoon Anaerobic Digester with biogas collected and vented to a destruction device such as an internal combustion engine or flare, and treated waste discharged into a secondary lagoon or storage pond. (≈75%)
3) Anaerobic Treatment Lagoon designed to meet Natural Resources Conservation Service (NRCS) standards (≈40%)

d. Step 4 - Cost Effectiveness Analysis

Aerobic Treatment Lagoon:

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

Energy Requirement for Complete Aeration

In order to effectively calculate the costs of this control option, the energy requirement for complete aeration must be determined. 1.5 to 2.5 pounds of oxygen is required to

digest 1 pound of Biological Oxygen Demand (BOD_5) with additional oxygen required for conversion of ammonia to nitrate (nitrification).[19] It is generally accepted that at least twice the BOD should be provided for complete aeration[20]. According to Dr. Ruihong Zhang of the University of California, Davis, 2.4 lb (1.1 kg) of oxygen (O_2) per cow must be provided each day for removal of BOD and an additional 3 lb (1.4 kg) for oxidation of 70% of the nitrogen.[21] Based on the data gathered in a UC Davis study on aerator performance for wastewater lagoons, aeration efficiencies for mechanical aerators range from 0.10 to 0.68 kg of oxygen provided per kW-hr of energy utilized.[22] For this analysis it will be assumed that twice the BOD is required for complete aeration and that mechanical aerators will provide 1.0 kg of oxygen per kW-hr. This efficiency is very conservative since it is greater than the efficiency of the most efficient aerator tested in the UC Davis study (0.68 kg-O_2/kW-hr) and more than twice the efficiency of the most efficient aerator tested that had been installed in dairy lagoons (0.49 kg-O_2/kW-hr). Additionally, the efficiency tests were performed in clean water and lower aeration efficiencies are expected in liquid dairy manure that contains a significant amount of solids. The yearly energy requirement per cow is calculated as follows:

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

The total yearly energy requirement is calculated below. Based on animal units (AU), it is assumed that the BOD loading (and the energy requirement) for the dry cows will be 80% of that of the milk cows, the BOD loading from the large heifers will be 73% of milk cows, the BOD loading from the small and medium heifers will be 35% of milk cows, and the BOD loading from the baby calves will be 21% of milk cows.[23]

As discussed in the evaluation, after completion of the project, the dairy will house 2,320 Holstein milk cows; 263 dry cows; 910 support stock; and 500 calves (0-3 months). The amount of electricity required for complete aeration of the lagoon system is calculated as follows:

(2,320 milk cows x 803 kW/cow-year) + (263 dry cows x 0.8 x 803 kW/cow-year) + (910 support stock x 0.73 x 803 kW/cow-year) + (500 calves x 0.21 x 803 kW/cow-year) = 2,649,659 kW-hr/year

Cost of Electricity for Complete Aeration:

The cost for electricity is based upon on an average retail price of industrial electricity in California for May 2013 taken from the Energy Information Administration (EIA) Website: http://www.eia.doe.gov/cneaf/electricity/epm/table5_6_b.html.

[19] An Assessment of Technologies for Management and Treatment of Dairy Manure in California's San Joaquin Valley, December 2005, page 34 (http://www.arb.ca.gov/ag/caf/dairypnl/dmtfaprprt.pdf)
[20] See http://www.extension.org/faq/27574 and http://www.omafra.gov.on.ca/english/engineer/facts/04-033.htm
[21] An Assessment of Technologies for Management and Treatment of Dairy Manure in California's San Joaquin Valley, December 2005, page 35 (http://www.arb.ca.gov/ag/caf/dairypnl/dmtfaprprt.pdf)
[22] Aerator Performance for Wastewater Lagoon Application, September 2007, UC Davis, R.H. Zhang (http://asae.frymulti.com/abstract.asp?aid=23832&t=2)
[23] Animal Unit (AU) factors are taken from the California Regional Water Quality Control Board Central Valley Region Annual Report for Dairies Subject to Monitoring and Reporting (http://www.waterboards.ca.gov/centralvalley/available_documents/dairies/genorderwdrform.pdf)

Average Cost for electricity = $0.1055/kW-hr

The electricity costs for complete aeration are calculated as follows:
2,649,659 kW-hr/year x $0.1055/kW-hr
= $279,539/year

VOC Emission Reductions for Complete Aeration

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

The annual VOC Emission Reductions for the lagoons, storage ponds, and liquid manure land application unit are calculated as follows:

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

[(2,320 milk cows x 0.74 lb-VOC/cow-yr) + (263 dry cows x 0.40 lb-VOC/cow-yr) + (910 support stock x 0.31 lb-VOC/cow-yr) + (500 calves x 0.06 lb-VOC/yr)] x 0.95 + [(2,320 milk cows x 1.33 lb-VOC/cow-yr) + (263 dry cows x 0.72 lb-VOC/cow-yr) + (910 support stock x 0.55 lb-VOC/cow-yr) + (500 calves x 0.10 lb-VOC/cow-yr)] x 0.95

=[2,134 lb-VOC/year x 0.95] + [3,825 lb-VOC/year x 0.95]
= **5,661 lb-VOC/year**

Cost of VOC Emission Reductions

Cost of reductions = ($279,539/year)/((5,661 lb-VOC/year)(1 ton/2000 lb))
= **$98,760/ton of VOC reduced**

As shown above, the electricity cost alone for complete aeration would cause the cost of the VOC reductions to be greater than the $17,500/ton cost effectiveness threshold of the District BACT policy. The equipment is therefore not cost effective and is being removed from consideration at this time.

Covered Lagoon Anaerobic Digester:

Pursuant to Section 5.3 of the Settlement Agreement (9/20/2004) between the District and the Western United Dairyman and the Alliance of Western Milk Producers Inc., installation of an anaerobic digester will only be required if this technology is proven effective in reducing emissions and is required by the final Dairy BACT Guideline[1].

The applicant has proposed to install an anaerobic digester if this technology is proven effective in reducing emissions and is required by the final Dairy BACT Guideline.

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

Anaerobic Treatment Lagoon:

The applicant has proposed an anaerobic treatment lagoon, as described in full detail under section VI, Emission Control Technology Evaluation, of the main evaluation. The applicant's proposal therefore meets the BACT requirements under this category.

e. Step 5 - Select BACT

The facility is proposing an anaerobic treatment lagoon designed according to National Resource Conservation Service (NRCS) Guidelines. Additionally, the facility is proposing to install an anaerobic digester if determined to be an effective emissions control in the final Dairy BACT guideline. Therefore, the BACT requirements are satisfied.

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

2. BACT Analysis for NH_3 Emissions from the Lagoon & Storage Pond

a. Step 1 - Identify all control technologies

A cost effectiveness threshold has not been established for ammonia. Therefore, only options that meet the District's definition of Achieved-in-Practice controls will be considered for ammonia at this time. (Although these options must meet the District definition of Achieved-in-Practice, pursuant to the Settlement Agreement (9/20/2004) between the District and Western United Dairyman and Alliance of Western Milk Producers Inc[1], the District will not deem any control options Achieved-in-Practice until after the Dairy BACT Guideline has been established.)

The following practice has been identified as a possible control option for the NH3

emissions from the lagoon and storage pond. No other control technologies that meet the definition of Achieved-in-Practice have been identified for the lagoon or storage pond:

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

Description of Control Technologies

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

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

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The facility is proposing to feed all animals in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations, which satisfies the BACT requirements.

Additionally, District Rule 2201 defines BACT as including the most stringent emission limitation or control technique, including process and equipment changes, that has been found by the APCO to be cost effective and technologically feasible for such class or category of sources or for a specific source. The District has found that the mitigation measures required by District Rule 4570 are technologically feasible for confined animal facilities and the applicant has proposed these options. Although District Rule 4570 is only intended to reduce VOC emissions, many of these measures also reduce ammonia emissions. Therefore, in addition to the BACT requirements determined in the Top-Down BACT Analysis above, implementation of the mitigation measures that the applicant has selected to comply with Rule 4570 will also be required as part of BACT for NH_3 emissions from the lagoons/storage ponds.

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

1. BACT Analysis for VOC Emissions from Liquid Manure Land Application:

a. Step 1 - Identify all control technologies

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

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

1) Irrigation from liquid treated in an Aerobic Treatment Lagoon – mechanical aeration to achieve a dissolved oxygen concentration of 2.0 mg/L (≈95%)
2) Irrigation using liquid treated in an Anaerobic Treatment Lagoon designed to meet Natural Resources Conservation Service (NRCS) standards (≈40%)
3) Injection of Liquid and Slurry Manure (≈50%)

Description of Control Technologies

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

An aerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of wastewater by microbes in the presence of oxygen (O_2). The process

of aerobic decomposition results in the conversion of organic compounds in the wastewater into carbon dioxide (CO_2), and (H_2O), nitrates, sulphates and inert biomass (sludge). The process of aerobic digestion is sometimes referred to as nitrification (especially when discussing NH_3 transformation). Complete aerobic digestion (100% aeration) removes nearly all malodors and also virtually eliminates VOCs, H_2S, and NH_3 emissions from liquid waste. Because these compounds would be removed from the liquid manure, emissions from liquid manure land application would also be eliminated.

Sufficient oxygen must be provided to sustain the aerobic microorganisms in completely aerated lagoons. Lagoons can be considered completely aerobic if sufficient oxygen is provided to achieve a dissolved oxygen (DO) content of 2.0 mg/L or more. Oxygen is typically provided by mechanical aerators. These aerators may float on the lagoon surface or be submerged in the lagoon. Aeration can also be performed by injection of tiny air bubbles into the lagoon water, mixing of the lagoon water, or spraying of the water into the air. According to Dr. Ruihong Zhang, a researcher at the University of California, Davis, at least 95% VOC control can be achieved if the dissolved oxygen (DO) content of the liquid manure is 2.0 mg/L or more. A major disadvantage of completely aerated lagoons is the enormous cost of the energy required to run the aerators continuously. Because of this, it has been determined that completely aerated lagoons are not cost effective options for dairy facilities at the present time.

2) Anaerobic Treatment Lagoon

An anaerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of manure by microbes in the absence of oxygen. The process of anaerobic decomposition results in the preferential conversion of organic compounds in the wastewater into methane (CH_4), carbon dioxide (CO_2), and water rather than intermediate metabolites (VOCs). The National Resource Conservation Service (NRCS) California Field Office Technical Guide Code 359 - Waste Treatment Lagoon specifies criteria for the design of anaerobic treatment lagoons. A properly designed anaerobic treatment lagoon will reduce the Volatile Solids (VS) by at least 50% and will reduce the biological oxygen demand (BOD), which will result in greater efficiency in degrading compounds that contain carbon into methane and carbon dioxide rather than VOCs. Since 50% of the Volatile Solids in the liquid manure will have been removed or digested in the lagoon, there will be less Volatile Solids remaining in the effluent to decompose into VOCs. Although, the Volatile Solids reduction will be at least 50%, to be conservative a 40% control will be applied to irrigation from a storage pond after an anaerobic treatment lagoon.

3) Injection of Liquid and Slurry Manure

Liquid and slurry manure is used to irrigate crops on land farmed by dairies. Manure can either be injected into the soil or left on the surface of the soil and allowed to soak in. Because the liquid and slurry manure is high in Nitrogen, Phosphorus, and Potassium (N-P-K), it supplies nutrients needed by crops. Dairies have nutrient management programs to regulate the amount of liquid and slurry manure applied to cropland. This program is used to balance the specific nutrients applied to the crops, such as nitrogen,

with the amount of nutrients that the crops can utilize. Balancing the needs of the crop with what is supplied helps to minimize contamination of ground water. During the process of liquid and slurry manure application to the crops VOC and NH_3 are emitted. Injecting manure hinders volatilization and speeds the uptake of nutrients that would degrade into gaseous pollutants. It is estimated that injection of manure will reduce VOC emissions from land application of manure by 50%.

The manure can only be injected during the time when the crop is not fully mature. This is because a tractor must be used to pull a cultivator with the liquid and slurry manure shanks. Once the crop is planted and grown to a certain height, it is no longer feasible for the tractor to get into the field due to the potential of damaging the crop. Ron Prong of Till-Tech Systems (519) 775-2575 states that his company's liquid and slurry manure injection system can be used up to four weeks after planting of the crops without causing damage. Therefore, injection of slurry manure can only be required until the crops become so tall that damage will occur.

b. Step 2 - Eliminate technologically infeasible options

Option 3 - Injection of Liquid and Slurry Manure

The Dairy Permitting Advisory Group (DPAG) found that injection of flushed manure was not be a feasible BACT option in their report of BACT options for dairies in the San Joaquin Valley.[24]

Injection is typically restricted to slurry manure that has been vacuumed from the cow housing or that has been removed from settling basins and/or weeping walls. Injection of flushed liquid manure from the lagoons is not considered feasible because the additional water from flushing increases the amount of liquid that must be transported by the trucks or honey wagons, which will generate more emissions. Because of the added time and expense, injection is not used for flushed liquid manure; therefore, this option will be removed from consideration at this time.

c. Step 3 - Rank remaining options by control effectiveness

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

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

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

[24] Page 150 of the Final DPAG Report - "Recommendations to the San Joaquin Valley Air Pollution Control Officer Regarding Best Available Control Technology for Dairies in the San Joaquin Valley" January 31, 2006 (http://www.valleyair.org/busind/pto/dpag/dpag_idx.htm)

d. Step 4 - Cost Effectiveness Analysis

Aerobic Treatment Lagoon:

The preceding cost analysis performed for the BACT analysis for VOC emissions from the lagoon and storage pond demonstrated that the energy costs alone, not including any capital costs, caused complete aeration to exceed the District VOC cost effective threshold. This analysis included VOC reductions from liquid manure land application as well as the lagoon and storage pond since complete aeration reduces emissions from both emissions units. Therefore, no further cost analysis is required for complete aeration.

Anaerobic Treatment Lagoon:

The applicant has proposed a control method that is at least equivalent to this option; therefore a cost-effectiveness analysis is not required.

e. Step 5 - Select BACT

The facility is proposing the irrigation of crops using liquid and slurry manure after treatment in an anaerobic treatment lagoon that is designed according to National Resource Conservation Service (NRCS) Guidelines. Additionally, the facility is proposing to install an anaerobic digester if determined to be an effective emissions control in the final Dairy BACT guideline. Therefore, the BACT requirements are satisfied.

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

2. BACT Analysis for NH_3 Emissions from the Liquid Manure Land Application

a. Step 1 - Identify all control technologies

A cost effectiveness threshold has not been established for ammonia. Therefore, only options that meet the District's definition of Achieved-in-Practice controls will be considered for ammonia at this time. (Although these options must meet the District definition of Achieved-in-Practice, pursuant to the Settlement Agreement (9/20/2004) between the District and Western United Dairyman and Alliance of Western Milk Producers Inc[1], the District will not deem any control options Achieved-in-Practice until

after the Dairy BACT Guideline has been established.)

The following practice has been identified as a possible control option for the NH_3 emissions from the liquid manure land application. No other control technologies that meet the definition of Achieved-in-Practice have been identified for liquid manure land application.

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

Description of Control Technologies

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

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

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The facility is proposing to feed all animals in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations, which satisfies the BACT requirements.

Additionally, District Rule 2201 defines BACT as including the most stringent emission limitation or control technique, including process and equipment changes, that has been found by the APCO to be cost effective and technologically feasible for such class or category of sources or for a specific source. The District has found that the mitigation measures required by District Rule 4570 are technologically feasible for confined animal facilities and the applicant has proposed these options. Although District Rule 4570 is only intended to reduce VOC emissions, many of these measures also reduce ammonia emissions. Therefore, in addition to the BACT requirements determined in the Top-Down BACT Analysis above, implementation of the mitigation measures that the applicant has selected to comply with Rule 4570 will also be required as part of BACT for NH_3 emissions from liquid manure land application.

V. Top Down BACT Analysis for the Solid Manure

BACT Analysis for NH_3 Emissions from Solid Manure Handling & Land Application:

a. Step 1 - Identify all control technologies

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

The following practice has been identified as a possible control option for the increase of NH_3 emissions from solid manure handling and land application.

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

Description of Control Technologies

1) 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 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 utilizing routine nutritional analysis for rations.

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The facility is proposing to feed all animals at the dairy in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.

Additionally, District Rule 2201 defines BACT as including the most stringent emission limitation or control technique, including process and equipment changes, that has been found by the APCO to be cost effective and technologically feasible for such class or category of sources or for a specific source. The District has found that the mitigation measures required by District Rule 4570 are technologically feasible for confined animal facilities and the applicant has proposed these options. Although District Rule 4570 is only intended to reduce VOC emissions, many of these measures also reduce ammonia emissions. Therefore, in addition to the BACT requirements determined in the Top-Down BACT Analysis above, implementation of the mitigation measures that the applicant has selected to comply with Rule 4570 will also be required as part of BACT for NH_3 emissions from solid manure handling and land application.

APPENDIX D

Lagoon Design Analysis

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	918	ft
Width	412	ft
Depth	12	ft
Slope	1	ft

Primary Lagoon Volume	**4,349,376 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	2,320	x	17	x	71%	x	50%	=	**14,001**
Dry Cow	263	x	9.2	x	71%	x	50%	=	**859**
Heifer (15 to 24 months)	910	x	7.1	x	48%	x	50%	=	**1,551**
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)	500	x	1.0	x	100%	x	50%	=	**250**
Bulls	0	x	9.2	x	48%	x	50%	=	**0**
Total for Dairy									**16,661**

[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.

agoon 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	14,001	÷	0.011	=	**1,272,836**
Dry Cow	859	÷	0.011	=	**78,087**
Heifer (15 to 24 months)	1,551	÷	0.011	=	**140,967**
Heifer (7 to 14 months)	0	÷	0.011	=	**0**
Heifer (3 to 6 months)	0	÷	0.011	=	**0**
Calf (under 3 months)	250	÷	0.011	=	**22,727**
Bulls	0	÷	0.011	=	**0**
Total for Dairy					**1,514,618**

[1] VSLR for an anaerobic treatment lagoon in San Joaquin Valley would be 6.5 lb VS/1000 ft3-day to 11 lb VS/1000 ft3-day according to the NRCS and USDA AWTFH. Based on phone conversation with Matt Summers (USDA) on July 14, 2006, he suggested that the 11 lb VS VS/1000 ft3-day

Lagoon Design Check in Accordance with NRCS Guideline #359

Sludge Accumulation Volume

The sludge accumulation volume accounts for the solids contained in the manure that cannot be fully digested by bacteria and that gradually settle to the bottom of the lagoon as sludge. The sludge accumulation volume for lagoon systems without solids separation can be calculated from the USDA Field Handbook. However, there are no accepted guidelines for calculating the sludge accumulation volume for lagoon systems with solids separation, but many designers of digester expect it to be minimal.

This facility has an efficient solids separation system consisting prior to the anaerobic treatment lagoon system. The separation system will remove a large portion of the fibers, lignin, cellulose, and other fibrous materials from the manure. These are the materials that would otherwise cause sludge accumulation from the lack of digestion in a lagoon or digester. Because fibrous materials and other solids will not enter the lagoon system, the sludge accumulation volume required will be minimized and can be considered negligible.

Nevertheless, the primary lagoon will have sufficient space remaining for sludge accumulation, as shown by the following calculation:

SAV = VPL - MTV

Where:

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

SAV =	**VPL**	**-**	**MTV**	
SAV =	**4,349,376**	**1,514,618**	**=**	**2,834,758 (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	2,320	x	2.40	ft^3	=	5,568	ft^3/day
Dry Cows	263	x	1.30	ft^3	=	342	ft^3/day
Heifers (15-24 mo)	910	x	0.78	ft^3	=	710	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	500	x	0.15	ft^3	=	75	ft^3/day
Bulls	0	x	1.30	ft^3	=	-	ft^3/day
Total	3,993					**6,695**	**ft^3/day**
Fresh water per milk cow used in flush at milk parlor			**50**	gal/day			

*Table 1.b - Section 3 of ASAE D384.2 (March 2005). The calf manure was estimated to be 1/2 of the calf number found in the table, since the average weight of these calves is approx. 1/2 of the calves identified in the table.

Lagoon Design Check in Accordance with NRCS Guideline #359 Cont.

Formula:

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

Total HFR:

⇨

50 gal	2320 milk cows	x	ft3	+	6,695	ft3
milk cow * day			7.48 gal			day

=	22,202.7	ft3/day

Formula:

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

HRT:

⇨

1,514,618 ft3	day	=	=	68.2176736	days
	22,202.7 ft3				

APPENDIX E

RMR and AAQA Summary

San Joaquin Valley Air Pollution Control District
Risk Management Review

To:	J. Siongco – Permit Services
From:	Kyle Melching – Technical Services
Date:	August 28, 2013
Facility Name:	GJ Silva Dairy Inc
Location:	3107 S. Prairie Flower Rd., Turlock
Application #(s):	N-5763-1-5, 2-5, 3-5, 4-3, & 9-3
Project #:	N-1130087

A. RMR SUMMARY

RMR Summary					
Categories	**Dairy Milking Parlor (Unit 1-5)**	**Dairy Cow Housing (Unit 2-5)**	**Dairy Lagoons (Unit 3-5)**	**Project Totals**	**Facility Totals**
Prioritization Score	0.15	5.21	1.15	<1	>1
Acute Hazard Index	0.01	0.72	0.02	0.75	0.75
Chronic Hazard Index	0.00	0.2	0.00	0.2	0.2
Maximum Individual Cancer Risk	**7.94E-07**	**2.66E-06**	N/A[1]	3.45E-06	3.45E-06
T-BACT Required?	**No**	**Yes-PM10**	**No**		
Special Permit Conditions?	**No**	**No**	**No**		

[1]The Maximum Individual Cancer Risk was not calculated since there are no risk factors associated with any of the Hazardous Air Pollutants (HAPs) under analysis.

B. RMR REPORT

I. Project Description

Technical Services performed a Risk Management Review and Ambient Air Quality Analysis (AAQA) for modifications to an existing dairy. The dairy will expand to 2,320 milk cows, not to exceed a combined total of 2,583 mature cows (milk and dry); 910 support stock (heifers and bulls; and 500 calves.

II. Analysis

Technical Services performed prioritizations using the District's HEARTs database. Emissions calculated using District-developed spreadsheets for dairies were input into the HEARTs database. In accordance with the District's *Risk Management Policy for Permitting New and Modified Sources* (APR 1905-1, March 2, 2001), risks from the proposed project were prioritized using the procedures in the 1990 CAPCOA Facility Prioritization Guidelines and incorporated in the District's HEART's database.

The ammonia from the land application of dry manure will be counted in Unit 3-5, with the lagoons. Units' 1-5, 2-5, and 3-5 (milking parlor, cow housing, and lagoon emissions) have a combined prioritization score greater than one; therefore, a refined health risk assessment was required and performed for each unit. AERMOD was used, with area source parameters and meteorological data from Modesto to determine maximum dispersion factors at the nearest on-site residential and off-site business receptors. These dispersion factors were input into the HARP model to calculate the chronic and acute hazard indices and the carcinogenic risk for each unit.

No prioritization or further review was required for Units 4-3 and 9-3 (solid manure handling and feed storage & handling).

The following parameters were used for the review:

Analysis Parameters N-5763 , Project N-1130087 Milk Cow Housing 1			
Total Increase of Cows		505	
Total Increase of PM10 (lb/hr)	0.167	**Total Increase of PM10 (lb/yr)**	1462

Analysis Parameters N-5763 , Project N-1130087 Milk Cow Housing 2			
Total Increase of Cows		397	
Total Increase of PM10 (lb/hr)	0.142	**Total Increase of PM10 (lb/yr)**	1246

Analysis Parameters N-5763 , Project N-1130087 Heifer Cow Housing			
Total Decrease of Cows		-490	
Total Decrease of PM10 (lb/hr)	-0.59	**Total Decrease of PM10 (lb/yr)**	-5160

Analysis Parameters N-5763 , Project N-1130087 Milk Parlor and Land Management			
Total Increase of Milk Cows		1320	
Ammonia Emissions from Land Application (lb/hr)	1.53	**Ammonia Emissions from Land Application (lb/yr)**	13,383

Technical Services performed modeling for the criteria pollutant PM_{10} using AERMOD with meteorological data for 2005-2009 from Modesto. The emission rates used for criteria pollutant modeling were 1462 lbs-PM_{10}/year for the Milk Cow Housing 1 area and 1246 lbs-PM_{10} for the Milk Cow Housing 2 area. The concentrations we collected and totaled from each housing unit, receptor by receptor. In addition, the project results in a decrease in PM_{10} emissions due to a head reduction in the Heifer Housing area. This reduction in PM_{10} resulted in a negative annual rate of -5,160 lb-PM_{10}/year and a emission rate of -3.07E-06 g/s-m^2. Since AERMOD does not model negative emissions; the emission rate was inputted into AERMOD as 3.07E-06 g/s-m^2 and the receptor by receptor concentrations were subtracted from the results from the Milk Cow Housing concentrations.

The following parameters were used for the review:

Analysis Parameters (Milk Cow Housing 1)			
PM10 (lb/yr)	1462	**Milk Parlor & Cow Housing Approx. Area (m^2)**	37,220
Emissions (g/s-m^2)	5.64E-07		

Analysis Parameters (Milk Cow Housing 2)			
PM10 (lbs/yr)	1246	**Milk Parlor & Cow Housing Approx. Area (m^2)**	32,077
Emissions (g/s-m^2)	5.58E-07		

Analysis Parameters (Heifer Housing)			
PM10 (tons/yr)	-5160	**Milk Parlor & Cow Housing Approx. Area (m^2)**	24,195
Emissions (g/s-m^2)	-3.07E-06		

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
Max Individual Receptor Value	5.6
Interim Significance Level	10.4[1]
Result	Pass[2]

[1]The District has decided on an interim basis to use a threshold for fugitive dust sources of 10.4 $\mu g/m^3$ for the 24-hour average concentration.
[2]The PM10 concentration is below the District's interim threshold for fugitive dust sources.

III. Conclusions

Unit 1-5

The acute and chronic indices are below 1.0; and the maximum individual cancer risk associated with the unit is **7.94E-07;** which is less than the 1 in a million threshold. In accordance with the District's Risk Management Policy, the unit is approved **without** Toxic Best Available Control Technology (T-BACT).

Unit 2-5

The acute and chronic indices are below 1.0; and the maximum individual cancer risk associated with the unit is **2.66E-06;** which is greater than the 1 in a million threshold. In accordance with the District's Risk Management Policy, the unit is approved **with** Toxic Best Available Control Technology (T-BACT).

Unit 3-5

The acute and chronic indices are below 1.0; the maximum individual cancer risk was not calculated since there are no risk factors associated with any of the Hazardous Air

Pollutants (HAPs) under analysis for this unit. In accordance with the District's Risk Management Policy, the unit is approved **without** Toxic Best Available Control Technology (T-BACT).

These conclusions are based on the data provided by the applicant and the project engineer. Therefore, this analysis is valid only as long as the proposed data and parameters do not change.

IV. Attachments

A. RMR request from the project engineer
B. Additional information from the applicant/project engineer
C. Dairy AAQA Guidance Email w/ AERMOD calculations
D. Dairy Emissions Calculation Spreadsheets
E. Prioritization score w/ toxic emissions summary
F. HARP On-Ramp Information
G. HARP Risk Reports
H. HARP Risk Tabulation Spreadsheet
I. Facility Summary

APPENDIX F

Draft ATCs

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: N-5763-1-5 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: GJ SILVA DAIRY INC
MAILING ADDRESS: 3107 S PRAIRIE FLOWER RD
TURLOCK, CA 95380

LOCATION: 3107 S PRAIRIE FLOWER RD
TURLOCK, CA 95380

EQUIPMENT DESCRIPTION:
MODIFICATION OF 1,000 COW MILKING OPERATION WITH ONE DOUBLE-20 PARALLEL MILKING PARLOR (40 STALLS) AND ONE DOUBLE-20 HERRINGBONE HOSPITAL BARN MILKING PARLOR (40 STALLS): INCREASE THE NUMBER OF MILK COWS TO 2,320

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. {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]
4. {4484} Permittee shall flush or hose milk parlor immediately prior to, immediately after, or during each milking. [District Rule 4570]
5. {4485} Permittee shall provide verification that milk parlors are flushed or hosed prior to, immediately after, or during each milking. [District Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

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

Seyed Sadredin, Executive Director / APCO

DRAFT

DAVID WARNER, Director of Permit Services
N-5763-1-5 . Oct 1 2013 11 03AM – AIYABEIJ Joint Inspection NOT Required

6. {4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]

7. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: N-5763-2-5 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: GJ SILVA DAIRY INC
MAILING ADDRESS: 3107 S PRAIRIE FLOWER RD
TURLOCK, CA 95380

LOCATION: 3107 S PRAIRIE FLOWER RD
TURLOCK, CA 95380

EQUIPMENT DESCRIPTION:
MODIFICATION OF COW HOUSING - 1,000 MILK COWS HOUSED IN FREESTALLS WITH FLUSH SYSTEM; 216 DRY COWS AND 1,400 TOTAL SUPPORT STOCK (HEIFERS) HOUSED IN OPEN CORRALS WITH FLUSH SYSTEM; AND 475 CALVES (0-3 MONTHS) HOUSED IN CALF HUTCHES WITH SCRAPE SYSTEM: INCREASE THE HERD CAPACITY TO 2,320 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 2,583 MATURE COWS (MILK AND DRY); 910 SUPPORT STOCK (HEIFERS AND BULLS); AND 500 CALVES (0-3 MONTHS)

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. {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]
4. The total number of cows at this facility shall not exceed any of the following limits: 2,320 milk cows; not to exceed a combined total of 2,583 mature cows (milk and dry cows); 910 support stock (heifers and bulls); and 500 calves (0 - 3 months). [District Rule 2201]

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.

Seyed Sadredin, Executive Director / APCO

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DAVID WARNER, Director of Permit Services
N-5763-2-5 : Oct 1 2013 1:51PM -- AIYABEIJ : Joint Inspection NOT Required

5. Mature cows shall be housed in freestall barns. [District Rules 2201 and 4102]
6. Permittee shall pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for mature cows and at least 6 feet along the corral side of the feedlane for support stock. [District Rules 2201 and 4570]
7. Permittee shall flush feed lanes and walkways at least four (4) times per day for mature cows and at least two times per day for support stock. [District Rules 2201 and 4570]
8. Permittee shall keep records or maintain an operating plan that requires feed lanes and walkways to be flushed at least four (4) times per day for mature cows and at least two times per day for support stock. [District Rules 2201 and 4570]
9. {4487} Permittee shall flush, scrape or vacuum freestall lanes immediately prior to, immediately after or during each milking. [District Rule 4570]
10. {4488} Permittee shall maintain records sufficient to demonstrate that freestall lanes are flushed, scraped or vacuumed immediately prior to, immediately after or during each milking. [District Rule 4570]
11. {4492} Permittee shall remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every seven (7) days. [District Rule 4570]
12. {4493} Permittee shall record the date that manure that is not dry is removed from individual cow freestall beds or raked, harrowed, scraped, or freestall bedding is graded at least once every seven (7) days. [District Rule 4570]
13. {4499} Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rule 4570]
14. {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 Rule 4570]
15. {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 Rule 4570]
16. {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 Rule 4570]
17. Permittee shall implement all of the following emission control measures: 1) slope the surfaces of the 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 corrals and exercise pens to ensure proper drainage and prevent water from standing more than forty-eight hours; and 3) scrape corral and exercise pen surfaces using a pull-type scraper during morning hours on a weekly basis, except when prevented by wet weather. [District Rules 2201 and 4570]
18. Permittee shall 1) maintain sufficient records to demonstrate that corrals and exercise pens are maintained to ensure proper drainage preventing water from standing for more than forty-eight hours and 2) maintain records of corral and exercise pen scraping. [District Rules 2201 and 4570]
19. {4515} 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]
20. {4516} 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]

CONDITIONS CONTINUE ON NEXT PAGE

21. {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 Rule 4570]
22. {4519} Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rule 4570]
23. Inspection for potholes and similar sources of emissions shall be performed on a monthly basis. A record of these inspections shall be maintained. [District Rule 2201]
24. Firm, stable soil that is not easily eroded shall be used for the exercise pen and corral surfaces. [District Rule 2201]
25. A supply of dry fill soil shall be kept on site in order to fill areas where erosion and gouging occurs. [District Rule 2201]
26. Clean rainfall runoff shall be diverted around exercise pen and corral surfaces to reduce the amount of water that is potentially retained on these surfaces. [District Rule 2201]
27. 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]
28. 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]
29. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: N-5763-3-5 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: GJ SILVA DAIRY INC
MAILING ADDRESS: 3107 S PRAIRIE FLOWER RD
TURLOCK, CA 95380

LOCATION: 3107 S PRAIRIE FLOWER RD
TURLOCK, CA 95380

EQUIPMENT DESCRIPTION:
MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF 3 MECHANICAL SEPARATORS; 7 SETTLING BASINS; 4 STORAGE PONDS; MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION: CONVERT STORAGE PONDS NUMBER 2, 1, AND 3 INTO A TWO-STAGE ANAEROBIC TREATMENT LAGOON SYSTEM WITH POND 2 AS ANAEROBIC TREATMENT LAGOON AND PONDS 1 AND 3 AS STORAGE PONDS; CORRECT NUMBER OF SETTLING BASINS TO THREE.

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. {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]
4. The liquid manure handling system shall handle flush manure from no more than 2,320 milk cows; not to exceed a combined total of 2,583 mature cows (milk and dry cows); 910 support stock (heifers and bulls); and 500 calves (0 - 3 months). [District Rule 2201]

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.

Seyed Sadredin, Executive Director / APCO

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DAVID WARNER, Director of Permit Services
N-5763-3-5 : Oct 1 2013 1:55PM -- AIYABEIJ Joint Inspection NOT Required

5. The liquid manure lagoon shall be designed, constructed and operated according to the anaerobic treatment lagoon requirements of NCRCS Guideline No. 359. A minimum liquid manure depth of 8.4 feet shall be retained in the lagoon at all times. [District Rule 2201]

6. Permittee shall maintain design specifications, calculations, including Minimum Treatment Volume (MTV), Hydraulic Retention Time (HRT) demonstrating that the anaerobic treatment lagoon meets the requirements listed in the NRCS Field Office Technical Guide Code 359. [District Rule 2201]

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

8. {4550} Permittee shall not allow liquid manure to stand in the fields for more than twenty-four (24) hours after irrigation. [District Rule 4570]

9. {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 Rule 4570]

10. {4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]

11. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: N-5763-4-3 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: GJ SILVA DAIRY INC
MAILING ADDRESS: 3107 S PRAIRIE FLOWER RD
TURLOCK, CA 95380

LOCATION: 3107 S PRAIRIE FLOWER RD
TURLOCK, CA 95380

EQUIPMENT DESCRIPTION:
MODIFICATION OF SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; WINDROW PILE COMPOSTING; SOLID MANURE APPLICATION TO LAND: INCREASE THE HERD CAPACITY TO 2,320 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 2,583 MATURE COWS (MILK AND DRY); 910 SUPPORT STOCK (HEIFERS AND BULLS); AND 500 CALVES (0-3 MONTHS)

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. {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]
4. {4529} 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]

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.

Seyed Sadredin, Executive Director / APCO

DRAFT

DAVID WARNER, Director of Permit Services
N-5763-4-3 : Oct 1 2013 11:04AM – AIYABEIJ : Joint Inspection NOT Required

5. {4530} 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]

6. {4531} 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]

7. {4541} Permittee shall incorporate all solid manure within seventy-two (72) hours of land application. [District Rule 4570]

8. {4542} Permittee shall maintain records to demonstrate that all solid manure has been incorporated within seventy-two (72) hours of land application. [District Rule 4570]

9. {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]

10. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: N-5763-9-3 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: GJ SILVA DAIRY INC
MAILING ADDRESS: 3107 S PRAIRIE FLOWER RD
TURLOCK, CA 95380

LOCATION: 3107 S PRAIRIE FLOWER RD
TURLOCK, CA 95380

EQUIPMENT DESCRIPTION:
MODIFICATION OF FEED STORAGE AND HANDLING CONSISTING OF COMMODITY BARNS AND SILAGE PILES: INCREASE THE HERD CAPACITY TO 2,320 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 2,583 MATURE COWS (MILK AND DRY); 910 SUPPORT STOCK (HEIFERS AND BULLS); AND 500 CALVES (0-3 MONTHS)

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

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (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.

Seyed Sadredin, Executive Director / APCO

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DAVID WARNER, Director of Permit Services
N-5763-9-3 : Oct 1 2013 11 04AM – AIYABEIJ Joint Inspection NOT Required

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

6. {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 Rule 4570]

7. {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 Rule 4570]

8. {4458} Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rule 4570]

9. {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 Rule 4570]

10. {4460} Permittee shall store grain in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rule 4570]

11. {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 Rule 4570]

12. {4462} 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]

13. {4463} Permittee shall maintain records to demonstrate animals are fed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rule 4570]

14. {4468} For bagged silage/feedstuff, permittee shall utilize a sealed feed storage system (e.g., ag bag). [District Rule 4570]

15. {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 Rule 4570]

16. {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 4570]

17. {4471} Permittee shall select and implement one of the following mitigation measures for building each silage pile at the facility: Option 1) build the silage pile such that the average bulk density is at least 44 lb/cu ft for corn silage and 40 lb/cu ft for other silage types, as measured in accordance with Section 7.11 of District Rule 4570; Option 2) Adjust filling parameters when creating the silage pile to achieve an average bulk density of at least 44 lb/cu ft for corn silage and at least 40 lb/cu ft for other silage types as determined using a District-approved spreadsheet; or Option 3) build silage piles using crops harvested with the applicable minimum moisture content, maximum Theoretical Length of Chop (TLC), and roller opening identified in District Rule 4570, Table 4.1, 1.d and manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. Records of the option chosen as a mitigation measure for building each silage pile shall be maintained. [District Rule 4570]

18. {4472} For each silage pile that Option 1 (Measured Bulk Density) is chosen as a mitigation measure for building the pile, records of the measured bulk density shall be maintained. [District Rule 4570]

19. {4473} For each silage pile that Option 2 (Bulk Density Determined by Spreadsheet) is chosen as a mitigation measure for building the pile, records of the filling parameters entered into the District-approved spreadsheet to determine the bulk density shall be maintained. [District Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

20. {4474} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall harvest corn used for the pile at an average moisture content of at least 65% and harvest other silage crops for the pile at an average moisture content of at least 60%. [District Rule 4570]

21. {4475} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records of the average percent moisture of crops harvested for silage shall be maintained. [District Rule 4570]

22. {4476} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall adjust setting of equipment used to harvest crops for the pile to incorporate the following parameters for Theoretical Length of Chop (TLC) and roller opening, as applicable: 1) Corn with no processing: TLC not exceeding 1/2 inch, 2) Processed Corn: TLC not exceeding 3/4 inch and roller opening of 1-4 mm, 3) Alfalfa/Grass: TLC not exceeding 1.0 inch, 4) Other silage crops: TLC not exceeding 1/2 inch. [District Rule 4570]

23. {4477} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records that equipment used to harvest crops for the pile was set to the required TLC and roller opening for the type of crop harvested shall be maintained. [District Rule 4570]

24. {4478} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rule 4570]

25. {4479} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall maintain a plan that requires that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rule 4570]

26. {4480} Permittee shall select and implement at least two of the following mitigation measures for management of silage piles at the facility: Option 1) manage silage piles such that only one silage pile has an uncovered face and the total exposed surface area is less than 2,150 square feet, or manage multiple uncovered silage piles such that the total exposed surface area of all uncovered silage piles is less than 4,300 square feet; Option 2) use a shaver/facer to remove silage from the silage pile, or shall use another method to maintain a smooth vertical surface on the working face of the silage pile; or Option 3) inoculate silage with homolactic lactic acid bacteria in accordance with manufacturer recommendations to achieve a concentration of at least 100,000 colony forming units per gram of wet forage, apply propionic acid, benzoic acid, sorbic acid, sodium benzoate, or potassium sorbate at the rate specified by the manufacturer to reduce yeast counts when forming silage piles, or apply other additives at rates that have been demonstrated to reduce alcohol concentrations in silage and/or VOC emissions from silage and have been approved by the District and EPA. Records of the options chosen for managing each silage pile shall be maintained. [District Rule 4570]

27. {4481} If Option 1 (Limiting Exposed Area of Silage) is chosen as a mitigation measure for managing silage piles, the permittee shall calculate and record the maximum (largest part of pile) total exposed area of each silage pile. Records of the maximum calculated area shall be maintained. [District Rule 4570]

28. {4482} For each silage pile that Option 2 (Shaver/Facer or Smooth Face) is chosen as a mitigation measure for building the pile, the permittee shall maintain records that a shaver/facer was used to remove silage from the pile or shall visually inspect the pile at least daily to verify that the working face was smooth and maintain records of the visual inspections. [District Rule 4570]

29. {4483} For each silage pile that Option 3 (Silage Additives) is chosen as a mitigation measure for building the pile, records shall be maintained of the type additive (e.g. inoculants, preservative, other District & EPA-approved additive), the quantity of the additive applied to the pile, and a copy of the manufacturers instructions for application of the additive. [District Rule 4570]

30. {4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

31. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]