San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

MAR 10 2017

Jose Soares
Jose Soares Dairy
P O Box 189
Delhi, CA 95315

Re: Notice of Preliminary Decision - Authority to Construct
Facility Number: C-7180
Project Number: C-1132675

Dear Mr. Soares:

Enclosed for your review and comment is the District's analysis of Jose Soares Dairy's application for an Authority to Construct for a new dairy with a maximum herd capacity of 2,880 milk cows, not to exceed a combined total of 3,544 mature cows (milk and dry); 2,845 support stock (heifers and bulls), and 135 calves (0 - 3 months old), to be located 1½ miles south of Avenue 21 on Road 1 in Dos Palos.

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,

Arnaud Marjollet
Director of Permit Services

AM:jka

Enclosures

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

Seyed Sadredin
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San Joaquin Valley Air Pollution Control District
Authority to Construct Application Review
New Dairy

Facility Name:	Jose Soares Dairy	Date:	March 2, 2017
Mailing Address:	P O Box 189	Engineer:	Jonah Aiyabei
	Delhi, CA 95315	Lead Engineer:	Jerry Sandhu
Contact Person:	Jose Soares, Owner		
Telephone:	(209) 634-1291		
Application #s:	C-7180-6-0 through 10-0		
Project #:	C-1132675		
Deemed Complete:	December 22, 2016		

I. Proposal

Jose Soares Dairy has requested Authority to Construct (ATC) permits for a new dairy with a maximum herd capacity of 2,880 milk cows, not to exceed a combined total of 3,544 mature cows (milk and dry); 2,845 support stock (heifers and bulls), and 135 calves (0 - 3 months old). The proposed project includes the construction of a milking barn with a 72-stall carousel milking parlor; seven freestall barns and one special needs freestall barn; 25 open corrals with shade structures; calf hutch lanes; a liquid manure management system consisting of a processing pit, mechanical separator(s), an anaerobic treatment lagoon, and a storage pond; solid manure management facilities; and feed storage and handling facilities.

The draft ATC permits for the proposed project are included in Appendix A. Project site plans showing the proposed facility are included in Appendix B.

Project Background

ATC permits for the proposed dairy were previously issued in 2008, via project #C-1062111. However, the applicant did not commence construction prior to expiration dates of the ATC permits. At the applicant's request, the ATC permits were renewed one time in 2011; but the renewed ATC permits also expired prior to the commencement of construction. The applicant would now like to begin work on the project. Since the previously issued ATC permits have expired and cannot be renewed more than one time (per District Rule 2050, Cancellation of Application), a new application and new ATC permits are required prior to commencement of any construction.

II. Applicable Rules

Rule 1070	Inspections (12/17/92)
Rule 2010	Permits Required (12/17/92)
Rule 2201	New and Modified Stationary Source Review Rule (2/18/16)
Rule 2410	Prevention of Significant Deterioration (6/16/11)

Rule 2520	Federally Mandated Operating Permits (6/21/01)
Rule 2550	Federally Mandated Preconstruction Review for Major Sources of Air Toxics (6/18/98)
Rule 4101	Visible Emissions (2/17/05)
Rule 4102	Nuisance (12/17/92)
Rule 4550	Conservation Management Practices (CMP) (8/19/04)
Rule 4570	Confined Animal Facilities (10/21/10)
CH&SC §41700	Health Risk Assessment
CH&SC §42301.6	School Notice

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

III. Project Location

The proposed dairy will be located approximately 1½ miles south of Avenue 21 on Road 1 in Dos Palos, Madera County. The proposed site is not within 1,000 feet of the outer boundaries of any K-12 schools. The public notification requirement of California Health and Safety Code §42301.6 is therefore not applicable to this project.

IV. Process Description

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

Female calves are retained in the herd while the male calves are sold off for meat production or other purposes. The calves take approximately 15 to 24 months to reach reproductive maturity, at which point they enter the milk production stream as bred heifers. Thus, in addition to the mature cows (milk and dry), a typical dairy herd also includes a certain proportion of calves and heifers at various stages of development (support stock). Mature cows that are culled from the herd (primarily due to diminishing milk yield, but also due to injury, disease, or other reasons) are replaced by the bred heifers entering the milk production stream. The support stock may also include a certain number of mature bulls for breeding purposes, although this is not common due to the prevalent use of artificial insemination.

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

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

Milking Operation:

Milking is a dairy's primary income generating activity. The lactating cows are milked two to four times per day. The milk is chilled and temporarily stored in onsite tanks until it is collected by tanker truck for delivery to a creamery. A purpose-built structure known as the milking barn is used for milking and the associated onsite milk handling activities. The milking barn is located in proximity to, but separate from the lactating cow housing areas. It is designed to facilitate efficient in-and-out movement of groups of cows being milked; and also to allow workers access to individual cows during milking. The first part of the milking barn, known as the holding area, is an open-sided roofed space where cows that are ready for milking are temporarily confined as they enter the milking parlor. The milking occurs in the milking parlor within the barn. There are several different parlor designs, including flat, parallel, herringbone, and rotary. Jose Soares Dairy will use a 72-stall carousel milking parlor.

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

Cow Housing:

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

Some of the dry cows and majority of the support stock are housed in open corrals. An open corral is a large loose-dirt open-air space where cows are confined using fences. A corral is typically bordered along one side by a paved drive-through feed alley. Feed bunks are located along the side of the drive-through alley. A stanchion fence separates the housing side of the corral from the feed alley and also facilitates the cows' orderly access to the feed (i.e. one cow per stanchion). The edge of the corral immediately opposite the feed bunks is typically paved and equipped with a flush system for efficient removal of manure deposited during feeding, which is a significant amount of the total manure associated with corral housing. Manure from the unpaved surfaces of the corral is removed by scraping. Watering troughs are provided

along the edges of the corral opposite the feed bunks, and can be accessed through the corral fencing. Shade structures may also be provided within the corral to improve the cows' comfort during hot weather.

Detailed housing arrangements for the proposed dairy are shown in Appendix C ('PM10 Mitigation Measures' sheet).

Liquid Manure Handling System:

Milk cows generate anywhere from 130 to 150 pounds of manure per day. The manure is deposited primarily in areas where the cows are housed and fed (cow housing), but a small amount is deposited in the milking barn and other transit areas. The manure is collected and managed in liquid and solid forms. Manure with a total solids content of 20% or higher usually can be handled as a solid, while manure with a total solids content of 10% or less can be handled as a liquid.

The proposed liquid manure handling system will consist of a processing pit, mechanical solids separator(s), an anaerobic treatment lagoon, a storage pond, and land application of treated liquid manure.

Solids Separation:

Flush water from the milk barn and housing areas is collected into a processing pit near the mechanical separators. The flush water is periodically agitated and pumped over the mechanical separator screens. The liquid passes through the screens and flows into the liquid manure lagoons. The solids fall off the bottom of the screen onto a stacking pad, from where they are later removed by a front end loader and spread out to dry on the drying pads.

Anaerobic Treatment Lagoon:

An anaerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of manure by microbes in the absence of oxygen. This process of anaerobic decomposition results in the preferential conversion of organic compounds in the manure into methane, carbon dioxide, and water rather than intermediate metabolites (VOC). The Natural Resources Conservation Service (NRCS) Field Office Technical Guide No. 359, Waste Treatment Lagoon, for California specifies the following criteria for anaerobic treatment lagoons:

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

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

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

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

The project proposal includes an 853' x 300' x 20' treatment lagoon meeting the criteria listed above.

Land Application:

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

Solid Manure Handling Operation:

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

Feed Storage and Handing Operation:

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

V. Equipment Listing

C-7180-6-0: 2,880 COW MILKING OPERATION WITH ONE 72 STALL CAROUSEL MILKING PARLOR

C-7180-7-0: COW HOUSING - 2,880 MILK COWS, NOT TO EXCEED A COMBINED TOTAL OF 3,544 MATURE COWS (MILK AND DRY); 2,845 SUPPORT STOCK (HEIFERS AND BULLS); 135 CALVES (0 - 3 MONTHS OLD) IN ON-GROUND HUTCHES; 7 FREESTALL BARNS, AND 1 SPECIAL NEEDS FREESTALL BARN, WITH A FLUSH/SCRAPE SYSTEM

C-7180-8-0: LIQUID MANURE HANDLING SYSTEM CONSISTING OF PROCESSING PIT(S), MECHANICAL SEPARATOR(S), ONE ANAEROBIC TREATMENT LAGOON (853' X 300' X 20'), AND ONE STORAGE POND; MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION AND FURROW IRRIGATION

C-7180-9-0: SOLID MANURE HANDLING OPERATION CONSISTING OF MANURE STOCK PILES; SOLID MANURE APPLICATION TO LAND AND OFFSITE HAULING

C-7180-10-0: FEED STORAGE AND HANDLING OPERATION CONSISTING OF COMMODITY BARN(S); SILAGE PILE(S); AND TOTAL MIXED RATION FEEDING

VI. Emission Control Technology Evaluation

Particulate matter (PM_{10}), volatile organic compounds (VOC), hydrogen sulfide (H_2S), and ammonia (NH_3) are the major pollutants of concern from dairy operations. PM_{10} emissions are mostly due to cows' activities on corral/pen surfaces covered with dust and pulverized manure. These activities disturb the fine particulate matter in the dust and manure, which is then more readily picked up by wind and entrained into the atmosphere. VOC emissions are a byproduct of the ruminant digestive process (i.e. enteric emissions), the decomposition and fermentation of feed, and the decomposition of organic matter in manure. NH_3 and H_2S emissions are byproducts of microbial metabolization of nitrogen and sulfur compounds in manure. The quantities of these emissions depend directly on the dairy's herd size and profile.[2]

Various management practices will be used to control emissions from the proposed dairy. Some of these practices are discussed below:

Cow Housing

Frequent Flushing

A flush system will be used to remove manure from the paved lanes and walkways, at least four times per day for mature cows and once per day for support stock. Frequent flushing creates a moist environment that greatly reduces or eliminates PM_{10} emissions. In addition, flush water dissolves NH_3 as well as various water-soluble VOC in the manure, thereby stopping or decelerating the emission of these pollutants directly into the atmosphere. Both manure and dissolved pollutants are subsequently carried by the flush water into the liquid manure handling system for further treatment.

Feeding Cows in Accordance with the NRC Guidelines

All cows will be fed in accordance with National Research Council (NRC) guidelines using routine nutritional analysis for rations. NRC guidelines are intended to optimize nutrient uptake by the cow, which not only increases feed efficiency but also minimizes the excretion of undigested protein and other nutrients in the manure. Since excess manure nutrients are the feedstock for the processes that result in NH_3, H_2S and VOC emissions as

[2] Herd size refers to the total number of cows, whereas profile refers to the specific categories (e.g. lactating, dry, heifer, calf) that constitute the herd.

manure decomposes, the reduction of nutrients in the manure is expected to reduce the emission of these pollutants.

Corral Scraping

Frequent scraping of the corral surfaces will reduce the amount of accumulated manure, 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 corral surface, which will further reduce emissions.

Feeding Heifers near Dusk

Heifers are generally most active during late evening hours when the heat of the day has subsided slightly. This increased evening activity results in dust and associated PM10 emissions. This high propensity for increased evening activity can be counteracted by scheduling the afternoon feeding at this time, such that majority of the heifers will be occupied at the feeding lanes instead of moving around the dryer dirt areas of the corrals.

Corral Sprinklers

When done at a rate sufficient to match the evaporation rate, sprinkling will keep corral surfaces consistently moist. This will reduce PM_{10} emissions by preventing any loose soil and dried manure from being entrained into the air by wind movement and/or cow activities. Water application rates must be properly adjusted, since excess water could potentially increase VOC and NH_3 emissions; and may also pose a health risk for the animals.

Windbreaks

Windbreaks are a single or multiple rows of trees in linear configurations planted on the windward or downwind side of a given site. The windbreaks are planted in accordance with the National Research Conservation Service (NRCS) standard #380. Guidelines from this standard in conjunction with guidelines discussed with the local NRCS office are summarized as follows:

- Windbreak density on the leeward side of the source and windward of the area to be protected should be at least 65%. This density will provide the optimum PM interception. "Density", when viewing through the windbreak from 60 feet to 100 feet away upwind of the rows, is the percentage of the background view that is obscured or hidden.

- In order to reach a density of 65%, a typical multi-row windbreak may consist of the following:

Row	Type of tree/shrub	Spacing[3]	Height
First row	Low shrubs Tall shrubs	3' to 5' apart 8' to 12' apart	5' +
Second row	Tall shrubs or medium size trees	8' to 12' apart	8'-25'
Third row	Large evergreens	Varies	35' +

[3] These are general spacing guidelines. Actual spacing requirements will vary, depending on tree species.

- Trees in adjacent rows should be offset from each other.
- Spacing between rows should be sufficient to accommodate cultivation equipment.
- Windbreaks should be irrigated to provide the greatest survivability and the most rapid growth of the trees and shrubs.
- Weed control and prompt replacement of any dead trees is required.

The applicant has proposed to establish windbreaks in accordance with the NRCS recommendations summarized above. The windbreaks will be planted along the entire eastern and southern boundaries of the proposed project site, and will consist of one row of Arizona cypress trees spaced ten feet apart, and one row of Chinese pistache trees spaced fourteen feet apart. Since Arizona cypress trees maintain foliage very close to the ground even in maturity, a first row of shrubs, which is typically needed for ground level coverage, is not necessary.

Liquid Manure Handling

Solids Separation

The liquid manure handling system is equipped with a mechanical separator for solids separation. Solids separation prevents excessive loading of solids into the treatment system, which could inhibit the microbial activity that is required for proper treatment.

Anaerobic Treatment

The project proposal includes a two-stage anaerobic treatment lagoon system. As shown in the design check in Appendix H, the proposed treatment system meets the specifications set forth in NRCS practice standard 359.

A properly designed and operated anaerobic treatment lagoon system reduces VOC emissions by enhancing the conversion of organic compounds in the manure into methane, carbon dioxide, and water. A two-stage anaerobic treatment lagoon system also has an air pollution benefit over single lagoon systems. Odors and VOC emissions are more effectively reduced in two-stage treatment systems since a constant treatment volume can be maintained in the primary lagoon, which promotes more efficient anaerobic digestion.

Liquid Manure Land Application

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

Solid Manure Handling

Based on the information currently available, emissions from solid manure applied to cropland are expected to be low. However, to ensure that any possible emissions are minimized, the manure will be promptly incorporated into the soil after application. This will reduce any volatilization of gaseous pollutants, as the soil provides cover from wind and other weather elements that enhance volatilization. In addition, incorporation reduces emissions by biofilter effect, whereby the adsorption of NH_3, VOC, and other compounds onto soil particles provides an opportunity for oxidation by the action of various microorganisms the soil.[4]

Feed Storage and Handling

All cows will be fed in accordance with National Research Council (NRC) guidelines using routine nutritional analysis for rations. NRC guidelines are intended to optimize nutrient uptake by the cow, which not only increases feed efficiency but also minimizes the excretion of undigested protein and other nutrients in the manure. Since excess manure nutrients are the feedstock for the processes that result in NH_3, H_2S and VOC emissions as manure decomposes, the reduction of nutrients in the manure is expected to reduce the emission of these pollutants.

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

VII. General Calculations

A. Assumptions

- Potential to emit calculations will be based on the permitted limits for the different age categories of cows in the proposed herd.
- Only non-fugitive emissions are considered when determining major source status. For this facility, the lagoon and storage pond (permit unit C-7180-8) are the only sources of non-fugitive emissions.
- All PM_{10} emissions will be allocated to the cow housing permit unit (C-7180-7).
- All H_2S emissions will be allocated to the liquid manure permit unit - lagoon/storage pond (C-7180-8); and will be assumed to be equivalent to 10% of the NH_3 emissions from the lagoon/storage pond.
- The PM_{10} control efficiency for shade structures is from a District document titled "Dairy/Feedlot PM_{10} Mitigation Practices and their Control Efficiencies."[5]

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

[5] http://www.valleyair.org/busind/pto/dpag/Dairy_PM10_Control_Efficiencies.pdf

- The PM_{10} emission factors are from a District document titled "Dairy and Feedlot PM_{10} Emissions Factors,"[6] which compiled data from studies performed by Texas A&M and ASAE, and a USDA/UC Davis report, quantifying dairy and feedlot emissions.

- The VOC emission factors for milk cows are from a District document titled "Air Pollution Control Officer's Revision to the Dairy VOC Emission Factors, February 2012."[7] Volatile solids excretion ratios were used to derive the proportionate VOC emission factors for dry cows and support stock.

- The NH_3 emission factor for milk cows is based on California Air Resources Board's dairy cattle ammonia emission factor.[8] Manure-based VOC emission ratios were used to apportion the NH_3 emission factor to the various emissions units. Further, nitrogen excretion ratios were used to derive the proportionate NH_3 emission factors for dry cows and support stock.

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

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

B. Emission Factors

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

C. Calculations

1. Pre-Project Potential to Emit (PE1)

Since this is a new facility PE1 = 0 for all pollutants.

2. Post-Project Potential to Emit (PE2)

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

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

PE2 Summary								
Permit unit	PM_{10}		VOC		NH_3		H_2S	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
C-7180-6-0	0.0	0	3.2	1,152	1.1	394	0.0	0
C-7180-7-0	37.5	13,803	115.3	42,089	229.5	83,831	0.0	0
C-7180-8-0	0.0	0	17.7	6,480	53.3	19,427	1.2	471
C-7180-9-0	0.0	0	5.8	2,101	30.7	11,250	0.0	0
C-7180-10-0	0.0	0	159.4	58,171	0.0	0	0.0	0

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

Pursuant to District Rule 2201, the SSPE1 is the sum of the Potential to Emit (PE) from all units with valid Authorities to Construct (ATC) or Permits to Operate (PTO) at the stationary source and the quantity of emission reduction credits (ERC) which have been banked since September 19, 1991 for actual emissions reductions (AER) that have occurred at the source, and which have not been used on-site.

Since this is a new facility, there are no valid ATCs, PTOs, or ERCs at the stationary source. SSPE1 = 0 for all pollutants.

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

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

This facility does not have any ERCs. The PE values for units C-7180-6 through C-7180-10 are calculated in Appendix C. The SSPE2 is as summarized in the following table:

SSPE2 (lb/year)							
Permit unit	NO_X	SO_X	PM_{10}	CO	VOC	NH_3	H_2S
C-7180-6-0	0	0	0	0	1,152	394	0
C-7180-7-0	0	0	13,803	0	42,089	83,831	0
C-7180-8-0	0	0	0	0	6,480	19,427	471
C-7180-9-0	0	0	0	0	2,101	11,250	0
C-7180-10-0	0	0	0	0	58,171	0	0
SSPE2	**0**	**0**	**13,803**	**0**	**109,993**	**114,902**	**471**

5. Major Source Determination

Rule 2201 Major Source Determination

Pursuant to District Rule 2201, a major source is a stationary source with an SSPE2 equal to or exceeding one or more of the major source thresholds shown in Table 3-3. For the purposes of determining major source status the following shall not be included:

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

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

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

Milking Parlor

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

Cow Housing

Although there are smaller dairy farms that have enclosed housing barns, such barns are usually not fully enclosed and do not include any systems for the collection of emissions. In addition, the airflow requirements for dairy cows are extremely high, primarily for herd health reasons. Airflow requirements are expected to be even higher in places such as the San Joaquin Valley, where daytime temperatures can

exceed 110 degrees Fahrenheit for prolonged periods during the summer months. Given the high air flow rates that will be involved, collection and control of the exhaust from housing barns is not only impractical but also cost prohibitive. The District therefore determines that emissions from housing barns cannot reasonably be captured, and are to be considered fugitive.

Manure Storage Areas

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

Land Application

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

Feed Storage and Handling

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

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

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

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

As previously stated, emissions from liquid manure lagoons and storage ponds have already been determined to be non-fugitive. The facility's non-fugitive stationary source potential emissions are summarized in the following table:

Non-Fugitive SSPE2 (lb/year)						
Category	**NO_X**	**SO_X**	**PM_{10}**	**CO**	**VOC**	**H_2S**
C-7180-8-0 - Lagoon only	0	0	0	0	3,101[9]	471
Non-Fugitive SSPE2	**0**	**0**	**0**	**0**	**3,101**	**471**

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

Rule 2201 Major Source Determination						
Category	**NO_X**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**	**CO**	**VOC**
SSPE1 (lb/yr)	0	0	0	0	0	0
SSPE2 (lb/yr)	0	0	0	0	0	3,101
Major Source Threshold (lb/yr)	20,000	140,000	140,000	140,000	200,000	20,000
Major Source? (Y/N)	N	N	N	N	N	N

Note: $PM_{2.5}$ assumed to be equal to PM_{10}

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

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

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

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

[9] From Appendix C - 'Post-Project Potential to Emit (PE2)' sheet.

The PSD major source determination is summarized in the following table:

PSD Major Source Determination						
Category	**NO_2**	**VOC**	**SO_2**	**CO**	**PM**	**PM_{10}**
Estimated facility PE before project increase (tpy)	0	0	0	0	0	0
PSD major source threshold (tpy)	250	250	250	250	250	250
PSD major source? (Y/N)	N	N	N	N	N	N

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

6. Baseline Emissions (BE)

The BE calculations are performed, pollutant by pollutant, for each emissions unit involved in the project. The BE are subsequently used to calculate the quarterly net emissions change (QNEC), and if applicable, to determine the amount of offsets required.

Pursuant to District Rule 2201, BE = PE1 for:

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

Otherwise,

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

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

7. SB 288 Major Modification

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

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

8. Federal Major Modification

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

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

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

Rule 2410 applies to any pollutant regulated under the Clean Air Act, except those for which the District has been classified nonattainment. The pollutants which must be addressed in the PSD applicability determination for sources located in the San Joaquin Valley and which are involved in this project are:[10]

- PM
- PM_{10}
- Hydrogen sulfide (H_2S)
- Total reduced sulfur (inlcuding H_2S)

Project Emissions Increase - New Major Source Determination

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

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

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

PSD Applicability Determination - New Major Source				
Category	**PM**	**PM_{10}**	**H_2S**	**S**
Total PE from new and modified units (tpy)	0	0	0.2	0.2
PSD major source threshold (tpy)	250	250	250	250
New PSD major source? (Y/N)	N	N	N	N

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

10. Quarterly Net Emissions Change (QNEC)

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

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

VIII. Compliance

Rule 1070 Inspections

This rule applies to any source operation which emits or may emit air contaminants. The rule requires the District to perform inspections for the purpose of obtaining information necessary to determine whether air pollution sources are in compliance with applicable rules and regulations. The rule also authorizes the District to require record keeping, to make inspections and to conduct tests of air pollution sources. The following conditions will be placed on the ATC permits to ensure compliance:

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

- {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]

Rule 2010 Permits Required

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

Pursuant to Section 3.0, any person building, altering or replacing any operation, article, machine, equipment, or other contrivance, the use of which may cause the issuance of air contaminants or the use of which may eliminate or reduce or control the issuance of air contaminants, shall first obtain authorization for such construction from the APCO. An Authority to Construct shall remain in effect until the Permit to Operate the source operation for which the application was filed is granted or denied, or the application is canceled as described in Rule 2050 (Cancellation of Application).

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

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

Rule 2201 New and Modified Stationary Source Review Rule

A. Best Available Control Technology (BACT)

1. BACT Applicability

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

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

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

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

The applicant is proposing a new dairy operation. As shown in Appendix D, BACT is triggered for the following new emissions units:

- Milking parlor: VOC
- Freestall Barn 1, Special Needs Freestall Barn, and Freestall Barns 3 through 8: VOC and NH_3
- Dry Cow Pens 1 and 2: VOC and NH_3
- Heifer Pens 1 through 6: NH_3
- Liquid manure storage: VOC and NH_3
- Liquid manure land application: VOC and NH_3
- Solid manure storage: VOC and NH_3
- Solid manure land application: VOC and NH_3
- Silage: VOC
- TMR: VOC

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

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

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

As discussed in Section I of this evaluation, there are no modified emissions units associated with this project. BACT is therefore not triggered under this category.

d. SB 288/Federal Major Modification

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

2. Top-Down BACT Analysis

Per Permit Services policies and procedures for BACT, a top-down BACT analysis shall be performed as a part of the application review for each application subject to the BACT requirements pursuant to the District's NSR rule.

Pursuant to the attached top-down BACT analysis (Appendix F), BACT has been satisfied with the following:

Milking parlor

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

Cow Housing

Freestall Barn 1, Special Needs Freestall Barn, Freestall Barns 3 through 8, Dry Cow Pen 1, and Dry Cow Pen 2

VOC: 1) Concrete feed lanes and walkways;

2) Flushing the feed lanes and walkways for mature cows four times per day and flushing feed lanes and walkways for the remaining animals once per day;

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

4) Properly sloping corrals/exercise pens (minimum slope of 3% where the available space for each animal is 400 square feet or less and 1.5% where the available space for each animal is more than 400 square feet) or managing corrals/exercise pens to maintain a dry surface;

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

6) VOC mitigation measures required by District Rule 4570.

Freestall Barn 1, Special Needs Freestall Barn, Freestall Barns 3 through 8, Dry Cow Pen 1, Dry Cow Pen 2, and Heifer Pens 1 through 6

NH3: 1) Concrete feed lanes and walkways;

2) Flushing the feed lanes and walkways for mature cows four times per day and flushing feed lanes and walkways for the remaining animals once per day;

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

4) Properly sloping corrals/exercise pens (minimum slope of 3% where the available space for each animal is 400 square feet or less and 1.5% where the available space for each animal is more than 400 square feet) or managing corrals/exercise pens to maintain a dry surface; and

5) Scraping corrals and exercise pens every two weeks using a pull-type scraper in the morning hours except when prevented by wet weather.

Liquid Manure Handling System

Lagoon/Storage Pond

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

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

Land Application

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

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

Solid Manure Handling Operation

Storage Piles

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

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

Land Application

VOC: 1) Rapid incorporation of solid manure into the soil after land application.

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

Feed Storage and Handling Operation

Silage:

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

TMR:

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

B. Offsets

1. Offset Applicability

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

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

Offset Determination (lb/year)					
	NO_X	SO_X	PM_{10}	CO	VOC
SSPE2	0	0	13,803	0	109,993
Offset Thresholds	20,000	54,750	29,200	200,000	20,000
Offsets triggered?	No	No	No	No	Yes

2. Quantity of Offsets Required

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

C. Public Notification

1. Applicability

Public noticing is required for:

a. New major sources, federal major modifications, and SB 288 major modifications,

b. Any new emissions unit with a potential to emit greater than 100 pounds during any one day for any one pollutant,

c. Any project which results in the offset thresholds being surpassed,

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

e. Any project which results in a Title V significant permit modification.

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

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

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

b. PE > 100 lb/day

Applications which include a new emissions unit with a PE greater than 100 pounds during any one day for any pollutant will trigger public noticing requirements. As shown in Appendix C of this evaluation, this project includes a new emissions unit (TMR) with a PE > 100 lb/day. Public noticing for PE > 100 lb/day purposes is therefore required.

c. Offset Thresholds

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

Offset Thresholds				
Pollutant	**SSPE1 (lb/yr)**	**SSPE2 (lb/yr)**	**Offset Threshold (lb/yr)**	**Public Notice Required?**
NO_X	0	0	20,000	No
SO_X	0	0	54,750	No
PM_{10}	0	13,803	29,200	No
CO	0	0	200,000	No
VOC	0	109,993	20,000	Yes
NH_3	0	114,902	N/A	No
H_2S	0	471	N/A	No

As shown in the preceding table, the offset threshold for VOC has been surpassed due to this project; therefore public noticing is triggered under this category.

d. SSIPE > 20,000 lb/year

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

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

SSIPE Public Notice Thresholds					
Pollutant	**SSPE2 (lb/yr)**	**SSPE1 (lb/yr)**	**SSIPE (lb/yr)**	**Public Notice Threshold (lb/yr)**	**Public Notice Required?**
NO_x	0	0	0	20,000	No
SO_x	0	0	0	20,000	No
PM_{10}	13,803	0	13,803	20,000	No
CO	0	0	0	20,000	No
VOC	109,993	0	109,993	20,000	Yes
NH_3	114,902	0	114,902	20,000	Yes
H_2S	471	0	471	20,000	No

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

e. Title V Significant Permit Modification

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

2. Public Notice Action

As discussed above, public notice is required for this project. Public notice documents will be submitted to the California Air Resources Board (CARB) and a public notice will be published in a local newspaper of general circulation in Madera County prior to the issuance of the ATC permits.

D. Daily Emission Limits (DELs)

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 based on the numbers and age categories of the cows in the permitted herd, as well as conditions enforcing BACT requirements. The following DEL conditions also enforce project design specifications proposed by the applicant for compliance with the ambient air quality standard for PM_{10}.

Proposed DEL Conditions:

Milking Operation

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

Cow Housing

- {modified 4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 2201]
- {modified 4486} Permittee shall pave feed lanes for a width of at least 8 feet along the corral side of the feed lane fence for milk and dry cows and at least 6 feet along the corral side of the feed lane fence for support stock. [District Rules 2201 and 4570]
- {modified 4487} For Freestall Barn 1, Special Needs Freestall Barn, Freestall Barns 3 through 8, Dry Cow Pen 1, Dry Cow Pen 2, and Heifer Pens 1 through 6, permittee shall flush lanes at least four times per day for mature cows and at least once per day for support stock. [District Rules 2201 and 4570]
- {modified 4508} For Heifer Pens 7 through 23, permittee shall scrape, vacuum or flush concrete lanes in corrals at least once every day for mature cows and every seven (7) days for support stock. [District Rules 2201 and 4570]
- {modified 4492} Permittee shall remove manure that is not dry from individual cow freestall beds or shall rake, harrow, scrape, or grade freestall bedding at least once every seven (7) days. [District Rules 2201 and 4570]
- {modified 4499} Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rules 2201 and 4570]
- {modified 4501} Permittee shall clean manure from corrals at least four (4) times per year with at least sixty (60) days between cleanings; or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]
- {modified 4554} Permittee shall implement at least one of the following mitigation measures: 1) slope the surfaces of the corrals and exercise pens at least 3% where the available space for each animal is 400 square feet or less and at least 1.5% where

the available space for each animal is more than 400 square feet; 2) maintain corrals and exercise pens to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape corrals and exercise pens sufficiently to maintain a dry surface, except during periods of wet weather. [District Rules 2201 and 4570]

- Permittee shall scrape corral and exercise pen surfaces every two weeks using a pull-type scraper during morning hours, except when prevented by wet weather. [District Rule 2201]
- Each open corral shall have at least one shade structure. [District Rule 2201]
- {modified 4515} Shade structures shall be installed in any of the following ways: 1) constructed with a light permeable roofing material; 2) installed uphill of any slope in the corral; or 3) installed so that the structure has a north/south orientation. Alternatively, permittee shall clean manure from under the shade structures at least once every fourteen (14) days, when weather permits access into the corrals. [District Rules 2201 and 4570]
- {modified 4520} Permittee shall knock down fence line manure build-up prior to it exceeding a height of twelve (12) inches at any time or point. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corrals becoming accessible. [District Rules 2201 and 4570]
- For all heifers, at least one of the daily feedings shall be done near dusk (i.e. within 1 hour of dusk). [District Rule 2201]
- {modified 4671} The number of calves may exceed the value stated in the equipment description as long as the total support stock (heifers, bulls, and calves) does not exceed the combined value stated in the equipment description, and there is no increase in the number of hutches or corrals. [District Rule 2201] N
- For Heifer Pens 1 – 14, the permittee shall install, operate, and maintain a sprinkler system designed to sprinkle water uniformly over all unpaved areas of the corrals. The sprinkling rate shall match the local wet soil evaporation rate (70-80% of the local wet pan evaporation rate) to maintain sufficient moisture content on the corral surfaces. Corral sprinkling shall not be required during wet weather. [District Rule 2201]
- Permittee shall establish windbreaks along the entire lengths of the eastern and southern boundaries of the dairy site. Windbreaks shall consist of the following rows, with the first row closest to the dairy site: one row of Arizona cypress trees, spaced 10 feet apart; and one row of Chinese pistache trees, spaced 14 feet apart. Trees in adjacent rows should be offset from each other. Spacing between rows shall be sufficient to accommodate cultivation equipment, but shall not exceed 24 feet. Any alternative windbreak proposal must be pre-approved by the District. [District Rule 2201]
- Trees initially planted as part of the windbreaks shall have a minimum container size of five gallons. [District Rule 2201]

- Windbreaks shall be irrigated and maintained for survivability and rapid growth. Dead trees shall be replaced as necessary to maintain a windbreak density of 65%. [District Rule 2201]
- Density is the percentage of the background view that is obscured or hidden when viewing through the windbreak from 60 ft to 100 ft upwind of the rows. [District Rule 2201]

Liquid Manure

- {modified 4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 2201]
- All liquid manure shall be treated in an anaerobic treatment lagoon system that is designed and operated according to the Natural Resources Conservation Service (NRCS) Field Office Technical Guide No. 359. [District Rule 2201]
- {modified 4538} Permittee shall remove solids with a solids separation system prior to the manure entering the lagoon. [District Rules 2201 and 4570]
- Any liquid manure applied to land shall have been treated in an anaerobic treatment lagoon system that is designed and operated according to the NRCS Field Office Technical Guide No. 359. [District Rule 2201]
- {modified 4550} Permittee shall not allow liquid manure to stand in the fields for more than twenty-four (24) hours after irrigation. [District Rules 2201 and 4570]

Solid Manure

- {modified 4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 2201]
- {modified 4526} Within seventy-two (72) hours of removal of solid manure from housing, permittee shall either 1) remove dry manure from the facility, or 2) cover dry manure outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed twenty-four (24) hours per event. [District Rule 4570]
- {modified 4541} Solid manure shall be incorporated into the soil within two hours of land application. [District Rules 2201 and 4570]

Feed

- {modified 4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
- {modified 4456} Permittee shall push feed so that it is within three feet of the feed lane fences within two hours of putting out the feed, or use feed troughs or other feeding structures designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]

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

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

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

- {modified 4468} For bagged silage/feedstuff, permittee shall utilize a sealed feed storage system (e.g., ag bag). [District Rules 2201 and 4570]

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

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

- {modified 4474} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall harvest corn used for the pile at an average moisture content of at least 65% and harvest other silage crops for the pile at an average moisture content of at least 60%. [District Rules 2201 and 4570]

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

not exceeding 1.0 inch, 4) Other silage crops: TLC not exceeding 1/2 inch. [District Rules 2201 and 4570]

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

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

E. Compliance Assurance

1. Source Testing

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

2. Monitoring

No monitoring requirements are applicable to the proposed project.

3. Recordkeeping

Recordkeeping is required to demonstrate compliance with the offset, public notification, and DEL requirements of Rule 2201. The following conditions will be placed on the ATC permits to enforce the applicable recordkeeping requirements:

Milking Operation

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

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

Cow Housing

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

- {modified 4488} Permittee shall maintain records sufficient to demonstrate the frequency at which lanes in Freestall Barn 1, Special Needs Freestall Barn, Freestall Barns 3 through 8, Dry Cow Pen 1, Dry Cow Pen 2, and Heifer Pens 1 through 6 are flushed. [District Rules 2201 and 4570]

- {modified 4556} For Heifer Pens 7 through 23, permittee shall maintain records demonstrating that concrete lanes in corrals are scraped, vacuumed, or flushed at least once every day for mature cows and at least once every seven (7) days for support stock. [District Rules 2201 and 4570]

- {modified 4493} Permittee shall record either of the following: 1) the dates on which manure that is not dry is removed from individual cow freestall beds, or 2) the dates on which freestall bedding is raked, harrowed, scraped, or graded. [District Rules 2201 and 4570]

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

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

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

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

- {modified 4516} For compliance using shade structures constructed with a light permeable roofing material, permittee shall maintain records, such as design

specifications, demonstrating that the shade structures are equipped with such roofing material. For compliance by cleaning the manure from under the shade structures, permittee shall maintain records demonstrating that manure is cleaned from under the shade structures at least once every fourteen (14) days, as long as weather permits access into corrals. [District Rules 2201 and 4570]

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

- Permittee shall maintain records of the feeding schedules for heifers. [District Rule 2201]

- Permittee shall maintain records, or similar documentation, of the local evaporation rates. [District Rule 2201]

- Permittee shall maintain records of the daily amount of water (inches or cm) applied to the corral surfaces. Records of sprinkler run times and flow rates may be used to satisfy this requirement. [District Rule 2201]

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

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

Liquid Manure

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

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

- Permittee shall maintain records to demonstrate that liquid manure applied to land has been treated in an anaerobic treatment lagoon system that is designed and operated according to the NRCS Field Office Technical Guide No. 359. [District Rule 2201]

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

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

Solid Manure

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

- {modified 4527} Permittee shall keep records of dates when manure is removed from the facility or permittee shall maintain records to demonstrate that dry manure piles outside the pens are covered with a weatherproof covering from October through May. [District Rules 2201 and 4570]

- {modified 4528} If weatherproof coverings are used, permittee shall maintain records, such as manufacturer warranties or other documentation, demonstrating that the weatherproof coverings over dry manure are installed, used, and maintained in accordance with manufacturer recommendations and applicable standards listed in NRCS Field Office Technical Guide Code 313 or 367, or any other applicable standard approved by the APCO, ARB, and EPA. [District Rules 2201 and 4570]

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

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

Feed

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

- {modified 4457} Permittee shall maintain an operating plan or records demonstrating that feed is pushed within three feet of the feed lane fences within two hours of putting out the feed; or that feed troughs or other structures designed to maintain feed within reach of the animals are used. [District Rules 2201 and 4570]

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

- {modified 4461} Permittee shall maintain records demonstrating that grain is/was stored in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]
- {4465} Permittee shall maintain records demonstrating that uneaten wet feed was removed from feed bunks within twenty-four (24) hours after the end of a rain event. [District Rules 2201 and 4570]
- {modified 4470} Permittee shall maintain records of the thickness and type of cover used to cover each silage pile. Permittee shall also maintain records of the date of the last delivery of material to each silage pile and the date each pile is covered. [District Rules 2201 and 4570]
- {modified 4472} For each silage pile that Option 1 (Measured Bulk Density) is chosen as a mitigation measure for building the pile, records of the measured bulk density shall be maintained. [District Rules 2201 and 4570]
- {modified 4473} For each silage pile that Option 2 (Bulk Density Determined by Spreadsheet) is chosen as a mitigation measure for building the pile, records of the filling parameters entered into the District-approved spreadsheet to determine the bulk density shall be maintained. [District Rules 2201 and 4570]
- {modified 4475} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records of the average percent moisture of crops harvested for silage shall be maintained. [District Rules 2201 and 4570]
- {modified 4477} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records that equipment used to harvest crops for the pile was set to the required TLC and roller opening for the type of crop harvested shall be maintained. [District Rules 2201 and 4570]
- {modified 4479} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall maintain a plan that requires that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rules 2201 and 4570]
- {modified 4481} If Option 1 (Limiting Exposed Area of Silage) is chosen as a mitigation measure for managing silage piles, the permittee shall calculate and record the maximum (largest part of pile) total exposed area of each silage pile. Records of the maximum calculated area shall be maintained. [District Rules 2201 and 4570]
- {modified 4482} For each silage pile that Option 2 (Shaver/Facer or Smooth Face) is chosen as a mitigation measure for managing the pile, the permittee shall maintain records that a shaver/facer was used to remove silage from the pile or shall visually inspect the pile at least daily to verify that the working face was smooth and maintain records of the visual inspections. [District Rules 2201 and 4570]

- {modified 4483} For each silage pile that Option 3 (Silage Additives) is chosen as a mitigation measure for managing the pile, records shall be maintained of the type additive (e.g. inoculants, preservative, other District & EPA-approved additive), the quantity of the additive applied to the pile, and a copy of the manufacturer's instructions for application of the additive. [District Rules 2201 and 4570]
- {modified 4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

4. Reporting

No reporting is required for the proposed project.

F. Ambient Air Quality Analysis (AAQA)

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

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

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

Rule 2410 Prevention of Significant Deterioration

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

Rule 2520 Federally Mandated Operating Permits

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

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

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

Newly constructed facilities or reconstructed units or sources at existing facilities are subject to preconstruction review requirements if they have the potential to emit hazardous air pollutants (air toxics) in "major" amounts (10 tons or more of an individual pollutant or 25 tons or more of a combination of pollutants) and the new units are not already subject to a standard

promulgated under Section 112(d), 112(j), or 112(h) of the Clean Air Act." Facilities or sources subject to Rule 2550 would be subject to stringent air pollution control requirements, referred to as Maximum Achievable Control Technology (MACT).

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

Hazardous Air Pollutant Emissions from Dairies		
HAP	**Emission Rate lb/milk cow-yr**	**Source**
Methanol	1.35	UC Davis - *VOC Emission from Dairy Cows and their Excreta,* 2005
Carbon disulfide	0.027	Dr. Schmidt - *Dairy Emissions using Flux Chambers (Phase I & II)*, 2005
Ethylbenzene	0.003	
o-Xylene	0.005	
1,2-Dibromo-3chloropropane	0.011	
1,2,4-Trichlorobenzene	0.025	
Naphthalene	0.012	
Hexachlorobutadiene	0.012	
Formaldehyde	0.005	
Acetaldehyde	0.029	
Chloroform	0.017	California State University Fresno (CSUF) - *Monitoring and Modeling of ROG at California Dairies*, 2005
Styrene	0.01	
Vinyl acetate[12]	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[13]	0.162	
Cadmium	0.009	Air Resources Board's Profile No. 423, Livestock Operations Dust
Hexavalent Chromium	0.004	
Nickel	0.026	
Arsenic	0.005	
Cobalt	0.003	
Lead	0.033	
Total	**1.828**	

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

[12] 0.01 + 0.07 = 0.08 lbs/hd-yr.
[13] 0.012 + 0.15 = 0.162 lbs/hd-yr.

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

HAPs Emissions Calculations						
Category	Number of cows		Emission Rate lb/cow-yr[14]		Emissions	
					lb/yr	tons/yr
Milking Cows	2,880	x	1.828	=	5,265	2.63
Dry Cows	664	x	1.123	=	746	0.37
Support Stock	2,845	x	0.786	=	2,236	1.12
Calves (0 - 3 mon)	135	x	0.584	=	79	0.04
				Total =	**8,326**	**4.16**

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

Rule 4101 Visible Emissions

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

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

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

Rule 4102 Nuisance

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

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

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

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

An HRA is not required for a project with a total facility prioritization score of less than one. According to the Risk Management Review (RMR) summary in Appendix G of this

[14] The emission rate total has been adjusted for each cow category using ratios based on manure production rates.

evaluation, the proposed project's total prioritization score, including the proposed project, is greater than one. An HRA was therefore required to determine the short-term acute and long-term chronic exposure risk.

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

HRA Summary		
Permit Unit	**Cancer Risk**	**T-BACT Required?**
C-7180-6-0	1.52E-08	No
C-7180-7-0	8.28E-09	No
C-7180-8-0	6.61E-07	No
C-7180-9-0	N/A	No
C-7180-10-0	N/A	No

T-BACT

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

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

Rule 4550 Conservation Management Practices (CMP)

This rule applies to agricultural operation sites located within the San Joaquin Valley air basin. The purpose of the rule is to limit fugitive dust emissions from agricultural operation sites. Pursuant to Section 5.1, effective on and after July 1, 2004, an owner/operator shall implement the applicable CMPs selected pursuant to Section 6.2 for each agricultural operation site.

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

This facility received District approval for its current CMP plan in 2011. The proposed project does not involve any changes or modifications to the previously approved CMP plan. Continued compliance with the requirements of this rule is therefore expected.

Rule 4570 Confined Animal Facilities (CAF)

This rule applies to CAF operations located within the San Joaquin Valley air basin. The purpose of the rule is to limit VOC emissions through the implementation of various mitigation measures for each emissions unit.

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

Pursuant to Section 5.1.2, a thirty-day public noticing and commenting period shall be required for all large CAFs receiving their initial Permit to Operate or ATC permits.

The applicant has submitted an application that is consistent with all the requirements of this rule. Since public noticing is required for this project, a public notice will be published in a local newspaper of general circulation prior to the issuance of the ATC permits.

Pursuant to Section 5.1.3, owners/operators shall submit a facility emissions mitigation plan as part of the permit application. The mitigation plan shall contain the following information:

- The name, business address, and phone number of the owners/operators responsible for the preparation and the implementation of the mitigation measures listed in the mitigation plan.
- The signature of the owners/operators attesting to the accuracy of the information provided and adherence to implementing the activities specified in the mitigation plan at all times and the date that the application was signed.
- A list of all the mitigation measures chosen for compliance with the requirements of the rule.

Pursuant to Section 5.1.4, the permit application shall include the following information, which is in addition to the facility's emission mitigation plan:

- The maximum number of animals at the facility in each production stage (facility capacity).
- Any other information necessary for the District to prepare an emission inventory of all regulated air pollutants emitted from the facility as determined by the APCO.

Pursuant to Section 5.1.5, the approved mitigation measures from the facility's mitigation plan will be listed on the permits as permit conditions.

Pursuant to Section 5.1.6, the District shall act upon the permit application within six (6) months of receiving a complete application.

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

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

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

- It is determined by a licensed veterinarian, certified nutritionist, CDFA, or USDA that any mitigation measure being suspended is detrimental to animal health or necessary for the

animal to molt, and a signed written copy of this determination shall be retained on-site and made available for inspection upon request.

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

The following condition will be placed on the permits to ensure compliance with the requirements of this section:

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

Pursuant to Section 5.6.1, an owner/operator of a medium or large Dairy CAF shall comply with the Phase II mitigation measures listed in Table 4.1. Recordkeeping requirements associated with these mitigation measures are outlined in Sections 7.3 through 7.8.

The mitigation measures selected by the applicant, together with the corresponding permit conditions, are summarized below by emissions unit category:

Feed Mitigation Measures - TMR

Feed according to National Research Council (NRC) guidelines.

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

or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]

Push feed so that it is within three (3) feet of the feed lane fences within two hours of putting out the feed, or use feed troughs or other feeding structures designed to maintain feed within reach of the animals.

- {modified 4456} Permittee shall push feed so that it is within three feet of the feed lane fences within two hours of putting out the feed, or use feed troughs or other feeding structures designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]

- {modified 4457} Permittee shall maintain an operating plan or records demonstrating that feed is pushed within three feet of the feed lane fences within two hours of putting out the feed; or that feed troughs or other structures designed to maintain feed within reach of the animals are used. [District Rules 2201 and 4570]

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

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

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

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

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

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

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

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

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

Feed Mitigation Measures - Silage

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

- {modified 4468} For bagged silage/feedstuff, permittee shall utilize a sealed feed storage system (e.g., ag bag). [District Rules 2201 and 4570]

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

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

- {modified 4470} Permittee shall maintain records of the thickness and type of cover used to cover each silage pile. Permittee shall also maintain records of the date of the last delivery of material to each silage pile and the date each pile is covered. [District Rules 2201 and 4570]

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

- Harvest silage crop at ≥ 65% moisture for corn; and ≥ 60% moisture for alfalfa/grass and other silage crops.

- Manage silage material delivery such that no more than six (6) inches of materials are un-compacted on top of the pile.

- Incorporate the following parameters for Theoretical Length of Chop (TLC) and roller opening, as applicable, for the crop being harvested:

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

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

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

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

- {modified 4474} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall harvest corn used for the pile at an average moisture content of at least 65% and harvest other silage crops for the pile at an average moisture content of at least 60%. [District Rules 2201 and 4570]

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

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

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

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

- {modified 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 Rules 2201 and 4570]

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

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

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

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

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

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

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

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

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

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

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

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

Milking Parlor

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

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

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

Cow Housing - Freestall Barns

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

- {modified 4486} Permittee shall pave feed lanes for a width of at least 8 feet along the corral side of the feed lane fence for milk and dry cows and at least 6 feet along the corral side of the feed lane fence for support stock. [District Rules 2201 and 4570]

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

- {modified 4487} For Freestall Barn 1, Special Needs Freestall Barn, Freestall Barns 3 through 8, Dry Cow Pen 1, Dry Cow Pen 2, and Heifer Pens 1 through 6, permittee shall

flush lanes at least four times per day for mature cows and at least once per day for support stock. [District Rules 2201 and 4570]

- {modified 4488} Permittee shall maintain records sufficient to demonstrate the frequency at which lanes in Freestall Barn 1, Special Needs Freestall Barn, Freestall Barns 3 through 8, Dry Cow Pen 1, Dry Cow Pen 2, and Heifer Pens 1 through 6 are flushed. [District Rules 2201 and 4570]

For large dairies only (1,000 milk cows or more) - 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.

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

- {modified 4493} Permittee shall record either of the following: 1) the dates on which manure that is not dry is removed from individual cow freestall beds, or 2) the dates on which freestall bedding is raked, harrowed, scraped, or graded. [District Rules 2201 and 4570]

Cow Housing – Open Corrals

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

- {modified 4486} Permittee shall pave feed lanes for a width of at least 8 feet along the corral side of the feed lane fence for milk and dry cows and at least 6 feet along the corral side of the feed lane fence for support stock. [District Rules 2201 and 4570]

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

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

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

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

- {modified 4501} Permittee shall clean manure from corrals at least four (4) times per year with at least sixty (60) days between cleanings; or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]

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

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

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

- {modified 4555} Permittee shall either 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; or 2) maintain records of the dates on which corrals and exercise pens are groomed (i.e. harrowed, raked, or scraped, etc.). [District Rules 2201 and 4570]

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

- {modified 4508} For Heifer Pens 7 through 23, permittee shall scrape, vacuum or flush concrete lanes in corrals at least once every day for mature cows and every seven (7) days for support stock. [District Rules 2201 and 4570]

- {modified 4556} For Heifer Pens 7 through 23, permittee shall maintain records demonstrating that concrete lanes in corrals are scraped, vacuumed, or flushed at least once every day for mature cows and at least once every seven (7) days for support stock. [District Rules 2201 and 4570]

Clean manure from under corral shades at least once every fourteen (14) days, when weather permits access into the corrals.

- {modified 4515} Shade structures shall be installed in any of the following ways: 1) constructed with a light permeable roofing material; 2) installed uphill of any slope in the corral; or 3) installed so that the structure has a north/south orientation. Alternatively, permittee shall clean manure from under the shade structures at least once every fourteen (14) days, when weather permits access into the corrals. [District Rules 2201 and 4570]

- {modified 4516} For compliance using shade structures constructed with a light permeable roofing material, permittee shall maintain records, such as design specifications, demonstrating that the shade structures are equipped with such roofing material. For compliance by cleaning the manure from under the shade structures, permittee shall maintain records demonstrating that manure is cleaned from under the shade structures at least once every fourteen (14) days, as long as weather permits access into corrals. [District Rules 2201 and 4570]

Knock down fence line manure build-up prior to it exceeding a height of twelve (12) inches at any time or point. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. The facility must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible.

- {modified 4520} Permittee shall knock down fence line manure build-up prior to it exceeding a height of twelve (12) inches at any time or point. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corrals becoming accessible. [District Rules 2201 and 4570]

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

Solid Manure

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

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

- {modified 4526} Within seventy-two (72) hours of removal of solid manure from housing, permittee shall either 1) remove dry manure from the dairy, or 2) cover dry manure outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed twenty-four (24) hours per event. [District Rules 2201 and 4570]

- {modified 4527} Permittee shall maintain records of dates on which manure is removed from the dairy; or maintain records to demonstrate that dry manure piles outside the housing are covered with a weatherproof covering from October through May. [District Rules 2201 and 4570]

- {modified 4528} Permittee shall maintain records, such as manufacturer warranties or other documentation, demonstrating that the weatherproof covering over dry manure are installed, used, and maintained in accordance with manufacturer recommendations and applicable standards listed in NRCS Field Office Technical Guide Code 313 or 367, or any other applicable standard approved by the APCO, ARB, and EPA. [District Rules 2201 and 4570]

Liquid Manure

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

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

Land Application – Solid Manure

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

- {modified 4541} Solid manure shall be incorporated into the soil within two hours of land application. [District Rules 2201 and 4570]
- {modified 4542} Permittee shall maintain records to demonstrate that solid manure has been incorporated into the soil within two hours of land application. [District Rules 2201 and 4570]

Land Application – Liquid Manure

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

- {modified 4550} Permittee shall not allow liquid manure to stand in the fields for more than twenty-four (24) hours after irrigation. [District Rules 2201 and 4570]
- {modified 4551} Permittee shall maintain records to demonstrate that liquid manure did not stand in the fields for more than twenty-four (24) hours after irrigation. [District Rules 2201 and 4570]

Pursuant to Section 7.2, owners/operators shall maintain the following records:

- Copies of all facility permits.
- Records of the number of animals of each species and production group at the facility on a quarterly basis. Examples of records that may be used include, but are not limited to, Dairy Herd Improvement Association records and animal inventories done for financial purposes.
- Records sufficient to demonstrate compliance with all applicable mitigation measures.

Pursuant to Section 7.9, owners/operators of a CAF subject to the requirements of Section 5.0 shall keep and maintain the required records in Sections 7.1 through 7.8.4, as applicable, for a minimum of five (5) years and the records shall be made available to the APCO and EPA upon request.

Therefore, the following conditions will be placed on the permits to ensure compliance with the requirements of this section:

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

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

Based on the preceding analysis, compliance with the requirements of this rule is expected.

California Health and Safety Code §42301.6 (School Notice)

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

California Environmental Quality ACT (CEQA)

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

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

Greenhouse Gas (GHG) Significance Determination

District is a Responsible Agency

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

District CEQA Findings

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

The District is a Responsible Agency for the project because of its discretionary approval power via its Permits rule (Rule 2010) and New Source Review rule (Rule 2201) (CEQA Guidelines §15381). Rule 2010 requires operators of emission sources to obtain an Authority to Construct (ATC) and Permit to Operate (PTO) from the District. Rule 2201 requires that new and modified stationary sources of emissions mitigate their emissions using best available control technology (BACT). As a Responsible Agency, the District complies with CEQA by considering the EIR prepared by the Lead Agency, and by reaching its own conclusion on whether and how to approve the project involved (CEQA Guidelines §15096).

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

Indemnification Agreement/Letter of Credit Determination

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

The proposed project is an operation of potential public concern in the Valley (dairy) and triggers Best Available Control Technology (BACT) requirements. The District has therefore determined that an indemnification agreement and letter of credit are required for this project.

IX. Recommendation

Compliance with all applicable rules and regulations is expected. Pending a successful public noticing period, issue Authority to Construct permits C-7180-6-0, 7-0, 8-0, 9-0, and 10-0; subject to the permit conditions shown on the drafts in in Appendix A.

X. Billing Information

Annual Permit Fees			
Permit Number	**Fee Schedule**	**Fee Description**	**Annual Fee**
C-7180-6-0	3020-06	Milking Operation	$116
C-7180-7-0	3020-06	Cow Housing	$116
C-7180-8-0	3020-06	Liquid Manure Handling System	$116
C-7180-9-0	3020-06	Solid Manure Handling Operation	$116
C-7180-10-0	3020-06	Feed Storage and Handling Operation	$116

XI. Appendices

A: Draft ATC Permits
B: Project Site Plan
C: Emissions Calculations
D: BACT Calculations
E: BACT Guidelines
F: BACT Analysis
G: RMR and AAQA Summary
H: Treatment Lagoon Design Check
I: QNEC

Appendix A

Draft ATC Permits

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: C-7180-6-0

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: JOSE SOARES DAIRY
MAILING ADDRESS: PO BOX 189
DELHI, CA 95315

LOCATION: 1.5 MILES SOUTH OF AVENUE 21 ON ROAD 1
DOS PALOS, CA

EQUIPMENT DESCRIPTION:
2,880 COW MILKING OPERATION WITH ONE 72 STALL CAROUSEL MILKING PARLOR

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 flush or hose down the milking parlor immediately prior to, immediately after, or during each milking. [District Rules 2201 and 4570]
5. Permittee shall provide verification that the milking parlor is flushed or hosed down immediately prior to, immediately after, or during each milking. [District Rules 2201 and 4570]
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 Rules 2201 and 4570]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (559) 230-5950 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT. This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Seyed Sadredin, Executive Director / APCO

Arnaud Marjollet, Director of Permit Services
C-7180-6-0 : Dec 28 2016 9:56AM – AIYABEIJ : Joint Inspection NOT Required

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

PERMIT NO: C-7180-7-0

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: JOSE SOARES DAIRY
MAILING ADDRESS: PO BOX 189
DELHI, CA 95315

LOCATION: 1.5 MILES SOUTH OF AVENUE 21 ON ROAD 1
DOS PALOS, CA

EQUIPMENT DESCRIPTION:
COW HOUSING - 2,880 MILK COWS, NOT TO EXCEED A COMBINED TOTAL OF 3,544 MATURE COWS (MILK AND DRY); 2,845 SUPPORT STOCK (HEIFERS AND BULLS); 135 CALVES (0 - 3 MONTHS OLD) IN ON-GROUND HUTCHES; 7 FREESTALL BARNS, AND 1 SPECIAL NEEDS FREESTALL BARN, WITH A FLUSH/SCRAPE SYSTEM

CONDITIONS

1. This Authority to Construct (ATC) shall be implemented concurrently with ATCs C-7180-8-0, 9-0, and 10-0. [District Rule 2201]
2. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
3. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
4. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
5. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (559) 230-5950 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT. This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Seyed Sadredin, Executive Director / APCO

Arnaud Marjollet, Director of Permit Services
C-7180-7-0 Feb 6 2017 8:02AM – AIYABEIJ Joint Inspection NOT Required

6. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rule 2201]
7. Permittee shall pave feed lanes for a width of at least 8 feet along the corral side of the feed lane fence for milk and dry cows and at least 6 feet along the corral side of the feed lane fence for support stock. [District Rules 2201 and 4570]
8. For Freestall Barn 1, Special Needs Freestall Barn, Freestall Barns 3 through 8, Dry Cow Pen 1, Dry Cow Pen 2, and Heifer Pens 1 through 6, permittee shall flush lanes at least four times per day for mature cows and at least once per day for support stock. [District Rules 2201 and 4570]
9. Permittee shall maintain records sufficient to demonstrate the frequency at which lanes in Freestall Barn 1, Special Needs Freestall Barn, Freestall Barns 3 through 8, Dry Cow Pen 1, Dry Cow Pen 2, and Heifer Pens 1 through 6 are flushed. [District Rules 2201 and 4570]
10. For Heifer Pens 7 through 23, permittee shall scrape, vacuum or flush concrete lanes in corrals at least once every day for mature cows and every seven (7) days for support stock. [District Rules 2201 and 4570]
11. For Heifer Pens 7 through 23, permittee shall maintain records demonstrating that concrete lanes in corrals are scraped, vacuumed, or flushed at least once every day for mature cows and at least once every seven (7) days for support stock. [District Rules 2201 and 4570]
12. Permittee shall remove manure that is not dry from individual cow freestall beds or shall rake, harrow, scrape, or grade freestall bedding at least once every seven (7) days. [District Rules 2201 and 4570]
13. Permittee shall record either of the following: 1) the dates on which manure that is not dry is removed from individual cow freestall beds, or 2) the dates on which freestall bedding is raked, harrowed, scraped, or graded. [District Rules 2201 and 4570]
14. Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rules 2201 and 4570]
15. Permittee shall maintain records demonstrating that water pipes and troughs are inspected and leaks are repaired at least once every seven (7) days. [District Rules 2201 and 4570]
16. Permittee shall clean manure from corrals at least four (4) times per year with at least sixty (60) days between cleanings; or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]
17. Permittee shall demonstrate that manure from corrals is cleaned at least four (4) times per year with at least sixty (60) days between cleanings; or demonstrate that corrals are cleaned at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]
18. Permittee shall implement at least one of the following mitigation measures: 1) slope the surfaces of the corrals and exercise pens at least 3% where the available space for each animal is 400 square feet or less and at least 1.5% where the available space for each animal is more than 400 square feet; 2) maintain corrals and exercise pens to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape corrals and exercise pens sufficiently to maintain a dry surface, except during periods of wet weather. [District Rules 2201 and 4570]
19. Permittee shall either 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; or 2) maintain records of the dates on which corrals and exercise pens are groomed (i.e. harrowed, raked, or scraped, etc.). [District Rules 2201 and 4570]
20. Permittee shall scrape corral and exercise pen surfaces every two weeks using a pull-type scraper during morning hours, except when prevented by wet weather. [District Rule 2201]
21. Permittee shall maintain sufficient records to demonstrate that corral and exercise pen surfaces are scraped every two weeks using a pull-type scraper during morning hours, except when prevented by wet conditions. [District Rule 2201]
22. Each open corral shall have at least one shade structure. [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

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

24. For compliance using shade structures constructed with a light permeable roofing material, permittee shall maintain records, such as design specifications, demonstrating that the shade structures are equipped with such roofing material. For compliance by cleaning the manure from under the shade structures, permittee shall maintain records demonstrating that manure is cleaned from under the shade structures at least once every fourteen (14) days, as long as weather permits access into corrals. [District Rules 2201 and 4570]

25. Permittee shall knock down fence line manure build-up prior to it exceeding a height of twelve (12) inches at any time or point. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corrals becoming accessible. [District Rules 2201 and 4570]

26. Permittee shall measure and document the depth of manure along the fence lines at least once every ninety (90) days. [District Rules 2201 and 4570]

27. For all heifers, at least one of the daily feedings shall be done near dusk (i.e. within 1 hour of dusk). [District Rule 2201]

28. Permittee shall maintain records of the feeding schedules for heifers. [District Rule 2201]

29. The number of calves may exceed the value stated in the equipment description as long as the total support stock (heifers, bulls, and calves) does not exceed the combined value stated in the equipment description, and there is no increase in the number of hutches or corrals. [District Rule 2201]

30. For Heifer Pens 1 - 14, the permittee shall install, operate, and maintain a sprinkler system designed to sprinkle water uniformly over all unpaved areas of the corrals. The sprinkling rate shall match the local wet soil evaporation rate (70-80% of the local wet pan evaporation rate) to maintain sufficient moisture content on the corral surfaces. Corral sprinkling shall not be required during wet weather. [District Rule 2201]

31. Permittee shall maintain records, or similar documentation, of the local evaporation rates. [District Rule 2201]

32. Permittee shall maintain records of the daily amount of water (inches or cm) applied to the corral surfaces. Records of sprinkler run times and flow rates may be used to satisfy this requirement. [District Rule 2201]

33. Permittee shall establish windbreaks along the entire lengths of the eastern and southern boundaries of the dairy site. Windbreaks shall consist of the following rows, with the first row closest to the dairy site: one row of Arizona cypress trees, spaced 10 feet apart; and one row of Chinese pistache trees, spaced 14 feet apart. Trees in adjacent rows should be offset from each other. Spacing between rows shall be sufficient to accommodate cultivation equipment, but shall not exceed 24 feet. Any alternative windbreak proposal must be pre-approved by the District. [District Rule 2201]

34. Trees initially planted as part of the windbreaks shall have a minimum container size of five gallons. [District Rule 2201]

35. Windbreaks shall be irrigated and maintained for survivability and rapid growth. Dead trees shall be replaced as necessary to maintain a windbreak density of 65%. [District Rule 2201]

36. Density is the percentage of the background view that is obscured or hidden when viewing through the windbreak from 60 ft to 100 ft upwind of the rows. [District Rule 2201]

37. 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]

38. 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]

39. {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

PERMIT NO: C-7180-8-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: JOSE SOARES DAIRY
MAILING ADDRESS: PO BOX 189
DELHI, CA 95315

LOCATION: 1.5 MILES SOUTH OF AVENUE 21 ON ROAD 1
DOS PALOS, CA

EQUIPMENT DESCRIPTION:
LIQUID MANURE HANDLING SYSTEM CONSISTING OF PROCESSING PIT(S), MECHANICAL SEPARATOR(S), ONE ANAEROBIC TREATMENT LAGOON (850' X 300' X 20'), AND ONE STORAGE POND; MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION AND FURROW IRRIGATION

CONDITIONS

1. This Authority to Construct (ATC) shall be implemented concurrently with ATCs C-7180-7-0, 9-0, and 10-0. [District Rule 2201]
2. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
3. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
4. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
5. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (559) 230-5950 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT. This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Seyed Sadredin, Executive Director / APCO

Arnaud Marjollet, Director of Permit Services
C-7180-8-0 : Jan 26 2017 1:42PM -- AIYABEIJ : Joint Inspection NOT Required

6. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rule 2201]
7. All liquid manure shall be treated in an anaerobic treatment lagoon system that is designed and operated according to the Natural Resources Conservation Service (NRCS) Field Office Technical Guide No. 359. [District Rule 2201]
8. Permittee shall maintain design specifications and calculations, including minimum treatment volume (MTV) and hydraulic retention time (HRT) calculations, demonstrating that the anaerobic treatment lagoon system meets the requirements listed in the NRCS Field Office Technical Guide No. 359. [District Rule 2201]
9. Permittee shall remove solids with a solids separation system prior to the manure entering the lagoon. [District Rules 2201 and 4570]
10. Any liquid manure applied to land shall have been treated in an anaerobic treatment lagoon system that is designed and operated according to the NRCS Field Office Technical Guide No. 359. [District Rule 2201]
11. Permittee shall maintain records to demonstrate that liquid manure applied to land has been treated in an anaerobic treatment lagoon system that is designed and operated according to the NRCS Field Office Technical Guide No. 359. [District Rule 2201]
12. Permittee shall not allow liquid manure to stand in the fields for more than twenty-four (24) hours after irrigation. [District Rules 2201 and 4570]
13. Permittee shall maintain records to demonstrate that liquid manure did not stand in the fields for more than twenty-four (24) hours after irrigation. [District Rules 2201 and 4570]
14. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]
15. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: C-7180-9-0

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: JOSE SOARES DAIRY
MAILING ADDRESS: PO BOX 189
DELHI, CA 95315

LOCATION: 1.5 MILES SOUTH OF AVENUE 21 ON ROAD 1
DOS PALOS, CA

EQUIPMENT DESCRIPTION:
SOLID MANURE HANDLING OPERATION CONSISTING OF MANURE STOCK PILES; SOLID MANURE APPLICATION TO LAND AND OFFSITE HAULING

CONDITIONS

1. This Authority to Construct (ATC) shall be implemented concurrently with ATCs C-7180-7-0, 8-0, and 10-0. [District Rule 2201]
2. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
3. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
4. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
5. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (559) 230-5950 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT. This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Seyed Sadredin, Executive Director / APCO

DRAFT

Arnaud Marjollet, Director of Permit Services
C-7180-9-0 : Dec 28 2016 11:27AM -- AIYABEIJ : Joint Inspection NOT Required

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

PERMIT NO: C-7180-10-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: JOSE SOARES DAIRY
MAILING ADDRESS: PO BOX 189
DELHI, CA 95315

LOCATION: 1.5 MILES SOUTH OF AVENUE 21 ON ROAD 1
DOS PALOS, CA

EQUIPMENT DESCRIPTION:
FEED STORAGE AND HANDLING OPERATION CONSISTING OF COMMODITY BARN(S); SILAGE PILE(S); AND TOTAL MIXED RATION FEEDING

CONDITIONS

1. This Authority to Construct (ATC) shall be implemented concurrently with ATCs C-7180-7-0, 8-0, and 9-0. [District Rule 2201]
2. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
3. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
4. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
5. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (559) 230-5950 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT. This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Seyed Sadredin, Executive Director / APCO

Arnaud Marjollet, Director of Permit Services
C-7180-10-0 Dec 28 2016 9:56AM -- AIYABEIJ Joint Inspection NOT Required

6. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
7. Permittee shall push feed so that it is within three feet of the feed lane fences within two hours of putting out the feed, or use feed troughs or other feeding structures designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]
8. Permittee shall maintain an operating plan or records demonstrating that feed is pushed within three feet of the feed lane fences within two hours of putting out the feed; or that feed troughs or other structures designed to maintain feed within reach of the animals are used. [District Rules 2201 and 4570]
9. Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
10. Permittee shall maintain an operating plan or records demonstrating that feeding of total mixed rations begins within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
11. Permittee shall store grain in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]
12. Permittee shall maintain records demonstrating that grain is/was stored in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]
13. Permittee shall remove uneaten wet feed from feed bunks within twenty-four (24) hours after the end of a rain event. [District Rules 2201 and 4570]
14. Permittee shall maintain records demonstrating that uneaten wet feed was removed from feed bunks within twenty-four (24) hours after the end of a rain event. [District Rules 2201 and 4570]
15. For bagged silage/feedstuff, permittee shall utilize a sealed feed storage system (e.g., ag bag). [District Rules 2201 and 4570]
16. Permittee shall cover all silage piles, except for the area where feed is being removed from the pile, with a plastic tarp that is at least five (5) mils (0.005 inches) thick, multiple plastic tarps with a cumulative thickness of at least 5 mils (0.005 inches), or an oxygen barrier film covered with a UV resistant material. Silage piles shall be covered within seventy-two (72) hours of last delivery of material to the pile. Sheets of material used to cover silage shall overlap so that silage is not exposed where the sheets meet. [District Rules 2201 and 4570]
17. Permittee shall maintain records of the thickness and type of cover used to cover each silage pile. Permittee shall also maintain records of the date of the last delivery of material to each silage pile and the date each pile is covered. [District Rules 2201 and 4570]
18. Permittee shall select and implement one of the following mitigation measures for building each silage pile at the facility: Option 1) build the silage pile such that the average bulk density is at least 44 lb/cu ft for corn silage and 40 lb/cu ft for other silage types, as measured in accordance with Section 7.11 of District Rule 4570; Option 2) Adjust filling parameters when creating the silage pile to achieve an average bulk density of at least 44 lb/cu ft for corn silage and at least 40 lb/cu ft for other silage types as determined using a District-approved spreadsheet; or Option 3) build silage piles using crops harvested with the applicable minimum moisture content, maximum Theoretical Length of Chop (TLC), and roller opening identified in District Rule 4570, Table 4.1, 1.d and manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. Records of the option chosen as a mitigation measure for building each silage pile shall be maintained. [District Rules 2201 and 4570]
19. For each silage pile that Option 1 (Measured Bulk Density) is chosen as a mitigation measure for building the pile, records of the measured bulk density shall be maintained. [District Rules 2201 and 4570]
20. For each silage pile that Option 2 (Bulk Density Determined by Spreadsheet) is chosen as a mitigation measure for building the pile, records of the filling parameters entered into the District-approved spreadsheet to determine the bulk density shall be maintained. [District Rules 2201 and 4570]

CONDITIONS CONTINUE ON NEXT PAGE

21. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall harvest corn used for the pile at an average moisture content of at least 65% and harvest other silage crops for the pile at an average moisture content of at least 60%. [District Rules 2201 and 4570]

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

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

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

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

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

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

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

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

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

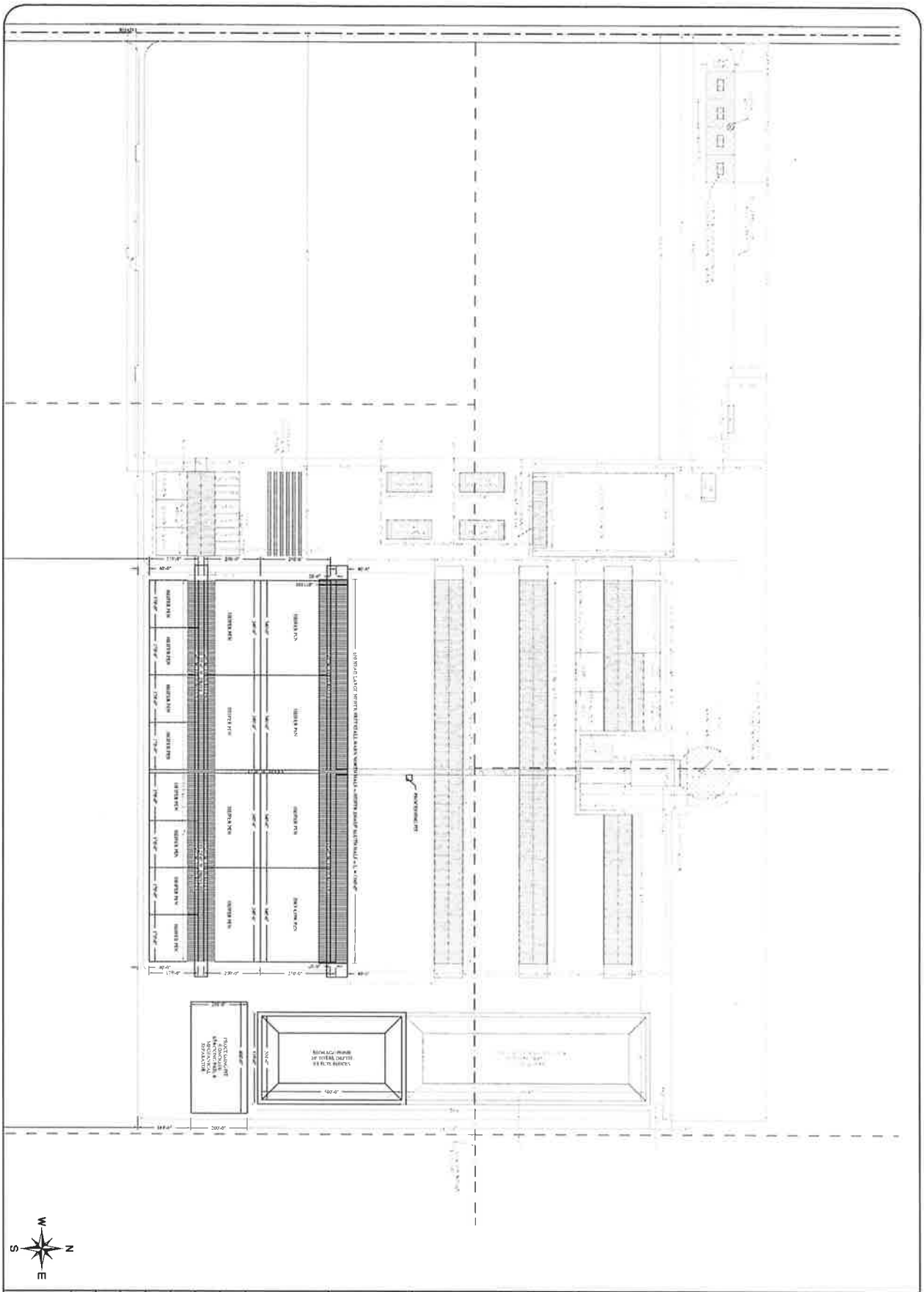
31. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

CONDITIONS CONTINUE ON NEXT PAGE

32. {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]

Appendix B

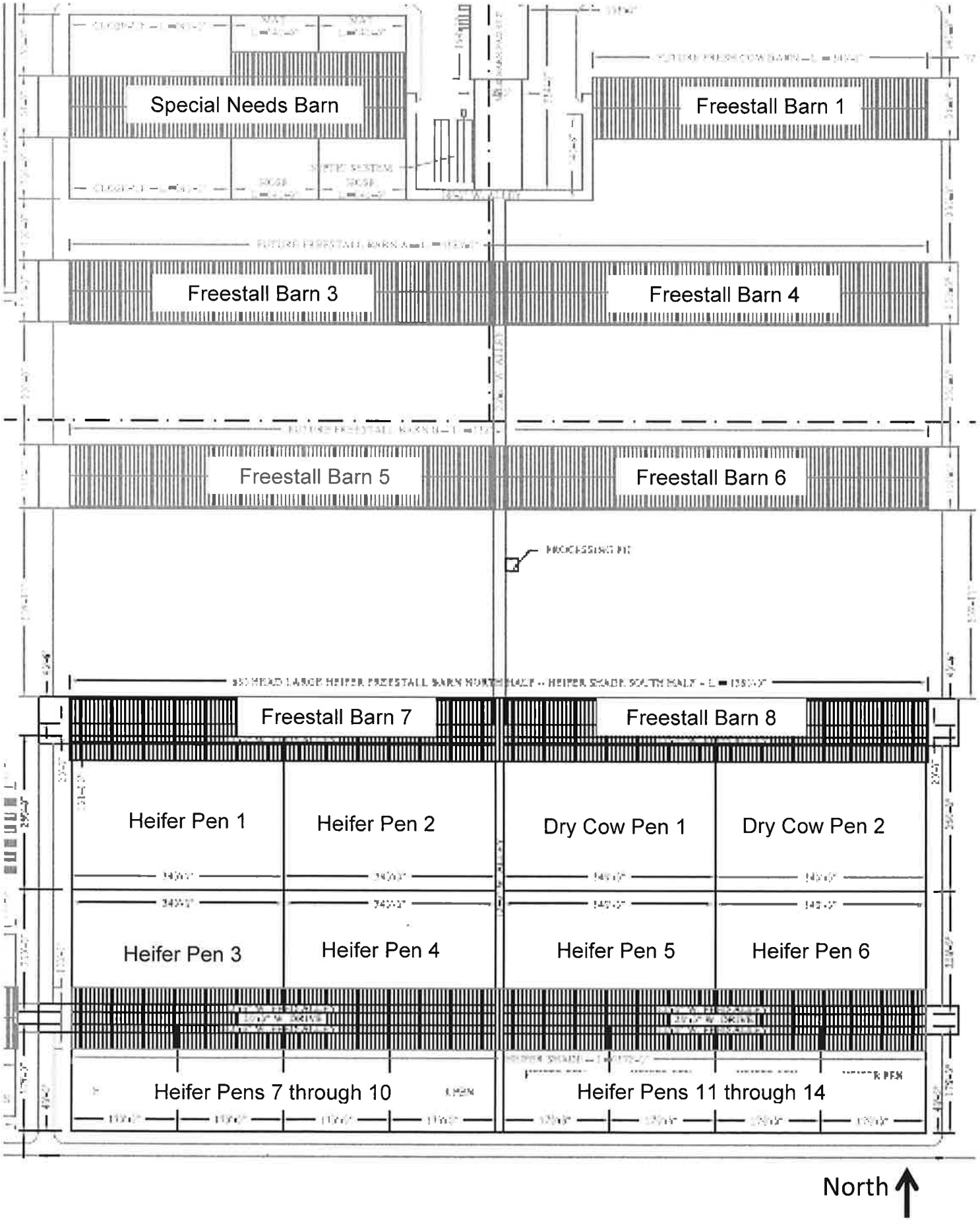
Project Site Plan



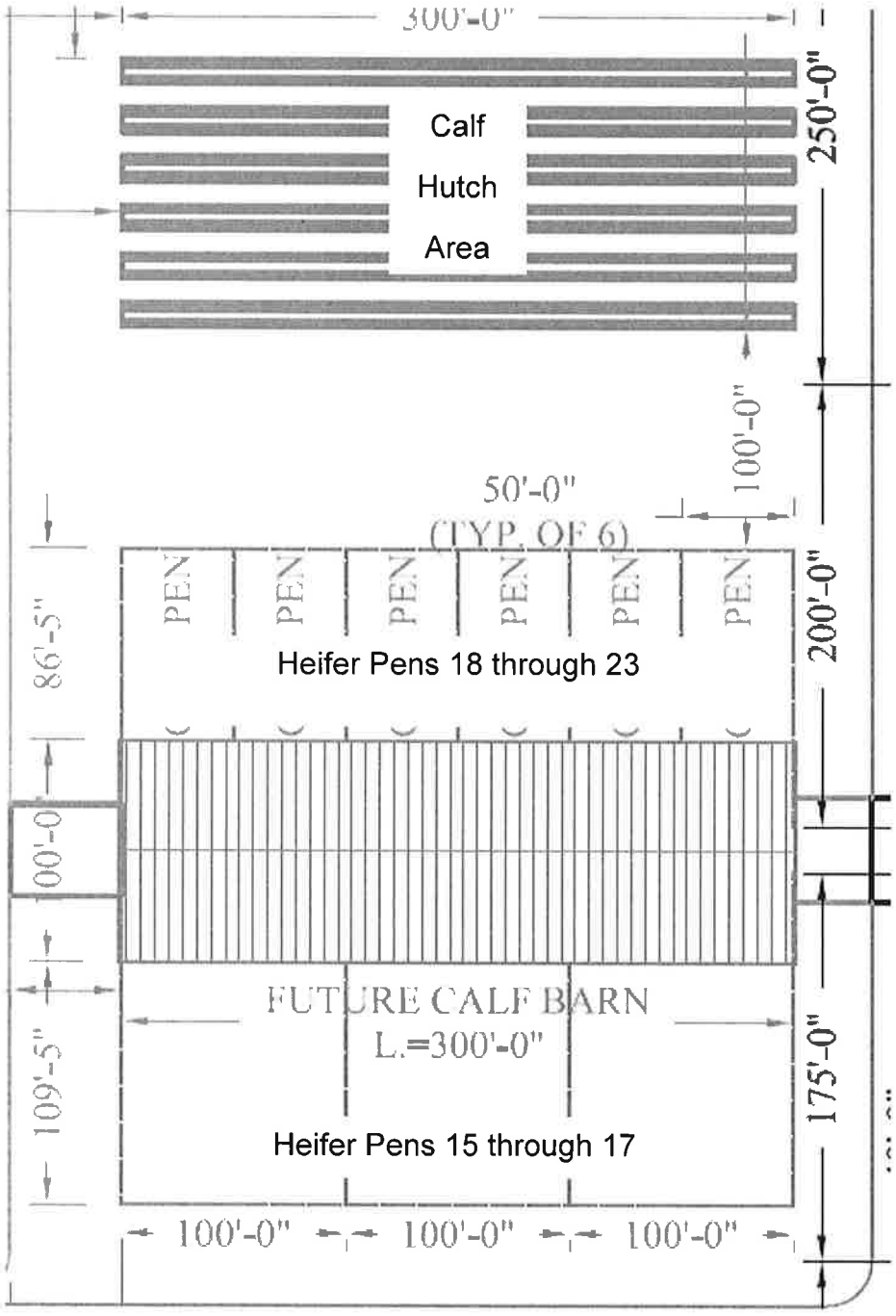
SHEET	SITE	SCALE	DATE	REVISION	DRAWN	DESIGN	PROJECT #			SITE PLAN	JOE SOARES DAIRY ROAD 1 MADERA COUNTY
S		1" = 150'	09/20/16	MCM	TCK	TCK	05-003				

EAC ENGINEERING
California Office
Idaho Office

Jose Soares Dairy (C-7180) Cow Housing Units – Sheet 1 of 2



Jose Soares Dairy (C-7180) Cow Housing Units – Sheet 2 of 2



North

Appendix C

Emissions Calculations

Rev. November 16, 2015

Pre-Project Facility Information

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

Pre-Project Herd Size							
Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals		
Milk Cows					0		
Dry Cows					0		
Support Stock (Heifers, Calves, and Bulls)					0		
Large Heifers					0		
Medium Heifers					0		
Small Heifers					0		
Bulls					0		
	Calf Hutches				Calf Corrals		
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	Total # of Calves
Calves							0

Total Herd Summary	
Total Milk Cows	0
Total Mature Cows	0
Support Stock (Heifers, Calves, and Bulls)	0
Total Calves	0
Total Dairy Head	0

Pre-Project Silage Information			
Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn			
Alfalfa			
Wheat			

Post-Project Facility Information

1. Does this facility house Holstein or Jersey cows? Holstein
   Most facilities house Holstein cows unless explicitly stated on the PTO or application.
2. Does the facility have an anaerobic treatment lagoon? yes
3. Does the facility land apply liquid manure? yes
   Answering "yes" assumes worst case.
4. Does the facility land apply solid manure? yes
   Answering "yes" assumes worst case.
5. Is any scraped manure sent to a lagoon? yes
   Answering "yes" assumes worst case.
6. Does this project result in any new lagoon/storage pond(s) or an increase in surface area for any existing lagoon/storage pond(s)? yes

Post-Project Herd Size							
Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals		
Milk Cows	2,880				2,880		
Dry Cows	266		398		664		
Support Stock (Heifers, Calves, and Bulls)	680		2,165		2,845		
Large Heifers					0		
Medium Heifers					0		
Small Heifers					0		
Bulls					0		
	Calf Hutches				Calf Corrals		
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	Total # of Calves
Calves			135				135

Total Herd Summary	
Total Milk Cows	2,880
Total Mature Cows	3,544
Support Stock (Heifers, Calves, and Bulls)	2,845
Total Calves	135
Total Dairy Head	6,524

Post-Project Silage Information			
Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	1	21	100
Alfalfa			
Wheat	1	15	100

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

VOC Mitigation Measures and Control Efficiencies

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

Cow Housing				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	VOC Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Enteric Emissions Mitigations		
☐	☑	Feed according to NRC guidelines	0%	10%
		Total Control Efficiency	0%	10%
		Corrals/Pens Mitigations		
☐	☑	Feed according to NRC guidelines	0%	10%
☐	☑	Inspect water pipes and troughs and repair leaks at least once every seven days. Note: If selected for dairies > 999 milk cows, CE is already included in EF.	0%	0%
☐	☑	**Dairies:** Clean manure from corrals at least four times per year with at least 60 days between cleaning, or clean corrals at least once between April and July and at least once between September and December. Note: If selected for dairies > 999 milk cows, CE is already included in EF. Note: No additional control given for increased cleaning frequency (e.g. BACT requirement). **Heifer/Calf Ranches:** Scrape corrals twice a year with at least 90 days between cleanings, excluding in-corral mounds. Note: No additional control given for increased cleaning frequency (e.g. BACT requirement).	0%	0%
☐	☑	Scrape, vacuum, or flush concrete lanes in corrals at least once every day for mature cows and every seven days for support stock, or clean concrete lanes such that the depth of manure does not exceed 12 inches at any point or time. Note: No additional control given for increased cleaning frequency (e.g. BACT requirement).	0%	10%
☐	☑	Implement one of the following: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 sq ft or less and slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 sq ft; 2) maintain corrals to ensure proper drainage preventing water from standing more than 48 hrs; 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface. Note: If selected for dairies > 999 milk cows, CE already included in EF.	0%	0%
☐	☐	Install shade structures such that they are constructed with a light permeable roofing material. Note: If selected for dairies > 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.	0%	5%
☐	☐	Install all shade structures uphill of any slope in the corral. Note: If selected for dairies > 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.		
☐	☑	Clean manure from under corral shades at least once every 14 days, when weather permits access into corral. Note: If selected for dairies > 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.		
☐	☐	Install shade structure so that the structure has a North/South orientation. Note: If selected for dairies > 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.		
☐	☐	Manage corrals such that the manure depth in the corral does not exceed 12 inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. The manure facility must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF.	0%	0%
☐	☑	Knockdown fence line manure build-up prior to it exceeding a height of 12 inches at any time or point. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. The facility must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible.	0%	10%
☐	☐	Use lime or a similar absorbent material in the corral according to the manufacturer's recommendation to minimize moisture in the corrals.	0%	0%
☐	☐	Apply thymol to the corral soil in accordance with the manufacturer's recommendation.	0%	0%
		Total Control Efficiency	0.00%	30.75%
		Bedding Mitigations		

☐	☑	Feed according to NRC guidelines	0%	10%
☐	☐	Use non-manure-based bedding and non-separated solids based bedding for at least 90% of the bedding material, by weight, for freestalls (e.g. rubber mats, almond shells, sand, or waterbeds).	0%	0%
☐	☑	For a large dairy (1,000 milk cows or larger) or a heifer/calf ranch - Remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every 7 days.	0%	10%
☐	☐	**(D)** For a medium dairy only (500 to 999 milk cows) - Remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every 14 days.	0%	0%
		Total Control Efficiency	0.00%	19.00%
		Lanes Mitigations		
☐	☑	Feed according to NRC guidelines	0%	10%
☐	☑	Pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers. Note: No control efficiency at this time.	0%	0%
☐	☑	**Dairies:** Flush, scrape, or vacuum freestall flush lanes immediately prior to or after, or during each milking; or flush or scrape freestall flush lanes at least 3 times per day. **Heifer/Calf Ranches:** Vacuum, scrape, or flush freestalls at least once every seven days.	0%	10%
☐	☐	**(D)** Have no animals in exercise pens or corrals at any time.	0%	0%
		Total Control Efficiency	0.00%	19.00%

Liquid Manure Handling				
Measure Proposed?		**Mitigation Measure(s) per Emissions Point**	**VOC Control Efficiency (%)**	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Lagoons/Storage Ponds Mitigations		
☐	☑	Feed according to NRC guidelines	0%	10%
☐	☐	Use phototropic lagoon	0%	0%
☐	☑	Use an anaerobic treatment lagoon designed according to NRCS Guideline No. 359	0%	40%
☐	☑	Remove solids from the waste system with a solid separator system, prior to the waste entering the lagoon. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF.	0%	0%
☐	☐	Maintain lagoon pH between 6.5 and 7.5	0%	0%
		Total Control Efficiency	0.00%	46.00%
		Liquid Manure Land Application Mitigations		
☐	☑	Feed according to NRC guidelines	0%	10%
☐	☑	Only apply liquid manure that has been treated with an anaerobic or aerobic treatment lagoon, aerobic lagoon, or digester system	0%	40%
☐	☑	Allow liquid manure to stand in the fields for no more than 24 hours after irrigation. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF.	0%	0%
☐	☐	Apply liquid/slurry manure via injection with drag hose or similar apparatus	0%	0%
		Total Control Efficiency	0.00%	46.00%

Solid Manure Handling				
Measure Proposed?		**Mitigation Measure(s) per Emissions Point**	**VOC Control Efficiency (%)**	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Solid Manure Storage Mitigations		
☐	☑	Feed according to NRC guidelines	0%	10%
☐	☑	Within 72 hours of removal from housing, either a) remove dry manure from the facility, or b) cover dry manure outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed 24 hours per event.	0%	10%
		Total Control Efficiency	0.00%	19.00%
		Separated Solids Piles Mitigations		
☐	☑	Feed according to NRC guidelines	0%	10%
☐	☐	Within 72 hours of removal from the drying process, either a) remove separated solids from the facility, or b) cover separated solids outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed 24 hours per event.	0%	0%
		Total Control Efficiency	0.00%	10.00%
		Solid Manure Land Application Mitigations		
☐	☑	Feed according to NRC guidelines	0%	10%
☐	☑	Incorporate all solid manure within 72 hours of land application. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF. Note: No additional control given for rapid manure incorporation (e.g. BACT requirement).	0%	0%
☐	☐	Only apply solid manure that has been treated with an anaerobic treatment lagoon, aerobic lagoon or digester system.	0%	0%
☐	☐	Apply no solid manure with a moisture content of more than 50%	0%	0%
		Total Control Efficiency	0.00%	10.00%

Silage and TMR				
Measure Proposed?		**Mitigation Measure(s) per Emissions Point**	**VOC Control Efficiency (%)**	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Corn/Alfalfa/Wheat Silage Mitigations		

☐	☑	1. Utilize a sealed feed storage system (e.g. Ag-Bag) for bagged silage, or 2. Cover the surface of silage piles, except for the area where feed is being removed from the pile, with a plastic tarp that is at least 5 mils thick (0.005 inches), multiple plastic tarps with a cumulative thickness of at least 5 mils (0.005 inches), or an oxygen barrier film covered with a UV resistant material within 72 hours of last delivery of material to the pile, and implement one of the following: a) build silage piles such that the average bulk density is at least 44 lb/cu-ft for corn silage and 40 lb/cu-ft for other silage types, as measured in accordance with Section 7.10 of Rule 4570, b) when creating a silage pile, adjust filling parameters to assure a calculated average bulk density of at least 44 lb/cu-ft for corn silage and at least 40 lb/cu-ft for other silage types, using a spreadsheet approved by the District, c) harvest silage crop at > or = 65% moisture for corn; and >= 60% moisture for alfalfa/grass and other silage crops; manage silage material delivery such that no more than 6 inches of materials are uncompacted on top of the pile; and incorporate the applicable Theoretical Length of Chop (TLC) and roller opening for the crop being harvested. For dairies - implement two of the following: For heifer/calf ranches - implement one of the following: Manage Exposed Silage. a) manage silage piles such that only one silage pile has an uncovered face and the uncovered face has a total exposed surface area of less than 2,150 sq. ft., or b) manage multiple uncovered silage piles such that the total exposed surface area of all silage piles is less than 4,300 sq ft. Maintain Silage Working Face. a) use a shaver/facer to remove silage from the silage pile, or b) maintain a smooth vertical surface on the working face of the silage pile Silage Additive: a) inoculate silage with homolactic acid bacteria in accordance with manufacturer recommendations to achieve a concentration of at least 100,000 colony forming units per gram of wet forage or apply proprionic acid, benzoic acid, sorbic acid, sodium benzoate, or potassium sorbate at a rate specified by the manufacturer to reduce yeast counts when forming silage pile; or b) apply other additives at specified rates that have been demonstrated to reduce alcohol concentrations in silage and/or VOC emissions from silage and have been approved by the District and EPA.	0.0%	39.0%
		Total Control Efficiency*	0.00%	39.00%

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

		TMR Mitigations		
☐	☑	**(D)** Push feed so that it is within 3 feet of feedlane fence within 2 hrs of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the cows.	0%	10%
☐	☑	**(D)** Begin feeding total mixed rations within 2 hrs of grinding and mixing rations. Note: If selected for dairies > 999 milk cows, control efficiency already included in EF.	0%	0%
☐	☐	Feed steam-flaked, dry rolled, cracked or ground corn or other ground cereal grains.	0%	0%
☐	☑	Remove uneaten wet feed from feed bunks within 24 hrs after then end of a rain event.	0%	10%
☐	☐	**(D)** For total mixed rations that contain at least 30% by weight of silage, feed animals total mixed rations that contain at least 45% moisture.	0%	0%
☐	☐	Feed according to NRC guidelines. Note: If selected for dairies, control efficiency already included in EF.	0%	0%
		Total Control Efficiency	0.00%	19.00%

Ammonia Mitigation Measures and Control Efficiencies

Milking Parlor				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	NH3 Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Milking Parlor Floor Mitigations		
FALSE	TRUE	Feed according to NRC guidelines	0%	28%
		Total Control Efficiency	0%	28%

Cow Housing				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	NH3 Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Corrals/Pens Mitigations		
☐	☑	Feed according to NRC guidelines	0%	28%
☐	☑	Clean manure from corrals at least four times per year with at least 60 days between cleaning, or clean corrals at least once between April and July and at least once between September and December. **OR** Use lime or a similar absorbent material in the corral according to the manufacturer's recommendation to minimize moisture in the corrals. **OR** Apply thymol to the corral soil in accordance with the manufacturer's recommendation.	0%	50%
		Total Control Efficiency	0%	64%
		Bedding Mitigations		
☐	☑	Feed according to NRC guidelines	0%	28%
☐	☑	Use non-manure-based bedding and non-separated solids based bedding for at least 90% of the bedding material, by weight, for freestalls (e.g. rubber mats, almond shells, sand, or waterbeds). **OR** For a large dairy only (1,000 milk cows or larger) - Remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every 7 days. **OR** For a medium dairy only (500 to 999 milk cows) - Remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every 14 days.	0.0%	47.7%
		Total Control Efficiency	0.00%	62.34%
		Lanes Mitigations		
☐	☑	Feed according to NRC guidelines	0%	28%
		Total Control Efficiency	0%	28%

Liquid Manure Handling				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	NH3 Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Lagoons/Storage Ponds Mitigations		
☐	☑	Feed according to NRC guidelines	0%	28%
☐	☑	Use phototropic lagoon **OR** Remove solids from the waste system with a solid separator system, prior to the waste entering the lagoon.	0%	80%
		Total Control Efficiency	0.0%	85.6%
		Liquid Manure Land Application Mitigations		
☐	☑	Feed according to NRC guidelines	0%	28%
☐	☑	Only apply liquid manure that has been treated with an anaerobic treatment lagoon	0%	42%
		Total Control Efficiency	0.00%	58.24%

Solid Manure Handling				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	NH3 Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Solid Manure Land Application Mitigations		
☐	☑	Feed according to NRC guidelines	0%	28%
☐	☐	Incorporate all solid manure within 72 hours of land application. **AND** Only apply solid manure that has been treated with an anaerobic treatment lagoon, aerobic lagoon or digester system. **AND** Apply no solid manure with a moisture content of more than 50%	0%	0%
		Total Control Efficiency	0.00%	28.00%

PM10 Mitigation Measures and Control Efficiencies

Control Measure	PM10 Control Efficiency
Shaded corrals (milk and dry cows)	16.7%
Shaded corrals (heifers and bulls)	8.3%
Downwind shelterbelts	12.5%
Upwind shelterbelts	10%
Freestall with no exercise pens and non-manure based bedding	90%
Freestall with no exercise pens and manure based bedding	80%
Fibrous layer in dusty areas (i.e. hay, etc.)	10%
Bi-weekly corral/exercise pen scraping and/or manure removal using a pull type manure harvesting equipment in morning hours when moisture in air except during periods of rainy weather	15%
Sprinkling of open corrals/exercise pens	50%
Feeding young stock (heifers and calves) near dusk	10%

Pre-Project PM10 Mitigation Measures

Pre-Project PM10 Mitigation Measures														
Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows in All Housing Structure(s)	Maximum Design Capacity of Each Structure	# of Combined Housing Structures in row	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk
Pre-Project Total # of Cows			Zero											

Post-Project PM10 Mitigation Measures

Post-Project PM10 Mitigation Measures

	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows in All Housing Structure(s)	Maximum Design Capacity of Each Structure	# of Combined Housing Structures in row	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk
1	Freestall Barn 1	freestall	milk cows	480	480	1	☐	☑	☐	☐	☐	☐	☑	☐	☐
2	Special Needs Barn A	freestall	dry cows	266	266	1	☐	☑	☐	☐	☐	☐	☑	☐	☐
3	Special Needs Barn B	open corral	dry cows	58	58	1	☑	☑	☐	☐	☐	☐	☑	☐	☐
4	Freestall Barn 3	freestall	milk cows	600	600	1	☐	☑	☐	☐	☐	☐	☑	☐	☐
5	Freestall Barn 4	freestall	milk cows	600	600	1	☐	☑	☐	☐	☐	☐	☑	☐	☐
6	Freestall Barn 5	freestall	milk cows	600	600	1	☐	☑	☐	☐	☐	☐	☑	☐	☐
7	Freestall Barn 6	freestall	milk cows	600	600	1	☐	☑	☐	☐	☐	☐	☑	☐	☐
8	Freestall Barn 7	freestall	support stock	340	340	1	☐	☑	☐	☐	☐	☐	☑	☐	☐
9	Freestall Barn 8	freestall	support stock	340	340	1	☐	☑	☐	☐	☐	☐	☑	☐	☐
10	Heifer Pen 1	open corral	support stock	150	150	1	☑	☑	☐	☐	☐	☐	☑	☑	☑
11	Heifer Pen 2	open corral	support stock	150	150	1	☑	☑	☐	☐	☐	☐	☑	☑	☑
12	Dry Cow Pen 1	open corral	dry cows	170	170	1	☑	☑	☐	☐	☐	☐	☑	☐	☐
13	Dry Cow Pen 2	open corral	dry cows	170	170	1	☑	☑	☐	☐	☐	☐	☑	☐	☐
14	Heifer Pen 3	open corral	support stock	150	150	1	☑	☑	☐	☐	☐	☐	☑	☑	☑
15	Heifer Pen 4	open corral	support stock	150	150	1	☑	☑	☐	☐	☐	☐	☑	☑	☑
16	Heifer Pen 5	open corral	support stock	150	150	1	☑	☑	☐	☐	☐	☐	☑	☑	☑
17	Heifer Pen 6	open corral	support stock	150	150	1	☑	☑	☐	☐	☐	☐	☑	☑	☑
18	Heifer Pen 7	open corral	support stock	100	100	1	☑	☑	☐	☐	☐	☐	☑	☑	☑
19	Heifer Pen 8	open corral	support stock	100	100	1	☑	☑	☐	☐	☐	☐	☑	☑	☑
20	Heifer Pen 9	open corral	support stock	100	100	1	☑	☑	☐	☐	☐	☐	☑	☑	☑
21	Heifer Pen 10	open corral	support stock	100	100	1	☑	☑	☐	☐	☐	☐	☑	☑	☑
22	Heifer Pen 11	open corral	support stock	100	100	1	☑	☑	☐	☐	☐	☐	☑	☑	☑
23	Heifer Pen 12	open corral	support stock	100	100	1	☑	☑	☐	☐	☐	☐	☑	☑	☑
24	Heifer Pen 13	open corral	support stock	100	100	1	☑	☑	☐	☐	☐	☐	☑	☑	☑
25	Heifer Pen 14	open corral	support stock	100	100	1	☑	☑	☐	☐	☐	☐	☑	☑	☑
26	Heifer Pen 15	open corral	support stock	75	75	1	☑	☑	☐	☐	☐	☐	☑	☐	☑
27	Heifer Pen 16	open corral	support stock	75	75	1	☑	☑	☐	☐	☐	☐	☑	☐	☑
28	Heifer Pen 17	open corral	support stock	75	75	1	☑	☑	☐	☐	☐	☐	☑	☐	☑
29	Heifer Pen 18	open corral	support stock	40	40	1	☑	☑	☐	☐	☐	☐	☑	☐	☑
30	Heifer Pen 19	open corral	support stock	40	40	1	☑	☑	☐	☐	☐	☐	☑	☐	☑
31	Heifer Pen 20	open corral	support stock	40	40	1	☑	☑	☐	☐	☐	☐	☑	☐	☑
32	Heifer Pen 21	open corral	support stock	40	40	1	☑	☑	☐	☐	☐	☐	☑	☐	☑
33	Heifer Pen 22	open corral	support stock	40	40	1	☑	☑	☐	☐	☐	☐	☑	☐	☑
34	Heifer Pen 23	open corral	support stock	40	40	1	☑	☑	☐	☐	☐	☐	☑	☐	☑
35	Calf Hutch Area	on ground hutches	calves	135	135	1	☐	☑	☐	☐	☐	☐	☐	☐	☐

Post-Project PM10 Mitigation Measures for New Housing Units at an Expanding Dairy

Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows in All Housing Structure(s)	Maximum Design Capacity of Each Structure	# of Combined Housing Structures in row	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk
	Post-Project Total # of Cows		6,524											

Post-Project PM10 Control Efficiencies and Emission Factors

	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows in All Housing Structure(s)	Maximum Design Capacity of Each Structure	Uncontrolled EF (lb/hd-yr)	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk	Controlled EF (lb/hd-yr)
1	Freestall Barn 1	freestall	milk cows	480	480	1.370		12.5%					15%			1.02
2	Special Needs Barn A	freestall	dry cows	266	266	1.370		12.5%					15%			1.02
3	Special Needs Barn B	open corral	dry cows	58	58	5.460	16.7%	12.5%					15%			3.38
4	Freestall Barn 3	freestall	milk cows	600	600	1.370		12.5%					15%			1.02
5	Freestall Barn 4	freestall	milk cows	600	600	1.370		12.5%					15%			1.02
6	Freestall Barn 5	freestall	milk cows	600	600	1.370		12.5%					15%			1.02
7	Freestall Barn 6	freestall	milk cows	600	600	1.370		12.5%					15%			1.02
8	Freestall Barn 7	freestall	support stock	340	340	1.370		12.5%					15%			1.02
9	Freestall Barn 8	freestall	support stock	340	340	1.370		12.5%					15%			1.02
10	Heifer Pen 1	open corral	support stock	150	150	10.550	8.3%	12.5%					15%	50%	10%	3.24
11	Heifer Pen 2	open corral	support stock	150	150	10.550	8.3%	12.5%					15%	50%	10%	3.24
12	Dry Cow Pen 1	open corral	dry cows	170	170	5.460	16.7%	12.5%					15%			3.38
13	Dry Cow Pen 2	open corral	dry cows	170	170	5.460	16.7%	12.5%					15%			3.38
14	Heifer Pen 3	open corral	support stock	150	150	10.550	8.3%	12.5%					15%	50%	10%	3.24
15	Heifer Pen 4	open corral	support stock	150	150	10.550	8.3%	12.5%					15%	50%	10%	3.24
16	Heifer Pen 5	open corral	support stock	150	150	10.550	8.3%	12.5%					15%	50%	10%	3.24

17	Heifer Pen 6	open corral	support stock	150	150	10.550	8.3%	12.5%					15%	50%	10%	3.24
18	Heifer Pen 7	open corral	support stock	100	100	10.550	8.3%	12.5%					15%	50%	10%	3.24
19	Heifer Pen 8	open corral	support stock	100	100	10.550	8.3%	12.5%					15%	50%	10%	3.24
20	Heifer Pen 9	open corral	support stock	100	100	10.550	8.3%	12.5%					15%	50%	10%	3.24
21	Heifer Pen 10	open corral	support stock	100	100	10.550	8.3%	12.5%					15%	50%	10%	3.24
22	Heifer Pen 11	open corral	support stock	100	100	10.550	8.3%	12.5%					15%	50%	10%	3.24
23	Heifer Pen 12	open corral	support stock	100	100	10.550	8.3%	12.5%					15%	50%	10%	3.24
24	Heifer Pen 13	open corral	support stock	100	100	10.550	8.3%	12.5%					15%	50%	10%	3.24
25	Heifer Pen 14	open corral	support stock	100	100	10.550	8.3%	12.5%					15%	50%	10%	3.24
26	Heifer Pen 15	open corral	support stock	75	75	10.550	8.3%	12.5%					15%		10%	6.48
27	Heifer Pen 16	open corral	support stock	75	75	10.550	8.3%	12.5%					15%		10%	6.48
28	Heifer Pen 17	open corral	support stock	75	75	10.550	8.3%	12.5%					15%		10%	6.48
29	Heifer Pen 18	open corral	support stock	40	40	10.550	8.3%	12.5%					15%		10%	6.48
30	Heifer Pen 19	open corral	support stock	40	40	10.550	8.3%	12.5%					15%		10%	6.48
31	Heifer Pen 20	open corral	support stock	40	40	10.550	8.3%	12.5%					15%		10%	6.48
32	Heifer Pen 21	open corral	support stock	40	40	10.550	8.3%	12.5%					15%		10%	6.48
33	Heifer Pen 22	open corral	support stock	40	40	10.550	8.3%	12.5%					15%		10%	6.48
34	Heifer Pen 23	open corral	support stock	40	40	10.550	8.3%	12.5%					15%		10%	6.48
35	Calf Hutch Area	on ground hutches	calves	135	135	0.343		12.5%								0.30

Post-Project PM10 Control Efficiencies and Emission Factors for New Housing Emissions Units

Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows in All Housing Structure(s)	Maximum Design Capacity of Each Structure	Uncontrolled EF (lb/hd-yr)	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk	Controlled EF (lb/hd-yr)

lb/hd-yr Dairy Emissions Factors for Holstein Cows

			Milk Cows				Dry Cows				Large Heifers (15 to 24 months)				Medium Heifers (7 to 14 months)				Small Heifers (3 to 6 months)				Calves (0 - 3 months)				Bulls			
			Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled	
			<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2
Milking Parlor	VOC	Enteric Emissions in Milking Parlors	0.43	0.41	0.43	0.37	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
		Milking Parlor Floor	0.04	0.03	0.04	0.03	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
		Total	**0.47**	**0.44**	**0.47**	**0.40**	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
	NH3	**Total**	**0.19**	**0.19**	**0.19**	**0.14**	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
Cow Housing	VOC	Enteric Emissions in Cow Housing	3.89	3.69	3.89	3.32	2.33	2.23	2.33	2.01	1.81	1.71	1.81	1.54	1.23	1.17	1.23	1.05	0.69	0.65	0.69	0.58	0.32	0.31	0.32	0.28	1.10	1.04	1.10	0.94
		Corrals/Pens	10.00	6.60	10.00	4.57	5.40	3.56	5.40	2.49	4.20	2.76	4.20	1.91	2.85	1.88	2.85	1.30	1.60	1.04	1.60	0.72	0.75	0.50	0.75	0.35	2.55	1.67	2.55	1.16
		Bedding	1.05	1.00	1.05	0.81	0.57	0.54	0.57	0.44	0.44	0.42	0.44	0.34	0.30	0.28	0.30	0.23	0.17	0.16	0.17	0.13	0.08	0.08	0.08	0.06	0.27	0.25	0.27	0.20
		Lanes	0.84	0.80	0.84	0.65	0.45	0.44	0.45	0.35	0.35	0.33	0.35	0.27	0.24	0.23	0.24	0.18	0.13	0.13	0.13	0.10	0.06	0.06	0.06	0.05	0.21	0.20	0.21	0.16
		Total	**15.78**	**12.09**	**15.78**	**9.35**	**8.75**	**6.80**	**8.75**	**5.29**	**6.81**	**5.22**	**6.81**	**4.06**	**4.62**	**3.56**	**4.62**	**2.77**	**2.59**	**1.98**	**2.59**	**1.54**	**1.22**	**0.95**	**1.22**	**0.74**	**4.13**	**3.16**	**4.13**	**2.46**
	NH3	Enteric Emissions in Cow Housing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Corrals/Pens	41.90	41.90	41.90	15.08	21.20	21.20	21.20	7.63	11.00	11.00	11.00	3.96	7.90	7.90	7.90	2.84	6.00	6.00	6.00	2.16	1.80	1.80	1.80	0.65	15.30	15.30	15.30	5.51
		Bedding	6.30	6.30	6.30	2.37	3.20	3.20	3.20	1.20	1.70	1.70	1.70	0.64	1.20	1.20	1.20	0.45	0.90	0.90	0.90	0.34	0.30	0.30	0.30	0.11	2.30	2.30	2.30	0.87
		Lanes	5.10	5.10	5.10	3.67	2.60	2.60	2.60	1.87	1.30	1.30	1.30	0.94	1.00	1.00	1.00	0.72	0.70	0.70	0.70	0.50	0.20	0.20	0.20	0.14	1.90	1.90	1.90	1.37
		Total	**53.30**	**53.30**	**53.30**	**21.13**	**27.00**	**27.00**	**27.00**	**10.71**	**14.00**	**14.00**	**14.00**	**5.54**	**10.10**	**10.10**	**10.10**	**4.02**	**7.60**	**7.60**	**7.60**	**3.00**	**2.30**	**2.30**	**2.30**	**0.90**	**19.50**	**19.50**	**19.50**	**7.74**
Liquid Manure Handling	VOC	Lagoons/Storage Ponds	1.52	1.30	1.52	0.70	0.82	0.71	0.82	0.38	0.64	0.54	0.64	0.29	0.43	0.37	0.43	0.20	0.24	0.21	0.24	0.11	0.11	0.10	0.11	0.05	0.40	0.33	0.40	0.18
		Liquid Manure Land Application	1.64	1.40	N/A	0.76	0.89	0.76	N/A	0.41	0.69	0.58	N/A	0.32	0.47	0.40	N/A	0.22	0.26	0.22	N/A	0.12	0.12	0.11	N/A	0.06	0.42	0.35	N/A	0.19
		Total	**3.16**	**2.70**	**1.52**	**1.46**	**1.71**	**1.47**	**0.82**	**0.79**	**1.33**	**1.13**	**0.64**	**0.61**	**0.90**	**0.77**	**0.43**	**0.42**	**0.51**	**0.43**	**0.24**	**0.23**	**0.24**	**0.21**	**0.11**	**0.11**	**0.82**	**0.68**	**0.40**	**0.37**
	NH3	Lagoons/Storage Ponds	8.20	8.20	8.20	1.18	4.20	4.20	4.20	0.60	2.20	2.20	2.20	0.32	1.50	1.50	1.50	0.22	1.20	1.20	1.20	0.17	0.35	0.35	0.35	0.05	3.00	3.00	3.00	0.43
		Liquid Manure Land Application	8.90	8.90	N/A	3.72	4.50	4.50	N/A	1.88	2.30	2.30	N/A	0.96	1.70	1.70	N/A	0.71	1.30	1.30	N/A	0.54	0.37	0.37	N/A	0.15	3.23	3.23	N/A	1.35
		Total	**17.10**	**17.10**	**8.20**	**4.90**	**8.70**	**8.70**	**4.20**	**2.48**	**4.50**	**4.50**	**2.20**	**1.28**	**3.20**	**3.20**	**1.50**	**0.93**	**2.50**	**2.50**	**1.20**	**0.72**	**0.72**	**0.72**	**0.35**	**0.20**	**6.23**	**6.23**	**3.00**	**1.78**
Solid Manure Handling	VOC	Solid Manure Storage	0.16	0.15	0.16	0.12	0.09	0.08	0.09	0.07	0.07	0.06	0.07	0.05	0.05	0.04	0.05	0.03	0.03	0.02	0.03	0.02	0.01	0.01	0.01	0.01	0.04	0.04	0.04	0.03
		Separated Solids Piles	0.06	0.06	0.06	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02
		Solid Manure Land Application	0.39	0.33	N/A	0.30	0.21	0.18	N/A	0.16	0.16	0.14	N/A	0.12	0.11	0.09	N/A	0.08	0.06	0.05	N/A	0.05	0.03	0.03	N/A	0.02	0.10	0.08	N/A	0.07
		Total	**0.61**	**0.54**	**0.22**	**0.47**	**0.33**	**0.29**	**0.12**	**0.26**	**0.26**	**0.23**	**0.09**	**0.20**	**0.17**	**0.15**	**0.06**	**0.13**	**0.10**	**0.09**	**0.04**	**0.07**	**0.05**	**0.04**	**0.02**	**0.04**	**0.16**	**0.14**	**0.06**	**0.12**
	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	N/A	1.50	1.06	1.06	N/A	0.76	0.55	0.55	N/A	0.40	0.39	0.39	N/A	0.28	0.30	0.30	N/A	0.22	0.09	0.09	N/A	0.06	0.76	0.76	N/A	0.55
		Total	**3.42**	**3.42**	**1.33**	**2.83**	**1.73**	**1.73**	**0.67**	**1.43**	**0.90**	**0.90**	**0.35**	**0.75**	**0.64**	**0.64**	**0.25**	**0.53**	**0.48**	**0.48**	**0.18**	**0.40**	**0.15**	**0.15**	**0.06**	**0.12**	**1.25**	**1.25**	**0.45**	**1.04**

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	34,681	21,155
		Alfalfa Silage	17,458	17,458	10,649
		Wheat Silage	43,844	43,844	26,745
		TMR	13,056	13,056	10,575

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

PM_{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
Calf above-ground flushed	0.069	SJVAPCD
Calf above-ground scraped	0.206	SJVAPCD

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

Pre-Project Potential to Emit - Cow Housing

Pre-Project Potential to Emit - Cow Housing											
Housing Name(s) or #(s)	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
Pre-Project Total # of Cows		0				0.0	0	0.0	0	0.0	0

Pre-Project Totals						
Total # of Cows	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
0	0.0	0	0.0	0	0.0	0

Calculations:

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

Post-Project Potential to Emit - Cow Housing

	Post-Project Potential to Emit - Cow Housing											
	Housing Name(s) or #(s)	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
1	Freestall Barn 1	milk cows	480	9.35	21.13	1.02	12.3	4,488	27.8	10,142	1.3	489
2	Special Needs Barn A	dry cows	266	5.29	10.71	1.02	3.9	1,407	7.8	2,849	0.7	271
3	Special Needs Barn B	dry cows	58	5.29	10.71	3.38	0.8	307	1.7	621	0.5	196
4	Freestall Barn 3	milk cows	600	9.35	21.13	1.02	15.4	5,610	34.7	12,677	1.7	611
5	Freestall Barn 4	milk cows	600	9.35	21.13	1.02	15.4	5,610	34.7	12,677	1.7	611
6	Freestall Barn 5	milk cows	600	9.35	21.13	1.02	15.4	5,610	34.7	12,677	1.7	611
7	Freestall Barn 6	milk cows	600	9.35	21.13	1.02	15.4	5,610	34.7	12,677	1.7	611
8	Freestall Barn 7	support stock	340	4.06	5.54	1.02	3.8	1,380	5.2	1,882	0.9	346
9	Freestall Barn 8	support stock	340	4.06	5.54	1.02	3.8	1,380	5.2	1,882	0.9	346
10	Heifer Pen 1	support stock	150	4.06	5.54	3.24	1.7	609	2.3	830	1.3	486
11	Heifer Pen 2	support stock	150	4.06	5.54	3.24	1.7	609	2.3	830	1.3	486
12	Dry Cow Pen 1	dry cows	170	5.29	10.71	3.38	2.5	899	5.0	1,821	1.6	575
13	Dry Cow Pen 2	dry cows	170	5.29	10.71	3.38	2.5	899	5.0	1,821	1.6	575
14	Heifer Pen 3	support stock	150	4.06	5.54	3.24	1.7	609	2.3	830	1.3	486
15	Heifer Pen 4	support stock	150	4.06	5.54	3.24	1.7	609	2.3	830	1.3	486
16	Heifer Pen 5	support stock	150	4.06	5.54	3.24	1.7	609	2.3	830	1.3	486
17	Heifer Pen 6	support stock	150	4.06	5.54	3.24	1.7	609	2.3	830	1.3	486
18	Heifer Pen 7	support stock	100	4.06	5.54	3.24	1.1	406	1.5	554	0.9	324
19	Heifer Pen 8	support stock	100	4.06	5.54	3.24	1.1	406	1.5	554	0.9	324
20	Heifer Pen 9	support stock	100	4.06	5.54	3.24	1.1	406	1.5	554	0.9	324
21	Heifer Pen 10	support stock	100	4.06	5.54	3.24	1.1	406	1.5	554	0.9	324
22	Heifer Pen 11	support stock	100	4.06	5.54	3.24	1.1	406	1.5	554	0.9	324
23	Heifer Pen 12	support stock	100	4.06	5.54	3.24	1.1	406	1.5	554	0.9	324
24	Heifer Pen 13	support stock	100	4.06	5.54	3.24	1.1	406	1.5	554	0.9	324
25	Heifer Pen 14	support stock	100	4.06	5.54	3.24	1.1	406	1.5	554	0.9	324
26	Heifer Pen 15	support stock	75	4.06	5.54	6.48	0.8	305	1.1	415	1.3	486
27	Heifer Pen 16	support stock	75	4.06	5.54	6.48	0.8	305	1.1	415	1.3	486
28	Heifer Pen 17	support stock	75	4.06	5.54	6.48	0.8	305	1.1	415	1.3	486
29	Heifer Pen 18	support stock	40	4.06	5.54	6.48	0.4	162	0.6	221	0.7	259
30	Heifer Pen 19	support stock	40	4.06	5.54	6.48	0.4	162	0.6	221	0.7	259
31	Heifer Pen 20	support stock	40	4.06	5.54	6.48	0.4	162	0.6	221	0.7	259
32	Heifer Pen 21	support stock	40	4.06	5.54	6.48	0.4	162	0.6	221	0.7	259
33	Heifer Pen 22	support stock	40	4.06	5.54	6.48	0.4	162	0.6	221	0.7	259
34	Heifer Pen 23	support stock	40	4.06	5.54	6.48	0.4	162	0.6	221	0.7	259
35	Calf Hutch Area	calves	135	0.74	0.90	0.30	0.3	100	0.3	122	0.1	41
	Post-Project # of Cows (non-expansion)		6,524				115.3	42,089	229.5	83,831	37.5	13,803

Post-Project Potential to Emit - Cow Housing: New Freestalls at Existing Dairy											
Housing Name(s) or #(s)	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
Total # of Cows From Expansion		0				0.0	0	0.0	0	0.0	0

Post-Project Totals						
Total # of Cows	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
6,524	115.3	42,089	229.5	83,831	37.5	13,803

Calculations:

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

Pre-Project Potential to Emit (PE1)

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

	Calf Hutches				Calf Corrals		
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	Total # of Calves
Calves	0	0	0	0	0	0	0

Silage Information				
Feed Type	Maximum # Open Piles	Maximum Height (ft)	Maximum Width (ft)	Open Face Area (ft^2)
Corn	0	0	0	
Alfalfa	0	0	0	
Wheat	0	0	0	

Milking Parlor				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	0.0	0	0.0	0

Cow Housing						
Cow	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Total	0.0	0	0.0	0	0.0	0

Liquid Manure Handling						
Cow	VOC		NH3		H2S	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	0.0	0	0.0	0	0	0
Dry Cows	0.0	0	0.0	0	0	0
Support Stock (Heifers, Calves and Bulls)	0.0	0	0.0	0	0	0
Large Heifers	0.0	0	0.0	0	0	0
Medium Heifers	0.0	0	0.0	0	0	0
Small Heifers	0.0	0	0.0	0	0	0
Calves	0.0	0	0.0	0	0	0
Bulls	0.0	0	0.0	0	0	0
Total	0.0	0	0.0	0	0	0

Solid Manure Handling				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	0.0	0	0.0	0
Dry Cows	0.0	0	0.0	0
Support Stock (Heifers, Calves and Bulls)	0.0	0	0.0	0
Large Heifers	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0
Calves	0.0	0	0.0	0
Bulls	0.0	0	0.0	0
Total	0.0	0	0.0	0

Feed Handling and Storage		
	Daily PE (lb-VOC/day)	Annual PE (lb-VOC/yr)
Corn Emissions	0.0	0
Alfalfa Emissions	0.0	0
Wheat Emissions	0.0	0
TMR	0.0	0
Total	0.0	0

Calculations for milking parlor:

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

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

Calculations for cow housing:

See detailed calculations under Cow Housing Calculations worksheet.

Calculations for liquid manure and solid manure handling:

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

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

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

Calculations for silage emissions:

Annual PE = (EF1) x (area 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^2) 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 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	0.0	0.0	0.0
Cow Housing	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Liquid Manure	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Solid Manure	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feed Handling	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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

Total Annual Pre-Project Potential to Emit (lb/yr)							
Permit	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	0	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	0	0	0

Post-Project Potential to Emit (PE2)

Post-Project Herd Size					
Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals
Milk Cows	2,880	0	0	0	2,880
Dry Cows	266	0	398	0	664
Support Stock (Heifers, Calves, and Bulls)	680	0	2,165	0	2,845
Large Heifers	0	0	0	0	0
Medium Heifers	0	0	0	0	0
Small Heifers	0	0	0	0	0
Bulls	0	0	0	0	0

	Calf Hutches				Calf Corrals		
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	Total # of Calves
Calves	0	0	135	0	0	0	135

Silage Information				
Feed Type	Maximum # Open Piles	Maximum Height (ft)	Maximum Width (ft)	Open Face Area (ft^2)
Corn	1	21	100	1,601
Alfalfa	0	0	0	
Wheat	1	15	100	1,087

Milking Parlor				
Cow	VOC		NH3	
Milk Cows	lb/day	lb/yr	lb/day	lb/yr
Total	**3.2**	**1,152**	**1.1**	**394**

Cow Housing						
	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Total	**115.3**	**42,089**	**229.5**	**83,831**	**37.5**	**13,803**

Liquid Manure Handling						
Cow	VOC		NH3		H2S	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	11.5	4,205	38.7	14,112	0.9	340
Dry Cows	1.4	525	4.5	1,647	0.1	40
Support Stock (Heifers, Calves, and Bulls)	4.8	1,735	10.0	3,642	0.2	90
Large Heifers	0.0	0	0.0	0	0	0
Medium Heifers	0.0	0	0.0	0	0	0
Small Heifers	0.0	0	0.0	0	0	0
Calves	0.0	15	0.1	27	0	1
Bulls	0.0	0	0.0	0	0	0
Total	**17.7**	**6,480**	**53.3**	**19,427**	**1.2**	**471**

Solid Manure Handling				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	3.7	1,354	22.3	8,150
Dry Cows	0.5	173	2.6	950
Support Stock (Heifers, Calves, and Bulls)	1.6	569	5.8	2,134
Large Heifers	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0
Calves	0.0	5	0.0	16
Bulls	0.0	0	0.0	0
Total	**5.8**	**2,101**	**30.7**	**11,250**

Feed Handling and Storage		
	Daily PE (lb-VOC/day)	Annual PE (lb-VOC/yr)
Corn Emissions	10.0	3,639
Alfalfa Emissions	0.0	0
Wheat Emissions	8.6	3,124
TMR	140.8	51,408
Total	**159.4**	**58,171**

Calculations for milking parlor:

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

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

Calculations for cow housing:

See detailed calculations under Cow Housing Calculations worksheet.

Calculations for liquid manure and solid manure handling:

Annual PE = [(# milk cows) x (EF1 lb-pollutant/hd-yr)] + [(# dry cows) x (EF2 lb-pollutant/hd-yr)] + [(# large heifers) x (EF2 lb-pollutant/hd-yr)] + [(# medium heifers) x (EF2 lb-pollutant/hd-yr)] + [(# small heifers) x (EF2 lb-pollutant/hd-yr)] + [(# calves) x (EF2 lb-pollutant/hd-yr)] + [(# bulls) x (EF2 lb-pollutant/hd-yr)]

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

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

Calculations for silage emissions:

Annual PE = (EF2) x (area ft^2) x (0.0929 m^2/ft^2) x (8,760 hr/yr) x (60 min/hr) x 2.20E-9 lb/µg

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

Calculation for TMR emissions:

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

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

Calves are not included in TMR calculation.

Total Daily Post-Project Potential to Emit (lb/day)							
Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0.0	0.0	0.0	0.0	3.2	1.1	0.0
Cow Housing	0.0	0.0	37.5	0.0	115.3	229.5	0.0
Liquid Manure	0.0	0.0	0.0	0.0	17.7	53.3	1.2
Solid Manure	0.0	0.0	0.0	0.0	5.8	30.7	0.0
Feed Handling	0.0	0.0	0.0	0.0	159.4	0.0	0.0
Total	**0.0**	**0.0**	**37.5**	**0.0**	**301.4**	**314.6**	**1.2**

Major Source Emissions (lb/yr)					
Permit	NOx	SOx	PM10	CO	VOC
Milk Parlor	0	0	0	0	0
Cow Housing	0	0	0	0	0
Liquid Manure	0	0	0	0	3,101
Solid Manure	0	0	0	0	0
Feed Handling	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**3,101**

Total Annual Post-Project Potential to Emit (lb/yr)							
Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	1,152	394	0
Cow Housing	0	0	13,803	0	42,089	83,831	0
Liquid Manure	0	0	0	0	6,480	19,427	471
Solid Manure	0	0	0	0	2,101	11,250	0
Feed Handling	0	0	0	0	58,171	0	0
Total	**0**	**0**	**13,803**	**0**	**109,993**	**114,902**	**471**

Appendix D

BACT Calculations

BACT Applicability

Milking Parlor					
VOC Emissions					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)
Milk Cows	3.2	N/A	N/A	N/A	3.2
BACT triggered for VOC for milking parlor				Total	3.2
NH3 Emissions					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)
Milk Cows	1.1	N/A	N/A	N/A	1.1
				Total	1.1

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

Liquid Manure Handling					
VOC Emissions - Lagoon/Storage Pond(s)					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)
Milk Cows	5.5	N/A	N/A	N/A	5.5
Dry Cows	0.7	N/A	N/A	N/A	0.7
Support Stock (Heifers, Calves, and Bulls)	2.3	N/A	N/A	N/A	2.3
Large Heifers	0.0	N/A	N/A	N/A	0.0
Medium Heifers	0.0	N/A	N/A	N/A	0.0
Small Heifers	0.0	N/A	N/A	N/A	0.0
Calves	0.0	N/A	N/A	N/A	0.0
Bulls	0.0	N/A	N/A	N/A	0.0
BACT triggered for VOC for Lagoon/Storage Ponds				Total	8.5
VOC Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)
Milk Cows	6.0	N/A	N/A	N/A	6.0
Dry Cows	0.7	N/A	N/A	N/A	0.7
Support Stock (Heifers, Calves, and Bulls)	2.5	N/A	N/A	N/A	2.5
Large Heifers	0.0	N/A	N/A	N/A	0.0
Medium Heifers	0.0	N/A	N/A	N/A	0.0
Small Heifers	0.0	N/A	N/A	N/A	0.0
Calves	0.0	N/A	N/A	N/A	0.0
Bulls	0.0	N/A	N/A	N/A	0.0
BACT triggered for VOC for Liquid Manure Land Application				Total	9.2
NH3 Emissions - Lagoon/Storage Pond(s)					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)
Milk Cows	9.3	N/A	N/A	N/A	9.3
Dry Cows	1.1	N/A	N/A	N/A	1.1
Support Stock (Heifers, Calves, and Bulls)	2.5	N/A	N/A	N/A	2.5
Large Heifers	0.0	N/A	N/A	N/A	0.0
Medium Heifers	0.0	N/A	N/A	N/A	0.0
Small Heifers	0.0	N/A	N/A	N/A	0.0
Calves	0.0	N/A	N/A	N/A	0.0
Bulls	0.0	N/A	N/A	N/A	0.0
BACT triggered for NH3 for Lagoon/Storage Ponds				Total	12.9
NH3 Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)
Milk Cows	29.3	N/A	N/A	N/A	29.3
Dry Cows	3.4	N/A	N/A	N/A	3.4
Support Stock (Heifers, Calves, and Bulls)	7.5	N/A	N/A	N/A	7.5
Large Heifers	0.0	N/A	N/A	N/A	0.0
Medium Heifers	0.0	N/A	N/A	N/A	0.0
Small Heifers	0.0	N/A	N/A	N/A	0.0
Calves	0.1	N/A	N/A	N/A	0.1
Bulls	0.0	N/A	N/A	N/A	0.0
BACT triggered for NH3 for Liquid Manure Land Application				Total	40.3
H2S Emissions - Lagoon/Storage Pond(s)					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)
Milk Cows	N/A	N/A	N/A	N/A	N/A
Dry Cows	N/A	N/A	N/A	N/A	N/A
Support Stock (Heifers, Calves, and Bulls)	N/A	N/A	N/A	N/A	N/A
Large Heifers	N/A	N/A	N/A	N/A	N/A
Medium Heifers	N/A	N/A	N/A	N/A	N/A
Small Heifers	N/A	N/A	N/A	N/A	N/A
Calves	N/A	N/A	N/A	N/A	N/A
Bulls	N/A	N/A	N/A	N/A	N/A
BACT for H2S emissions will be calculated separately.				Total	0.0

Solid Manure Handling					
VOC Emissions - Solid Manure Storage/Separated Solids Piles					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)
Milk Cows	1.4	N/A	N/A	N/A	1.4
Dry Cows	0.2	N/A	N/A	N/A	0.2
Support Stock (Heifers, Calves, and Bulls)	0.6	N/A	N/A	N/A	0.6
Large Heifers	0.0	N/A	N/A	N/A	0.0
Medium Heifers	0.0	N/A	N/A	N/A	0.0
Small Heifers	0.0	N/A	N/A	N/A	0.0
Calves	0.0	N/A	N/A	N/A	0.0
Bulls	0.0	N/A	N/A	N/A	0.0
BACT triggered for VOC for Solid Manure Storage				Total	2.2
VOC Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)
Milk Cows	2.3	N/A	N/A	N/A	2.3
Dry Cows	0.3	N/A	N/A	N/A	0.3
Support Stock (Heifers, Calves, and Bulls)	1.0	N/A	N/A	N/A	1.0
Large Heifers	0.0	N/A	N/A	N/A	0.0
Medium Heifers	0.0	N/A	N/A	N/A	0.0
Small Heifers	0.0	N/A	N/A	N/A	0.0
Calves	0.0	N/A	N/A	N/A	0.0
Bulls	0.0	N/A	N/A	N/A	0.0
BACT triggered for VOC for Solid Manure Land Application				Total	3.6
NH3 Emissions - Solid Manure Storage/Separated Solids Piles					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)
Milk Cows	10.5	N/A	N/A	N/A	10.5
Dry Cows	1.2	N/A	N/A	N/A	1.2
Support Stock (Heifers, Calves, and Bulls)	2.7	N/A	N/A	N/A	2.7
Large Heifers	0.0	N/A	N/A	N/A	0.0
Medium Heifers	0.0	N/A	N/A	N/A	0.0
Small Heifers	0.0	N/A	N/A	N/A	0.0
Calves	0.0	N/A	N/A	N/A	0.0
Bulls	0.0	N/A	N/A	N/A	0.0
BACT triggered for NH3 for Solid Manure Storage				Total	14.4
NH3 Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)
Milk Cows	11.9	N/A	N/A	N/A	11.9
Dry Cows	1.4	N/A	N/A	N/A	1.4
Support Stock (Heifers, Calves, and Bulls)	3.1	N/A	N/A	N/A	3.1
Large Heifers	0.0	N/A	N/A	N/A	0.0
Medium Heifers	0.0	N/A	N/A	N/A	0.0
Small Heifers	0.0	N/A	N/A	N/A	0.0
Calves	0.0	N/A	N/A	N/A	0.0
Bulls	0.0	N/A	N/A	N/A	0.0
BACT triggered for NH3 for Solid Manure Land Application				Total	16.4

Feed Storage and Handling					
VOC Emissions - Silage					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)
Corn Silage	10.0	N/A	N/A	N/A	10.0
Alfalfa Silage	0.0	N/A	N/A	N/A	0.0
Wheat Silage	8.6	N/A	N/A	N/A	8.6
BACT triggered for VOC for Silage				Total	18.6
VOC Emissions - TMR					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)
TMR	140.8	N/A	N/A	N/A	140.8
BACT triggered for VOC for TMR				Total	140.8

Cow Housing - VOC Emissions

	Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)	BACT Triggered?
1	Freestall Barn 1	12.3	N/A	N/A	N/A	12.3	Yes
2	Special Needs Barn	3.9	N/A	N/A	N/A	3.9	Yes
3	Special Needs Barn	0.8	N/A	N/A	N/A	0.8	No
4	Freestall Barn 3	15.4	N/A	N/A	N/A	15.4	Yes
5	Freestall Barn 4	15.4	N/A	N/A	N/A	15.4	Yes
6	Freestall Barn 5	15.4	N/A	N/A	N/A	15.4	Yes
7	Freestall Barn 6	15.4	N/A	N/A	N/A	15.4	Yes
8	Freestall Barn 7	3.8	N/A	N/A	N/A	3.8	Yes
9	Freestall Barn 8	3.8	N/A	N/A	N/A	3.8	Yes
10	Heifer Pen 1	1.7	N/A	N/A	N/A	1.7	No
11	Heifer Pen 2	1.7	N/A	N/A	N/A	1.7	No
12	Dry Cow Pen 1	2.5	N/A	N/A	N/A	2.5	Yes
13	Dry Cow Pen 2	2.5	N/A	N/A	N/A	2.5	Yes
14	Heifer Pen 3	1.7	N/A	N/A	N/A	1.7	No
15	Heifer Pen 4	1.7	N/A	N/A	N/A	1.7	No
16	Heifer Pen 5	1.7	N/A	N/A	N/A	1.7	No
17	Heifer Pen 6	1.7	N/A	N/A	N/A	1.7	No
18	Heifer Pen 7	1.1	N/A	N/A	N/A	1.1	No
19	Heifer Pen 8	1.1	N/A	N/A	N/A	1.1	No
20	Heifer Pen 9	1.1	N/A	N/A	N/A	1.1	No
21	Heifer Pen 10	1.1	N/A	N/A	N/A	1.1	No
22	Heifer Pen 11	1.1	N/A	N/A	N/A	1.1	No
23	Heifer Pen 12	1.1	N/A	N/A	N/A	1.1	No
24	Heifer Pen 13	1.1	N/A	N/A	N/A	1.1	No
25	Heifer Pen 14	1.1	N/A	N/A	N/A	1.1	No
26	Heifer Pen 15	0.8	N/A	N/A	N/A	0.8	No
27	Heifer Pen 16	0.8	N/A	N/A	N/A	0.8	No
28	Heifer Pen 17	0.8	N/A	N/A	N/A	0.8	No
29	Heifer Pen 18	0.4	N/A	N/A	N/A	0.4	No
30	Heifer Pen 19	0.4	N/A	N/A	N/A	0.4	No
31	Heifer Pen 20	0.4	N/A	N/A	N/A	0.4	No
32	Heifer Pen 21	0.4	N/A	N/A	N/A	0.4	No
33	Heifer Pen 22	0.4	N/A	N/A	N/A	0.4	No
34	Heifer Pen 23	0.4	N/A	N/A	N/A	0.4	No
35	Calf Hutch Area	0.3	N/A	N/A	N/A	0.3	No
	New Units from Expansion						
	Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)	BACT Triggered?

Cow Housing - NH3 Emissions

Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)	BACT Triggered?
Freestall Barn 1	27.8	N/A	N/A	N/A	27.8	Yes
Special Needs Barn	7.8	N/A	N/A	N/A	7.8	Yes
Special Needs Barn	1.7	N/A	N/A	N/A	1.7	No
Freestall Barn 3	34.7	N/A	N/A	N/A	34.7	Yes
Freestall Barn 4	34.7	N/A	N/A	N/A	34.7	Yes
Freestall Barn 5	34.7	N/A	N/A	N/A	34.7	Yes
Freestall Barn 6	34.7	N/A	N/A	N/A	34.7	Yes
Freestall Barn 7	5.2	N/A	N/A	N/A	5.2	Yes
Freestall Barn 8	5.2	N/A	N/A	N/A	5.2	Yes
Heifer Pen 1	2.3	N/A	N/A	N/A	2.3	Yes
Heifer Pen 2	2.3	N/A	N/A	N/A	2.3	Yes
Dry Cow Pen 1	5.0	N/A	N/A	N/A	5.0	Yes
Dry Cow Pen 2	5.0	N/A	N/A	N/A	5.0	Yes
Heifer Pen 3	2.3	N/A	N/A	N/A	2.3	Yes
Heifer Pen 4	2.3	N/A	N/A	N/A	2.3	Yes
Heifer Pen 5	2.3	N/A	N/A	N/A	2.3	Yes
Heifer Pen 6	2.3	N/A	N/A	N/A	2.3	Yes
Heifer Pen 7	1.5	N/A	N/A	N/A	1.5	No
Heifer Pen 8	1.5	N/A	N/A	N/A	1.5	No
Heifer Pen 9	1.5	N/A	N/A	N/A	1.5	No
Heifer Pen 10	1.5	N/A	N/A	N/A	1.5	No
Heifer Pen 11	1.5	N/A	N/A	N/A	1.5	No
Heifer Pen 12	1.5	N/A	N/A	N/A	1.5	No
Heifer Pen 13	1.5	N/A	N/A	N/A	1.5	No
Heifer Pen 14	1.5	N/A	N/A	N/A	1.5	No
Heifer Pen 15	1.1	N/A	N/A	N/A	1.1	No
Heifer Pen 16	1.1	N/A	N/A	N/A	1.1	No
Heifer Pen 17	1.1	N/A	N/A	N/A	1.1	No
Heifer Pen 18	0.6	N/A	N/A	N/A	0.6	No
Heifer Pen 19	0.6	N/A	N/A	N/A	0.6	No
Heifer Pen 20	0.6	N/A	N/A	N/A	0.6	No
Heifer Pen 21	0.6	N/A	N/A	N/A	0.6	No
Heifer Pen 22	0.6	N/A	N/A	N/A	0.6	No
Heifer Pen 23	0.6	N/A	N/A	N/A	0.6	No
Calf Hutch Area	0.3	N/A	N/A	N/A	0.3	No
New Units from Expansion						
Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)	BACT Triggered?

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

	Cow Housing - PM10 Emissions						
	Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)	BACT Triggered?
1	Freestall Barn 1	1.3	N/A	N/A	N/A	1.3	No
2	Special Needs Barn	0.7	N/A	N/A	N/A	0.7	No
3	Special Needs Barn	0.5	N/A	N/A	N/A	0.5	No
4	Freestall Barn 3	1.7	N/A	N/A	N/A	1.7	No
5	Freestall Barn 4	1.7	N/A	N/A	N/A	1.7	No
6	Freestall Barn 5	1.7	N/A	N/A	N/A	1.7	No
7	Freestall Barn 6	1.7	N/A	N/A	N/A	1.7	No
8	Freestall Barn 7	0.9	N/A	N/A	N/A	0.9	No
9	Freestall Barn 8	0.9	N/A	N/A	N/A	0.9	No
10	Heifer Pen 1	1.3	N/A	N/A	N/A	1.3	No
11	Heifer Pen 2	1.3	N/A	N/A	N/A	1.3	No
12	Dry Cow Pen 1	1.6	N/A	N/A	N/A	1.6	No
13	Dry Cow Pen 2	1.6	N/A	N/A	N/A	1.6	No
14	Heifer Pen 3	1.3	N/A	N/A	N/A	1.3	No
15	Heifer Pen 4	1.3	N/A	N/A	N/A	1.3	No
16	Heifer Pen 5	1.3	N/A	N/A	N/A	1.3	No
17	Heifer Pen 6	1.3	N/A	N/A	N/A	1.3	No
18	Heifer Pen 7	0.9	N/A	N/A	N/A	0.9	No
19	Heifer Pen 8	0.9	N/A	N/A	N/A	0.9	No
20	Heifer Pen 9	0.9	N/A	N/A	N/A	0.9	No
21	Heifer Pen 10	0.9	N/A	N/A	N/A	0.9	No
22	Heifer Pen 11	0.9	N/A	N/A	N/A	0.9	No
23	Heifer Pen 12	0.9	N/A	N/A	N/A	0.9	No
24	Heifer Pen 13	0.9	N/A	N/A	N/A	0.9	No
25	Heifer Pen 14	0.9	N/A	N/A	N/A	0.9	No
26	Heifer Pen 15	1.3	N/A	N/A	N/A	1.3	No
27	Heifer Pen 16	1.3	N/A	N/A	N/A	1.3	No
28	Heifer Pen 17	1.3	N/A	N/A	N/A	1.3	No
29	Heifer Pen 18	0.7	N/A	N/A	N/A	0.7	No
30	Heifer Pen 19	0.7	N/A	N/A	N/A	0.7	No
31	Heifer Pen 20	0.7	N/A	N/A	N/A	0.7	No
32	Heifer Pen 21	0.7	N/A	N/A	N/A	0.7	No
33	Heifer Pen 22	0.7	N/A	N/A	N/A	0.7	No
34	Heifer Pen 23	0.7	N/A	N/A	N/A	0.7	No
35	Calf Hutch Area	0.1	N/A	N/A	N/A	0.1	No
	New Units from Expansion						
	Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)	BACT Triggered?

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

Appendix E

BACT Guidelines

San Joaquin Valley Unified Air Pollution Control District

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

Last Update: 2015

Emissions Unit: Milking Center

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

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

San Joaquin Valley Unified Air Pollution Control District

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

Last Update: 2016

Emissions Unit: Dairy Cow Housing - Freestall Barns

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

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

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San Joaquin Valley Unified Air Pollution Control District

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

Last Update: 2016

Emissions Unit: Dairy Cow Housing - Open Corrals

Pollutant	Achieved in Practice or contained in SIP	Technologically Feasible	Alternate Basic Equipment
PM_{10}	- Concrete feed lanes and walkways; - Scraping of open corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions; - Shade structures in open corrals; - Feeding heifers in corrals near dusk (within 1 hour of dusk); and - Windbreaks controlling dust from corrals (when feasible, supported by soil conditions, and there is adequate space at existing facilities) or an alternative measure with equivalent PM control (e.g. sprinkling/water application over at least 25% of the corral surface or average corral surface moisture content (wet-based) ≥ 16%)		Freestall Barns for Milk and Dry Cows, Saudi Style Barns for Milk and Dry Cows, Loafing Barns
VOC	- Concrete feed lanes and walkways; - Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, Scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning lanes and walkways for support stock (heifers) at least once per day); - Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines; - Properly sloping corrals (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing corrals to maintain a dry surface; - Scraping corrals and exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions; and - Rule 4570 Measures		
Ammonia	- Concrete feed lanes and walkways; - Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, Scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning lanes and walkways for support stock (heifers) at least once per day); - Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines; - Properly sloping corrals (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing corrals to maintain a dry surface; and - Scraping corrals and exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions;		

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

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San Joaquin Valley Unified Air Pollution Control District

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

Last Update: December 18, 2013

Emissions Unit: Liquid Manure Handling at Dairies

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

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

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San Joaquin Valley Unified Air Pollution Control District

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

Last Update: December 18, 2013

Emissions Unit: Liquid/Slurry Manure Land Application

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

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

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

San Joaquin Valley Unified Air Pollution Control District

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

Last Update: December 18, 2013

Emissions Unit: Solid Manure Handling - Storage

Pollutant	Achieved in Practice or contained in SIP	Technologically Feasible	Alternate Basic Equipment
VOC	All animals fed in accordance with NRC or other District-approved guidelines	1) In-Vessel/Enclosed Negatively-Aerated Static Pile (ASP) Vented to a Biofilter 2) Negatively-Aerated Static Pile (ASP) Vented to a Biofilter 3) Enclosed Negatively-Aerated Static Pile (ASP) 4) Open Negatively-Aerated Static Pile (ASP)	
Ammonia	All animals fed in accordance with NRC or other District-approved guidelines		

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

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

San Joaquin Valley Unified Air Pollution Control District

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

Last Update: December 18, 2013

Emissions Unit: Solid Manure Land Application

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

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

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

San Joaquin Valley Unified Air Pollution Control District

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

Last Update: 2015

Emissions Unit: Dairy Feed Storage and Handling System – Silage

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

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

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

San Joaquin Valley Unified Air Pollution Control District

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

Last Update: 2015

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

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

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

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

Appendix F

BACT Analysis

I. Top-Down BACT Analysis for the Milking Parlor

VOC Emissions

a. Step 1 - Identify all control technologies

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

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

Description of Control Technology

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

Almost all dairy operations utilize some type of flush or spray system to wash out the manure that's deposited in the milking parlor. The primary purpose of the flush or spray system is to maintain the minimum level of sanitation required in the milking parlor. However, this system also serves as an emission control for reducing VOC and ammonia emissions. The manure deposited in the milking parlor, which is a source of VOC emissions, is removed many times a day by flushing. Many of the VOCs emitted from fresh cow manure, such as alcohols (ethanol and methanol) and many Volatile Fatty Acids (VFAs), are highly soluble in water. Therefore, a large percentage of these compounds will dissolve in the flush water and will not be emitted into the air. The flush water can then carry the manure and the dissolved volatile compounds to an anaerobic treatment system where they are digested by microbial activity and converted into less polluting compounds such as methane and carbon dioxide.

b. Step 2 - Eliminate technologically infeasible options

The option identified in step 1 is technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

Only one option was previously identified in step 1:

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

d. Step 4 - Cost Effectiveness Analysis

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

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

e. Step 5 - Select BACT

The applicant has proposed to flush/spray the milking parlor before, after, or during milking each group of cows. The proposal satisfies BACT for this category.

II. Top-Down BACT Analysis for the Cow Housing

1. VOC Emissions

a. Step 1 - Identify all control technologies

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

1) Feed and Manure Management Practices

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

Description of Control Technologies

Concrete feed lanes and walkways

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

Increased flushing of feed lanes and walkways

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

In addition to cleaning the feed lanes and walkways, the flush system also serves as an emissions control method. Many of the VOCs emitted from fresh cow manure, such as alcohols (ethanol and methanol) and many Volatile Fatty Acids (VFAs), are highly soluble in water. Therefore, a large proportion of these compounds will dissolve in the flush water instead of being emitted directly from the housing areas. The flush water then carries the manure and the dissolved volatile compounds into an anaerobic treatment system where they are digested and converted into less polluting byproducts by microbial activity.

Feed lanes and walkways are typically flushed once or twice per day in the mature cow housing areas; and as infrequently as once a week in the support stock housing areas. Flushing the lanes four times per day for mature cows and once per day for support stock will increase the frequency with which manure is removed from the housing areas, which should result in a higher percentage of soluble volatile compounds being captured in the flush water, and therefore higher control efficiency. Although the control efficiency may actually be much higher, increasing the cleaning frequency of the lanes will be conservatively assumed to have a control efficiency of 10% for VOCs emitted from manure in cow housing areas, until better data becomes available.

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

Nutritional management of dairy feed is routinely practiced to improve milk production and herd health. The potential for VOC emissions can be reduced by reducing the quantity of undigested nutrients in the manure. Many of the VOCs emitted from Confined Animal Facilities, including dairies, originate from the decomposition of undigested protein in animal waste.[15] This undigested protein also produces ammonia emissions. The level of microbial action in the manure corresponds to the level of organic nitrogen content in the manure; the lower the level of nitrogen the lower the level of microbial action and the lower the production of ammonia and VOCs.

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

Based on very limited data (Klaunser, 1998, *J Prod Agric),* diet manipulation decreased nitrogen excretion by 34% while improving milk production. Up to 70% of excess nitrogen is lost off of the farm through volatilization, denitrification and leaching. Because of limited research, feeding cows in accordance with National Research Council (NRC) or other District-approved guidelines will be conservatively assumed to have a control efficiency of only 5-10% for both enteric[16] and manure VOC emissions.

Properly sloping exercise pens/corrals

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

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

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

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

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

b. Step 2 - Eliminate technologically infeasible options

All the options identified in step 1 are technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

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

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

d. Step 4 - Cost Effectiveness Analysis

Feed and Manure Management Practices

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

- Scraping exercise pens/corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions; and
- Rule 4570 measures.

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

e. Step 5 - Select BACT

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

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

The proposal satisfies BACT for this category.

2. Ammonia (NH_3) Emissions

a. Step 1 - Identify all control technologies

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

1) Feed and Manure Management Practices

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

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

Description of Control Technologies

Concrete feed lanes and walkways

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

Increased Flushing for feed lanes and walkways

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

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

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

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

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

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

recommendations made in this publication seek to achieve the maximum uptake of protein by the animal and the minimum carryover of nitrogen into the manure.

Properly sloping exercise pens/corrals

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

b. Step 2 - Eliminate technologically infeasible options

All the options identified in step 1 are technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

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

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

d. Step 4 - Cost Effectiveness Analysis

Feed and Manure Management Practices

- Concrete feed lanes and walkways;
- Flushing feed lanes and walkways for mature cows (milk and dry cows) at least four times per day and flushing feed lanes and walkways for support stock at least once per day;
- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
- Properly sloping exercise pens/corrals (minimum slope of 3% where the available

space for each animal is 400 square feet or less and 1.5% where the available space for each animal is more than 400 square feet) or managing exercise pens/corrals to maintain a dry surface; and

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

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

e. Step 5 - Select BACT

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

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

The proposal satisfies BACT for this category.

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

1. VOC Emissions

a. Step 1 - Identify all control technologies

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

1) Aerobic treatment lagoon or mechanically aerated lagoon

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

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

Description of Control Technologies

1) Aerobic Treatment Lagoon or Mechanically Aerated Lagoon

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

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

2) Covered Lagoon Digester

Covered treatment lagoons are one type of anaerobic digester. An anaerobic digester is an enclosed basin or tank that is designed to facilitate the decomposition of wastewater by microbes in the absence of oxygen. The process of anaerobic decomposition results in the preferential conversion of organic compounds in the wastewater into methane (CH_4), carbon dioxide (CO_2), and water rather than intermediate metabolites (VOC). The gas generated by this process is known as biogas, waste gas or digester gas. In addition to methane and carbon dioxide, biogas also contains small amounts of Nitrogen (N_2), Oxygen (O_2), Hydrogen Sulfide (H_2S), and Ammonia (NH_3). Biogas will also include trace amounts of various Volatile Organic Compounds (VOCs) that remain from incomplete digestion of the volatile solids in the incoming wastewater. The small amounts of undigested solids that remain after digestion are removed from the digester as sludge. Because biogas is mostly composed of methane, the main component of natural gas, the gas produced in the digester can be cleaned to remove H_2S and other impurities and used as fuel. The captured biogas can be combusted in a flare or may be sent to a boiler or internal combustion engine, where the gas can be used to generate useful heat or electrical energy.

As stated above, the gas generated in the covered lagoon anaerobic digester can be captured and then sent to a suitable combustion device. During combustion, gaseous hydrocarbons are oxidized to form CO_2 and water. The VOC emitted from the liquid

manure in the covered lagoon can be reduced by 95% with the use of an appropriate combustion device. Therefore, installation of the digester will lower the total VOC emitted from the liquid manure handling system. Although the control efficiency of the gas captured from the primary lagoon is expected to be 95% or more, the overall control efficiency is expected to be less, since some VOC will also be emitted from the storage pond and as fugitive emissions. For this analysis, the overall control efficiency is assumed to be 80% of the emissions that would have been emitted from the lagoon system.

3) Anaerobic Treatment Lagoon and Solids Removal/Separation System

An anaerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of manure by microbes in the absence of oxygen. The process of anaerobic decomposition results in the preferential conversion of organic compounds in the wastewater into methane (CH_4), carbon dioxide (CO_2), and water rather than intermediate metabolites (VOC). The Natural Resources Conservation Service (NRCS) Field Office Technical Guide No. 359, Waste Treatment Lagoon, for California specifies the following criteria for the design of anaerobic treatment lagoons:

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

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

The NRCS guideline suggests that this system consist of two cells, a treatment lagoon

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

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

Solids Removal/Separation - Mechanical Separator(s)

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

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

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

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

4) Solids Removal/Separation

d. Step 4 - Cost Effectiveness Analysis

Aerobic Treatment Lagoon or Mechanically Aerated Lagoon

Aerobic Treatment Lagoon

NRCS Practice Standard Code 359 requires that naturally aerobic lagoons be designed to have a minimum treatment surface area as determined on the basis of daily BOD_5 loading per unit of lagoon surface. The standard specifies that the maximum loading rate of naturally aerobic lagoons shall not exceed the loading rate indicated by the NRCS Agricultural Waste Management Field Handbook (AWMFH) or the maximum loading rate according to state regulatory requirements, whichever is more stringent. According to Figure 10-30 (August 2009) of the latest version of the AWMFH, the maximum aerobic lagoon loading rate for the San Joaquin Valley is 45 - 55 lb-BOD_5/acre-day. According to Table 4-5 (March 2008) of the NRCS AWMFH, the total daily manure produced by a milk cow will have 2.9 lb-BOD_5/day. Assuming that at least 80% of the manure will be flushed to the lagoon system, the minimum lagoon surface area required for a naturally aerobic lagoon treating manure from 2,880 milk cows in the San Joaquin Valley can be calculated as follows:

BOD_5 loading (lb/day) = 2,880 milk cows x 2.9 lb-BOD_5/cow-day x 0.80
= 6,682 lb-BOD_5/day

Minimum Surface Area (acres) = 6,682 lb-BOD_5/day ÷ 55 lb-BOD_5/acre-day
= 121.5 acres

As shown above, the minimum surface area required for a naturally aerobic lagoon to treat manure from the proposed number of milk cows is 121.5 acres. This does not include the additional surface area that would be required to treat manure from support stock. Based on the space requirements alone it is clear that this option cannot reasonably be required and no further analysis is needed.

Mechanically Aerated Lagoon

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

Biological Oxygen Demand (BOD_5)

In order to effectively calculate the cost of this control option, the energy requirement for complete aeration must be determined. It should be noted that approximately 1.5 to 2.5 pounds of oxygen is required to digest 1 pound of Biological Oxygen Demand

(BOD_5) with additional oxygen required for conversion of ammonia to nitrate (nitrification). It is generally accepted that at least twice the BOD should be provided for complete aeration. According to Dr. Ruihong Zhang of the University of California, Davis, 2.4 lb (1.1 kg) of oxygen per cow must be provided each day for removal of BOD and an additional 3 lb (1.4 kg) per cow for oxidation of 70% of the nitrogen.

The proposed rule specifies that an aerobic lagoon be designed and operated in accordance with NRCS Practice Standard Code 359. NRCS Practice Standard Code 359 requires that mechanically aerated lagoons use aeration equipment that provides a minimum of one pound of oxygen for each pound of daily BOD_5 loading. As discussed above, the total daily manure produced by a milk cow will have a BOD_5 of 2.9 lb/day and a lagoon handling flushed manure from 2,880 milk cows will have a loading rate of approximately 6,682 lb-BOD_5/day (3,031 kg-BOD_5/day).

Energy Requirement

Based on the data gathered in a UC Davis study on aerator performance for wastewater lagoons, aeration efficiencies for mechanical aerators ranged from 0.10 to 0.68 kg of oxygen provided per kW-hr of energy utilized. The most efficient aerator tested that had been installed in dairy lagoons had an aeration efficiency of 0.49 kg-O_2/kW-hr. These efficiency tests were performed in clean water and lower aeration efficiencies are expected in liquid manure because of the significant amount of solids that it contains. The yearly energy requirement for a mechanically aerated lagoon system treating flushed manure from 2,880 milk cows is calculated as follows:

3,031 kg-BOD_5/day ÷ (0.68 kg-O_2/kW-hr) x (365 day/year) = 1,626,934 kW-hr/year

Cost of Electricity

The cost of electricity will be based upon the average price for industrial electricity in California as of September 2016, as taken from the Energy Information Administration (EIA) website:[17]

Average cost of electricity = $0.1233/kW-hr

The electricity cost for complete aeration is calculated as follows:

1,626,934 kW-hr/year x $0.1233/kW-hr = $200,601/year

VOC Emissions Reductions

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

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

the actual control from providing 1 lb of oxygen for every 1 lb of BOD_5 loading is probably in the 50% range.

The annual VOC emissions reductions are calculated as:

[Number of cows] x [Lagoon/Storage Pond VOC EF (lb/cow-year)] x [Complete Aeration Control Efficiency for Lagoon/Storage Pond]
= 2,880 cows x 1.3 lb-VOC/cow-yr x 90% control
= 3,370 lb-VOC/yr

Cost of Reductions

Cost of reductions = ($200,601/year)/[(3,370 lb-VOC/year)(1 ton/2000 lb)]
= $119,051/ton

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

Covered Lagoon Digester

Capital Cost for Installation

The capital cost estimates for installation of a covered lagoon digester are based on information from the United States EPA AgSTAR publication "Anaerobic Digestion Capital Costs for Dairy Farms" (May 2010)[18] and the California Energy Commission (CEC) Public Interest Energy Research (PIER) Program Dairy Methane Digester System Program Evaluation Report (Feb 2009).[19] The formula in the AgSTAR publication results in a capital cost of $1,032 per cow. This estimate excludes costs of solids separation after digestion, hydrogen sulfide removal, and utility charges including line upgrades and interconnection costs and fees. Based on information from installations in California, the CEC PIER Dairy Methane Digester Program Evaluation Report gives an average cost of $585 per cow for installation of covered lagoon anaerobic digesters (see Table 9 - Total Project Costs and Cost per Cow and per kW).

For the purposes of this analysis, the more conservative capital cost of $585/cow will be used. Thus, the installation capital cost for the proposed herd of 2,880 milk cows is at least $1,684,800 ($585/cow x 2,880 cows).

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

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

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

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

Where:

A = Equivalent annual capital cost of the control equipment

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

i = Interest rate (assumed to be 10%)

n = Equipment life (assumed to be 10 years)

$A = [\$1,684,800 \times 0.1(1.1)^{10}]/[(1.1)^{10}-1]$
$= \$274,193/year$

Potential Production of Electricity

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

The potential quantity of electricity produced is calculated as follows:

Electrical Produced = 670.3 kW-hr/(milk cow-yr) x 2,880 milk cows
= 1,930,464 kW-hr/yr

Potential Cost Savings from Production of Electricity

The value of electricity generated will be calculated using the previously cited EIA rate of $0.1233/kW-hr.

Potential Cost Savings 1,930,464 kW-hr/yr x $0.1233/kW-hr
= $238,026/yr

The annualized capital cost less the potential savings from electricity produced is $36,167 ($274,193 - $238,026).

VOC Emissions Reductions

The annual VOC emissions reductions are calculated as:

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

2,880 cows x 1.3 lb-VOC/cow-yr x 80% control
= 2,995 lb-VOC/yr

Cost of Reductions

Cost of reductions = ($36,167/year)/[(2,995 lb-VOC/year)(1 ton/2000 lb)]
= $24,152/ton

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

Anaerobic Treatment Lagoon and Solids Removal/Separation System

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

e. Step 5 - Select BACT

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

2. NH_3 Emissions

a. Step 1 - Identify all control technologies

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

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

Description of Control Technology

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

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

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

b. Step 2 - Eliminate technologically infeasible options

The option listed in Step 1 above is technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

The remaining option is listed below:

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

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

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

1. VOC Emissions

a. Step 1 - Identify all control technologies

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

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

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

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

Description of Control Technologies

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

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

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

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

This practice would only allow the irrigation of liquid manure to cropland from the secondary lagoon after proper treatment has taken place in a covered lagoon/anaerobic digester. Covered treatment lagoons are one type of anaerobic digester. An anaerobic digester is an enclosed basin or tank that is designed to facilitate the decomposition of wastewater by microbes in the absence of oxygen. The process of anaerobic decomposition results in the preferential conversion of organic compounds in the wastewater into methane (CH_4), carbon dioxide (CO_2), and water rather than intermediate metabolites (VOC). The gas generated by this process is known as biogas, waste gas or digester gas. In addition to methane and carbon dioxide, biogas also contains small amounts of Nitrogen (N_2), Oxygen (O_2), Hydrogen Sulfide (H_2S), and Ammonia (NH_3). Biogas will also include trace amounts of various VOC that remain from incomplete digestion of the volatile solids in the incoming wastewater. The small amounts of undigested solids are removed from the digester as sludge.

Assumptions:

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

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

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

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

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

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

- Required volume - the minimum design volume should account for all potential sludge, treatment, precipitation, and runoff volumes.
- Treatment period - retention time of the material in the lagoon shall be the time required to provide environmentally safe utilization of waste. The minimum hydraulic retention time for a covered lagoon in the San Joaquin Valley is about 38 days.
- Waste loading shall be based on the maximum daily loading considering all waste sources that will be treated by the lagoon. The loading rate is typically based on volatile solids (VS) loading per unit of volume. The suggested loading rate for the San Joaquin Valley is 6.5 - 11 lb-VS/1000 ft^3/day depending on separation and type of system.

- The operating depth of the lagoon shall be 12 feet or greater. Maximizing the depth of the lagoon minimizes the surface area, which in turn minimizes the cover size and cost. Increasing the lagoon depth has the following advantages:
    - Minimizes surface area in contact with the atmosphere, thus reducing surface available to convection, evaporation
    - Smaller surface areas provide a more favorable and stable environment for methane bacteria
    - Better mixing of lagoon due to rising gas bubbles
    - Requires less land
    - More efficient for mechanical mixing

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

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

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) Irrigation of crops using liquid/slurry manure from an aerobic treatment lagoon or mechanically aerated lagoon (95% control efficiency)
2) Irrigation of crops using liquid/slurry manure from a holding/storage pond after being treated in a covered lagoon/digester (80% control efficiency)

3) Irrigation of crops using liquid/slurry manure from the secondary lagoon/holding/storage pond where preceded by an uncovered anaerobic treatment lagoon designed to meet Natural Resources Conservation Service (NRCS) standards (40% control efficiency)

d. Step 4 - Cost Effectiveness Analysis

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

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

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

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

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

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

e. Step 5 - Select BACT

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

2. NH_3 Emissions

a. Step 1 - Identify all control technologies

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

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

Description of Control Technology

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

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

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

b. Step 2 - Eliminate technologically infeasible options

The option listed in Step 1 above is technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

The remaining option is listed below:

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

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

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

1. VOC Emissions

a. Step 1 - Identify all control technologies

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

1) In-Vessel/Enclosed Negatively-Aerated Static Pile (ASP) Vented to a Biofilter
2) Negatively-Aerated Static Pile (ASP) Vented to a Biofilter
3) Enclosed Negatively-Aerated Static Pile (ASP)
4) Open Negatively-Aerated Static Pile (ASP)
5) All Animals Fed in Accordance With National Research Council (NRC) or Other District-Approved Guidelines

Description of Control Technologies

1) Open Negatively-Aerated Static Pile (ASP)

Aerated static piles are piles that are aerated directly with forced or drawn air systems to speed up the compost process. The aerated static pile is constructed to allow forced airflow (low pressure-high volume blowers and a piping system) so that the oxygen supply can be more accurately controlled. The material is piled over perforated pipes connected to a blower to withdraw air from the pile. The result is improved control of aerobic degradation or decomposition of organic waste and biomass bulking agents. This is considered a more efficient composting method than the industry standard of windrow composting.

VOC emissions primarily occur during the active and curing phases of the composting. To ensure consistent temperatures and prevent escape of odors and VOCs, the piles should be covered with a thick layer (12 to 18 inches) of finished compost or bulking agent.

With positive pressure aeration, contaminated air is pushed through the pile to the outer surface; therefore, making it difficult to be collected for odor treatment. However, positive pressure aeration is more effective at cooling the pile because it provides better airflow.

With negative aeration, air is pulled through the pile from the outer surface. Contaminated air is collected in the aeration pipes and can be directed to an odor treatment system. To avoid clogging, condensed moist air drawn from the pile must be removed before reaching the blower. Negative aeration might create uneven drying of the pile due to its airflow patterns.

A study conducted by City of Columbus, Ohio, demonstrated that the weighted-average odor emissions from an outdoor negative aeration pile is approximately 67% lower than

those from an outdoor positive aeration pile. Negative aeration is usually used during the beginning of the composting process to greatly reduce odors. In enclosed active composting area, negative pressure aeration also reduces moisture released into the building, and thus, reduces fogging. Positive aeration is used mostly near the end of the composting cycle for more efficient drying of the compost.[20]

An odor and emissions study done at the City of Philadelphia biosolids co-composting facility by the Department of Water[21] also concluded that controlling the temperature by controlling the oxygen availability using negative aeration composting is expected to result in lower emissions than those from open windrow composting.

The control efficiency can be estimated from the Technology Assessment for SCAQMD Proposed Rule 1133 Table 3-2 which uses a capture efficiency of 25 to 33% from an open ASP and multiplies it by a conservative 80% control equipment efficiency. The average control efficiency for open aerated static piles based on the Technology Assessment is 23.2%. Additional emission reduction potential from open ASPs cannot be quantified at this time. Therefore, a conservative control efficiency of 23.2% will be applied to the ASP.

2) Negatively-Aerated Static Piles (ASP) Vented to a Biofilter

This technology is the same as that described above for negatively aerated static piles except that the exhaust gases are vented to a biofilter. As discussed above negative aeration appears to be more efficient in reducing odors and emissions than positive aeration.

Biofiltration is an air pollution control technology that uses a solid media to absorb and adsorb compounds in the air stream and retains them for subsequent biological oxidation. A biofilter consists of a series of perforated pipes laid in a bed of gravel and covered with an organic media. As the air stream flows up through the media, the odorous compounds are removed by a combination of physical, chemical and biological processes. However, depending upon the airflow from the composting material and the design and material selection for the biofilter, the organic matter could quickly deteriorate.

In the biofiltration process, live bacteria biodegrade organic contaminants from air into carbon dioxide 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 harmless to humans unless ingested. Chemically, the biodegradation reaction for aerobic cultures is written as:

$$\text{Organic(s)} + \text{Oxygen} + \text{Nutrients} + \text{Microorganisms} \Rightarrow CO_2 + H_2O + \text{Microorganisms}$$

[20] Technology Assessment for SCAQMD proposed Rule 1133 Table 3-2.
[21] Conclusion # 2, "Measurement and Control of Odor and VOC emissions from the largest municipal aerated-static pile biosolids composting facility in the United States". William Toffey, Philadelphia Water Department; Lawrence Hentz, Post, Buckley, Shuh and Jerigan.

The organic(s) are air contaminants, the oxygen is in air, the nutrients are nitrogen and phosphorus mineral salts needed for microbial growth and the microorganisms are live bacteria on the biofilter media.

Biofiltration is a well-established emissions control technology in Europe where over two hundred biofilters were in use as of 1984 and even more are expected today. In the United States, biofilters have been mainly utilized for the treatment of odors as well as VOCs in wastewater treatment plants. Based on the information collected by SCAQMD, existing biofilter composting applications have achieved control efficiencies of about 80% to 90% for VOC and 70% to over 90% for ammonia (one of this composting applications reported an initial control efficiency of 65 percent for VOC but was later improved to achieve an 80 percent control efficiency). This specific field example along with other available data presented in SCAQMD's Technology Assessment Report demonstrates that a well-designed, well-operated, and well-maintained biofilter is capable of achieving 80% control efficiency for VOC and ammonia.[22]

Thus, the overall control efficiency for an open negatively-aerated ASP vented to a biofilter is approximately 84.6%, i.e. [23.2% + ((1 – 23.2%) x 80%)].

3) Enclosed Negatively-Aerated Static Pile (ASP)

An enclosed aerated static pile uses the same forced aeration principle of an open ASP, except that the entire pile is fully enclosed, either inside a building or with a tarp around it.

There are a few companies that are promoting this type of system. In this analysis, the following two companies will be discussed: AgBag International Ltd and the Gore Cover. Both technologies are briefly described below:

AgBag International Ltd.

The AgBag system was developed by Compost Technology International and is based in Oregon. The system has controlled aeration capabilities and has minimal space requirements. It is suited for small to mid-size composting. The system is comprised of the following components:

- Large sealed bags (pods) of adjustable length up to 200 ft, either 5 ft or 10 ft diameter
- 9 mm recyclable plastic (not re-usable)
- Adjustable aeration system with inserted valved vents
- Hopper, mixer & compost compactor

The Ag-Bag Environmental system provides a cycle time of as little as 8 weeks. Curing adds another 30 to 60 days. AgBag states that three annual composting cycles could be obtained. The area needed to compost is determined by the volume of waste material.

[22] SCAQMD Final Staff Report for Rule 1133, page 18.

Mixing – A composite mix of materials needs to be balanced for proper carbon to nitrogen (C:N) ratio. This means a mix of greens (nitrogen sources) to browns (carbon sources). The best ratio that AgBag recommends is between 20 to 40:1, with 30:1 being ideal.

The oxygen supply is replenished by forced aeration. This eliminates the labor-intensive need to turn piles. Temperature monitors indicate when the airflow needs adjusting to maintain proper temperatures. Moisture is adjusted at time of filling or added to the total mixture upon blending. The compost matrix is sufficient in size to maintain heat, even in cold climates. The system contains vents throughout to allow air to escape. These vents are controlled by the operator. Ag-Bag is considered an in-vessel system.

After 8-12 weeks of composting, the compost cycle is completed. The "Pod", as AgBag likes to call it, is opened and the material is static piled for 30-60 days to cure or mature.

A representative of AgBag has claimed very high control efficiencies for both VOCs and ammonia and has claimed that the system acts as its own biofilter, thus reducing emissions. However, VOC and ammonia control efficiencies are not readily available at this time. Furthermore, AgBag has not provided any technical information to support their claimed level of control.

AgBag is working closely with SCAQMD and the Milk Producers Council to perform a pilot study to evaluate the efficiency of this technology. Until the study is completed, this technology will be conservatively assumed to control emissions by at least 10% more than open aerated static piles, with a minimum control efficiency of 33.2%. Once the study is completed, the District will be able to more accurately determine the control efficiency for this technology.

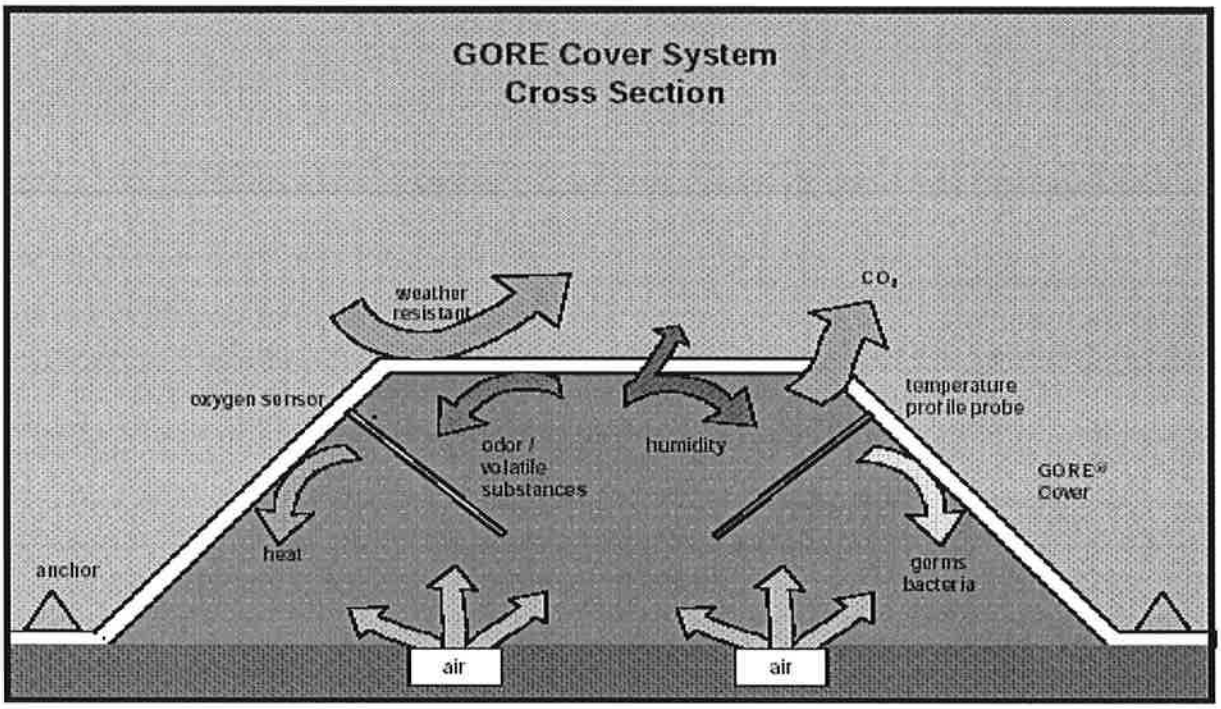
Gore Cover

The Gore Cover, manufactured by Gore Creative Technologies Worldwide, utilizes positive aeration and a specially designed cover to create an enclosed system that controls odors, microorganisms and creates a consistent product unaffected by outside environmental conditions. Medium pressure aerators connect to aeration pipes on the floor or aeration ducts in the floor. Stainless steel probes inserted into the pile monitor oxygen and temperature parameters. The data is relayed to and stored in a computer. This data controls the aerators to keep pile conditions consistent. The Gore Cover system can significantly reduce odors by the controlled use of a semi permeable membrane that is permeable to oxygen but impermeable to large molecules. The cover protects the pile from weather conditions, but allows release of CO_2. These controlled conditions allow consistent product to be produced without risk of damp pockets that may create anaerobic conditions and increased odors.

In addition to the membrane, which covers the organic material during composting, the system includes a concrete floor and wall, blowers for aeration, and a winder for efficient movement of the cover. The system also requires consistent management including preparation of materials to achieve a homogenous mixture with moisture content of 55-60% and monitoring of temperature and oxygen levels. With this system, the composting process takes eight weeks. The "heap" of organic material is covered by

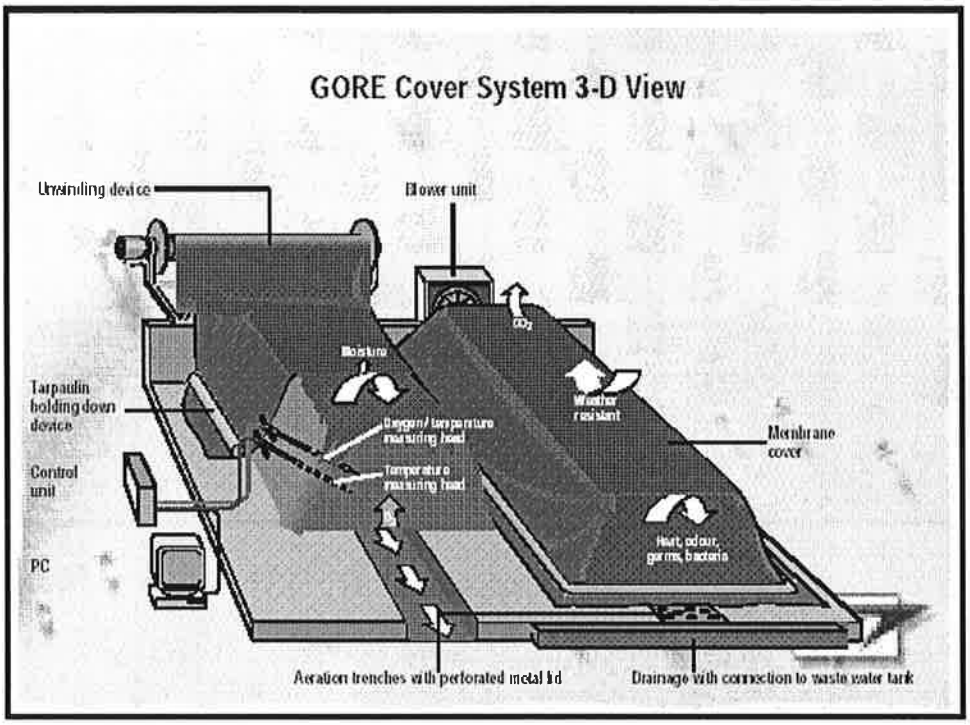
the membrane, which is secured to the ground, allowed to compost for four weeks, then moved and re-covered for two weeks for stabilization. During the final two weeks of curing, the heap is uncovered.

A fine film of condensation develops during the composting process that collects on the inside cover. According to the manufacturer, the moisture helps to dissolve the gases. The condensation then drips back onto the pile, where they can continue to be broken down by the composting process.



The system, according to Gore Cover, shortens the time required to produce finished, premium compost, as follows:

- First zone – Four weeks – Material stays on the initial placement zone in-vessel
- Second zone – Two weeks – Material moved to another in-vessel zone with minimizing addition of water. Water addition is nominal because the in-vessel system retains the initial moisture within the system and only releases minimal amounts.
- Third zone – Two weeks – the final move is to a third uncovered zone.
- Screening – Material will be screened then ready to sell within 15 days.



There is no control efficiency available at this time for enclosed aerated static piles. A study is underway by SQAQMD and the Milk Producers Council to determine the control efficiencies for VOC and ammonia emissions from enclosed aerated composting systems. Until the study is completed, this technology will be conservatively assumed to control emissions by 10% more than open aerated static piles, with a minimum control efficiency of 33.2% until additional data are available.

4) <u>In-Vessel/Enclosed (Building, AgBag, Gore Cover, or Equivalent) Negatively-Aerated Static Pile (ASP) Vented to a Biofilter</u>

An in-vessel aerated static pile uses the same forced aeration principle of an open ASP, except that the entire pile is fully enclosed, either inside of a building or with a tarp around it. In addition to the in-vessel ASP, the biogas must be sent to a biofilter capable of reducing at least 80% emissions.

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 NH3." The overall control efficiency of this technology is equal to the combined control efficiencies of the enclosed aerated system (33.2%) and the biofilter (80%), calculated as follows:

CE = [33.2% + ((1 – 33.2%) x 80%) = 86.6%

5) <u>All Animals Fed in Accordance With NRC or Other District-Approved Guidelines</u>

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. This undigested protein also produces ammonia emissions. The level of microbial action in the manure corresponds to the level of organic nitrogen content in the manure; the lower the level of nitrogen the lower the level of microbial action and the lower the production of ammonia and VOCs.

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

As discussed in preceding sections, feeding in accordance with NRC or other District-approved guidelines will be conservatively assumed to have a control efficiency of only 5-10%.

b. Step 2 - Eliminate technologically infeasible options

All technologies listed in step 1 are currently considered to be technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

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

1) In-Vessel/Enclosed Negatively-Aerated Static Pile (ASP) Vented to a Biofilter (≈86.6% control)
2) Open Negatively-Aerated Static Pile (ASP) Vented to a Biofilter (≈84.6% control)
3) Enclosed Negatively-Aerated Static Pile (ASP) (≈33.2% control)
4) Open Negatively-Aerated Static Pile (ASP) (≈23.2% control)
5) All Animals Fed in Accordance With NRC or Other District-Approved Guidelines (≈5% control)

d. Step 4 - Cost Effectiveness Analysis

Options 1 and 2: In-Vessel/Enclosed Negatively-Aerated Static Piles Vented to Biofilter; or Open Negatively-Aerated Static Piles Vented to Biofilter

The following costs are taken from the final staff report for District Rule 4565 - Biosolids, Animal Manure, and Poultry Litter Operations (May 30, 2007).[23] The cost information is

[23] The capitol and operation costs for ASP and in-vessel composting given in the final staff report were taken from: United States Environmental Protection Agency, "Biosolids Technology Fact Sheet: Use of Composting for Biosolids Management" EPA 832-F-02-024, September 2002, http://water.epa.gov/scitech/wastetech/upload/2002_10_15_mtb_combioman.pdf. These costs were not adjusted for inflation

based on a large composting facility with a throughput of 200,000 wet tons per year. On a per ton basis the costs for smaller composting facilities would be higher since there would not be the economies of scale for building and operations created by large composting facilities.

Low Cost Scenario: ASP & Biofilter (200,000 wet ton/yr)	
Total Capital Cost	$7,775,000
Annualized capital cost (10% interest - 10 years)	$1,265,345
Total Annual O & M Cost	$124,305
Total Annualized Cost - ASP & Biofilter (Low-Estimate of Annual Costs) ($/yr/facility)	**$1,389,650**

High Cost Scenario: In-Vessel and RTO (200,000 wet ton/yr)	
Total Capital Cost	$21,185,000
Annualized capital cost (10% interest - 10 years)	$3,447,761
Total Annual O & M Cost	$285,910
Total Annualized Cost - In-Vessel & RTO (High-Estimate of Annual Costs) ($/yr/facility)	**$3,733,671**

The final staff report for District Rule 4565 stated that the use of ASPs and in-vessel composting would have unreasonably high costs for facilities that have a throughput of less than 100,000 wet tons per year. The costs given above are for a facility with a throughput of 200,000 wet tons per year. It will conservatively be assumed that the cost for a facility with a throughput of 100,000 wet tons per year will be half of the values given above. Therefore, the cost estimates for a facility with a throughput of 100,000 are as follows:

Low Annual Capital Cost Estimate (100,000 wet ton/yr) = $694,825/year

High Annual Capital Cost Estimate (100,000 wet ton/yr) = $1,866,836/year

Because it has been determined that composting or storing solid manure removed from dairy cow housing in an ASP or enclosure vented to a control device would not be cost-effective for a facility with a throughput of less than 100,000 tons per year, this analysis will be based on a dairy facility that can produce 100,000 tons of solid manure per year.

Number of Cows to Produce 100,000 ton/yr of Solid Manure

According to the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Agricultural Waste Management Field Handbook (AWMFH), Chapter 4 - Agricultural Waste Characteristics (March 2008), dairy cows in scraped open corrals produce approximately 77 lb per day of solid manure that can be

removed and transferred for storage or composting. The amount of solid manure removed for dairy cows housed in corrals or freestall barns with a flush system would be much less. The number of cows needed to produce 100,000 ton/year of solid manure is calculated as follows:

(100,000 ton/year x 2,000 lb/ton) ÷ (77 lb/cow-day x 365 day/yr) = 7,116 cows

VOC Emission Reductions from an ASP or Enclosure Handling Solid Manure from 7,116 Milk Cows:

The annual VOC emission reductions for ASP or in-vessel enclosure handling the solid manure from 7,116 milk cows are calculated as follows and shown in the table below:

[Number of cows] x [Solid Manure VOC EF (lb/cow-year)] x [ASP/In-Vessel Capture Efficiency] x [Control Device VOC Control Efficiency]

VOC Reductions for Dairy Solid Manure in ASP or Enclosure Vented to a Biofilter									
Category	**# of cows**	**x**	**Solid Manure Land Application EF (lb/cow-yr)**	**x**	**Capture (%)***	**x**	**Control (%)**	**=**	**lb-VOC/yr**
Milk Cow	7,116	x	0.33	x	50%	x	80%	=	939

*The capture efficiency is conservatively assumed to be 50%. The technical assessment of SCAQMD Rule 1133.2 and the staff report for District Rule 4565 give a capture efficiency of 33% for composting facilities, which would result in lower emission reductions.

Cost of VOC Emission Reductions

Low Estimate = ($694,825/year)/[(939 lb-VOC/year)(1 ton/2000 lb)]
= $1,479,925/ton of VOC reduced

High Estimate = ($1,866,836/year)/[(939 lb-VOC/year)(1 ton/2000 lb)]
= $3,976,222/ton of VOC reduced

As shown above, the cost alone of an ASP or in-vessel enclosure vented to a biofilter to handle the solid manure at a dairy would cause the cost of the VOC reductions to be greater than $1,479,925/ton. The excessively high costs of this option make it impractical for most confined animal facilities. Therefore, these control technologies are not cost effective.

Options 3 and 4: Enclosed or Open Negatively-Aerated Static Pile (ASP)

Cost effectiveness was evaluated by SCAQMD for a variety of controls for new and existing co-composting facilities based on implementation of several possible scenarios. The cost effectiveness for new co-composting facilities was estimated to be about $24,000 to $27,000 per ton of VOC reduced or $11,000 to $12,000 per ton of VOC and ammonia reduced based on fabric or concrete type of enclosure for the active phase of composting and forced aeration system for the active and curing phases vented to a bio-filter.[24]

[24] Final Staff report for proposed Rule 1133, 1133.1, and 1133.2).

For existing co-composting operations, SCAQMD analyzed a few different scenarios. Under one of the scenarios, assuming enclosure without an aeration system for active phase of composting and a forced aeration system for curing phase (both vented to a biofilter) and depending on the type of enclosure, the cost-effectiveness ranged from $11,400 to $15,400 per ton of VOC and ammonia reduced, or $30,000 to $40,000 per ton of VOC reduced. Under another scenario, using enclosure and aeration system for active phase, and aeration system for curing phase, both vented to biofilter, the cost effectiveness ranged from $8,700 to $10,000 per ton of VOC and ammonia reduced or $23,000 to $26,500 per ton of VOC reduced (depending on the type of enclosure). Under another scenario, assuming that forced aeration system (in combination with process controls, optimized feedstock mix ratios, and best management practices) for both active and curing phases (combined with a biofiltration system) could achieve the required reductions (i.e., 70% for VOC and ammonia), the cost-effectiveness could be as low as $6,500 per ton of VOC and ammonia reduced or $17,000 per ton of VOC reduced. However, SCAQMD stated that additional test data would be necessary to validate the efficiency of such control methods.[25]

The VOC and ammonia baseline emission factors used in the cost effectiveness analysis (also included in Rule 1133.2), were developed based on the AQMD source tests conducted in 1995 and 1996 for three windrow co-composting facilities (1.78 pounds of VOC and 2.93 pounds of ammonia per ton of throughput). These emission factors do not accurately represent the baseline emissions of manure storage piles from dairy/calf facilities. The emission factor for manure piles may in fact be lower.

Enclosed ASP, or in-vessel systems with control equipment, while feasible and effective at significantly reducing emissions, are costly. There may be additional emission reductions associated with ASP systems that have not been quantified in this evaluation. Additional testing of ASP systems, such as the ones discussed in this evaluation would allow the emission reduction potential of all control scenarios to be refined.

Therefore, these aerated static pile composting systems will be eliminated at this time.

All Animals Fed in Accordance With NRC or Other District-Approved Guidelines

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

e. Step 5 - Select BACT

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

[25] The cost assumptions used in this analysis (capital and operating cost) are included in the Technology Assessment Report for SCAQMD PR1133 (Attachment A to the Final Staff Report).

2. NH_3 Emissions

a. Step 1 - Identify all control technologies

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

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

Description of Control Technologies

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

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

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) All animals Fed in Accordance With National Research Council (NRC) or Other District-Approved Guidelines.

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

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

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

1. VOC Emissions

a. Step 1 - Identify all control technologies

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

1) Land Application of Solid Manure Processed by In-Vessel/Enclosed Negatively-Aerated Static Pile (ASP) Vented to a Biofilter
2) Land Application of Solid Manure Processed by Negatively-Aerated Static Pile (ASP) Vented to a Biofilter
3) Land Application of Solid Manure Processed by Enclosed Negatively-Aerated Static Pile (ASP)
4) Land Application of Solid Manure Processed by Open Negatively-Aerated Static Pile (ASP)
5) Rapid Incorporation of Solid Manure into the Soil After Land Application

Description of Control Technologies

1) Land Application of Solid Manure Processed by In-Vessel/Enclosed Negatively-Aerated Static Pile (ASP) Vented to a Biofilter
2) Land Application of Solid Manure Processed by Negatively-Aerated Static Pile (ASP) Vented to a Biofilter
3) Land Application of Solid Manure Processed by Enclosed Negatively-Aerated Static Pile (ASP)
4) Land Application of Solid Manure Processed by Open Negatively-Aerated Static Pile (ASP)

For options 1) through 4), the control technologies required for processing the manure prior to land application are the same ones described in the preceding section.

5) Rapid Incorporation of Solid Manure Into the Soil After Land Application

Various types of spreading techniques, such as box spreaders, flail type spreaders, side discharge spreaders, and spinner spreaders, are used to apply solid manure to cropland. Regardless of which technique is used, this practice requires the immediate incorporation of the manure into the soil, reducing emissions and surface run-off while minimizing the loss of nitrogen into the atmosphere. Based on a study by a local Valley

dairy, there is a great potential of reducing emissions by incorporating slurry manure rapidly into the soil. A similar reduction may be obtained by the rapid incorporation of solid manure. This technology is expected to yield a VOC control efficiency of up to 58%.[26]

b. Step 2 - Eliminate technologically infeasible options

All technologies listed in step 1 are currently considered to be technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

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

1) Land Application of Solid Manure Processed by In-Vessel/Enclosed Negatively-Aerated Static Pile (ASP) Vented to a Biofilter
2) Land Application of Solid Manure Processed by Negatively-Aerated Static Pile (ASP) Vented to a Biofilter
3) Land Application of Solid Manure Processed by Enclosed Negatively-Aerated Static Pile (ASP)
4) Land Application of Solid Manure Processed by Open Negatively-Aerated Static Pile (ASP)
5) Rapid Incorporation of Solid Manure into the Soil After Land Application

d. Step 4 - Cost Effectiveness Analysis

Options 1 through 4: Aerated Static Pile Composting

As determined in the preceding section, the composting technologies required for these control options are not cost effective.

Option 5: Rapid Incorporation of Solid Manure into the Soil After Land Application

This practice is currently used at many dairies and can easily be incorporated into existing and new dairies. Therefore, a cost effective analysis will not be performed.

e. Step 5 - Select BACT

The Achieved in Practice option is determined to be BACT. Therefore, BACT for this category is rapid incorporation of solid manure into the soil after land application.

[26] Page 87 of "Recommendations to the San Joaquin Valley Air Pollution Control Officer Regarding Best Available Control Technology for Dairies in the San Joaquin Valley" January 31, 2006 (http://www.valleyair.org/busind/pto/dpag/dpag_idx.htm).

2. NH_3 Emissions

a. Step 1 - Identify all control technologies

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

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

Description of Control Technologies

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

Various types of spreading techniques, such as box spreaders, flail type spreaders, side discharge spreaders, and spinner spreaders, are used to apply solid manure to cropland. Regardless of which technique is used, this practice requires the immediate incorporation of the manure into the soil, reducing emissions and surface run-off while minimizing the loss of nitrogen into the atmosphere. Based on a study by a local Valley dairy, there is a great potential of reducing emissions by incorporating slurry manure rapidly into the soil. A similar reduction may be obtained by the rapid incorporation of solid manure. This technology is expected to yield a NH3 control efficiency ranging from 49% to upwards of 98%.[27]

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

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

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

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

d. Step 4 - Cost Effectiveness Analysis

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

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

e. Step 5 - Select BACT

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

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

VOC Emissions

a. Step 1 - Identify all control technologies

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

1) District Rule 4570 measures

Description of Control Technology

District Rule 4570 measures

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

other ground cereal grains; removal of uneaten wet feed from feeding areas; and preparing TMR with a minimum moisture content, which reduces VOC since most of the compounds emitted are higly soluble in water.

b. Step 2 - Eliminate technologically infeasible options

The option identified in step 1 is technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

Only one option was previously identified in step 1:

1) District Rule 4570 measures

d. Step 4 - Cost Effectiveness Analysis

District Rule 4570 Measures

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

e. Step 5 - Select BACT

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

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

VOC Emissions

a. Step 1 - Identify all control technologies

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

2) District Rule 4570 measures

Description of Control Technology

District Rule 4570 measures

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

other ground cereal grains; removal of uneaten wet feed from feeding areas; and preparing TMR with a minimum moisture content, which reduces VOC since most of the compounds emitted are higly soluble in water.

b. Step 2 - Eliminate technologically infeasible options

The option identified in step 1 is technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

Only one option was previously identified in step 1:

2) District Rule 4570 measures

d. Step 4 - Cost Effectiveness Analysis

District Rule 4570 Measures

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

e. Step 5 - Select BACT

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

Appendix G

RMR and AAQA Summary

San Joaquin Valley Air Pollution Control District
Risk Management Review

To:	Jonah Aiyabei – Permit Services
From:	Cheryl Lawler – Technical Services
Date:	November 16, 2016
Facility Name:	Jose Soares Dairy
Location:	Road 1 & Avenue 20, Dos Palos
Application #(s):	C-7180-6-0, 7-0, 8-0, 9-0, 10-0
Project #:	C-1132675

A. RMR SUMMARY

RMR Summary						
Categories	**Milk Parlor (Unit 6-0)**	**Cow Housing (Unit 7-0)**	**Liquid Manure & Land Application (Unit 8-0)**	**Solid Manure Piles (Unit 9-0)**	**Project Totals**	**Facility Totals**
Prioritization Score	0.65	28.0	39.9	0.24	>1.0	>1.0
Acute Hazard Index	0.00	0.00	0.52	0.03	0.55	0.55
Chronic Hazard Index	0.00	0.00	0.00	0.00	0.01	0.01
Maximum Individual Cancer Risk	1.52E-08	8.28E-09	6.61E-07	N/A[1]	6.84E-07	6.84E-07
T-BACT Required?	**No**	**No**	**No**	**No**		
Special Permit Requirements?	**No**	**No**	**No**	**No**		

[1]There are no Cancer slope factors for any of the pollutants under analysis for this unit.

B. RMR REPORT

I. Project Description

Technical Services received a request on October 12, 2016, to perform a Risk Management Review (RMR) and Ambient Air Quality Analysis (AAQA) for a new proposed dairy consisting of 6,524 total dairy animals (Units 6-0, 7-0, 8-0, & 9-0).

The project also includes Unit 10-0 (Feed Storage & Handling). However, no review and analysis is required for this unit through the RMR & AAQA processes.

II. Analysis

Toxic emissions for the milk parlor, cow housing, lagoons, solid manure piles, and land application were calculated using emission factors derived from the District's evaluation of dairy research studies conducted by California colleges and universities. PM based toxic emissions for the cow housing were calculated using emission factors generated from using the worst case composite of the 1997 EPA speciation of Kern County feedlot soil. Emission

rates were then input into the San Joaquin Valley APCD's Hazard Assessment and Reporting Program (SHARP). In accordance with the District's Risk Management Policy for Permitting New and Modified Sources (APR 1905, May 28, 2015), risks from the project were prioritized using the procedures in the 1990 CAPCOA Facility Prioritization Guidelines. The prioritization score for this proposed facility was greater than 1.0 (see RMR Summary Table). Therefore, a refined health risk assessment was required. The AERMOD model was used, with the parameters outlined below and meteorological data for 2004-2008 from Los Banos to determine the dispersion factors (i.e., the predicted concentration or X divided by the normalized source strength or Q) for a receptor grid. These dispersion factors were input into the SHARP Program, which then used the Air Dispersion Modeling and Risk Tool (ADMRT) of the Hot Spots Analysis and Reporting Program Version 2 (HARP 2) to calculate the chronic and acute hazard indices and the carcinogenic risk for the project.

The H2S Calculator spreadsheet was used to calculate the Acute Hi from H2S in the lagoons.

The following parameters were used for the review:

Analysis Parameters Unit 6-0 Milk Parlor			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	3,162	**Release Height (m)**	1
# of Cows	6,524*	**Ammonia (lb/hr)**	0.05
		Ammonia(lb/yr)	394

*Used to calculate VOC TAC emissions

Analysis Parameters Unit 7-0 (Freestall Barn 1)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	13,536	**Release Height (m)**	1
PM10 (lb/hr)	0.05	**PM10 (lb/yr)**	489
VOC (lb/hr)	0.51	**VOC (lb/yr)**	4,488
Ammonia (lb/hr)	1.16	**Ammonia (lb/yr)**	10,142

Analysis Parameters Unit 7-0 (Special Needs Barn A)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	10,826	**Release Height (m)**	1
PM10 (lb/hr)	0.03	**PM10 (lb/yr)**	271
VOC (lb/hr)	0.16	**VOC (lb/yr)**	1,407
Ammonia (lb/hr)	0.33	**Ammonia (lb/yr)**	2,849

Analysis Parameters Unit 7-0 (Special Needs Barn B)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	2,653	**Release Height (m)**	1
PM10 (lb/hr)	0.02	**PM10 (lb/yr)**	196
VOC (lb/hr)	0.03	**VOC (lb/yr)**	307
Ammonia (lb/hr)	0.07	**Ammonia (lb/yr)**	621

Analysis Parameters Unit 7-0 (Freestall Barns 3, 4)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	22,799	**Release Height (m)**	1
PM10 (lb/hr)	0.07	**PM10 (lb/yr)**	611
VOC (lb/hr)	0.64	**VOC (lb/yr)**	5,610
Ammonia (lb/hr)	1.45	**Ammonia (lb/yr)**	12,677

Analysis Parameters Unit 7-0 (Freestall Barns 5, 6)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	25,269	**Release Height (m)**	1
PM10 (lb/hr)	0.07	**PM10 (lb/yr)**	611
VOC (lb/hr)	0.64	**VOC (lb/yr)**	5,610
Ammonia (lb/hr)	1.45	**Ammonia (lb/yr)**	12,677

Analysis Parameters Unit 7-0 (Freestall Barns 7, 8)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	6,317	**Release Height (m)**	1
PM10 (lb/hr)	0.04	**PM10 (lb/yr)**	346
VOC (lb/hr)	0.16	**VOC (lb/yr)**	1,380
Ammonia (lb/hr)	0.22	**Ammonia (lb/yr)**	1,882

Analysis Parameters Unit 7-0 (Heifer Pens 1, 2)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	7,897	**Release Height (m)**	1
PM10 (lb/hr)	0.05	**PM10 (lb/yr)**	486
VOC (lb/hr)	0.07	**VOC (lb/yr)**	609
Ammonia (lb/hr)	0.09	**Ammonia (lb/yr)**	830

Analysis Parameters Unit 7-0 (Dry Cow Pens 1, 2)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	7,897	**Release Height (m)**	1
PM10 (lb/hr)	0.07	**PM10 (lb/yr)**	575
VOC (lb/hr)	0.10	**VOC (lb/yr)**	899
Ammonia (lb/hr)	0.21	**Ammonia (lb/yr)**	1,821

Analysis Parameters Unit 7-0 (Heifer Pens 3, 4, 5, 6)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	6,317	**Release Height (m)**	1
PM10 (lb/hr)	0.05	**PM10 (lb/yr)**	486
VOC (lb/hr)	0.07	**VOC (lb/yr)**	609
Ammonia (lb/hr)	0.09	**Ammonia (lb/yr)**	830

Analysis Parameters Unit 7-0 (Heifer Pens 7, 8, 9, 10, 11, 12, 13, 14)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	2,764	**Release Height (m)**	1
PM10 (lb/hr)	0.04	**PM10 (lb/yr)**	324
VOC (lb/hr)	0.05	**VOC (lb/yr)**	406
Ammonia (lb/hr)	0.06	**Ammonia (lb/yr)**	554

Analysis Parameters Unit 7-0 (Heifer Pens 15, 16, 17)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	1,394	**Release Height (m)**	1
PM10 (lb/hr)	0.05	**PM10 (lb/yr)**	486
VOC (lb/hr)	0.03	**VOC (lb/yr)**	305
Ammonia (lb/hr)	0.05	**Ammonia (lb/yr)**	415

Analysis Parameters Unit 7-0 (Heifer Pens 18, 19, 20, 21, 22, 23)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	581	**Release Height (m)**	1
PM10 (lb/hr)	0.03	**PM10 (lb/yr)**	259
VOC (lb/hr)	0.02	**VOC (lb/yr)**	162
Ammonia (lb/hr)	0.03	**Ammonia (lb/yr)**	221

Analysis Parameters Unit 7-0 (Calf Hutch Area)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	5,574	**Release Height (m)**	1
PM10 (lb/hr)	0.004	**PM10 (lb/yr)**	41
VOC (lb/hr)	0.01	**VOC (lb/yr)**	100
Ammonia (lb/hr)	0.01	**Ammonia (lb/yr)**	122

Analysis Parameters Unit 8-0 Liquid Manure Handling			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	25,850	**Release Height (m)**	0
# of Cows	6,524*	**Ammonia (lb/hr)**	0.54
		Ammonia(lb/yr)	4,718

*Used to calculate VOC TAC emissions

Analysis Parameters Unit 9-0 Solid Manure Handling			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	3,807	**Release Height (m)**	0
Ammonia (lb/hr)	0.6	**Ammonia(lb/yr)**	5,264

Analysis Parameters (Units 8-0 & 9-0) Land Application*			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	3,377,197	**Release Height (m)**	0
Unit 8-0 Land Application Ammonia (lb/hr)	1.68	**Unit 8-0 Land Application Ammonia (lb/yr)**	14,710
Unit 9-0 Land Application Ammonia (lb/hr)	0.68	**Unit 9-0 Land Application Ammonia (lb/yr)**	5,986

*Ammonia emissions for both liquid manure and dry manure application were evaluated based on farmland application area. The risk from land application was associated with Unit 8-0.

AAQA

In addition to the RMR, Technical Services performed modeling for the criteria pollutant PM_{10} using AERMOD. The emission rate used was 13,803 lbs PM_{10}/year. The results from the Criteria Pollutant Modeling are as follows:

PM_{10} Pollutant Modeling Results
Values are in $\mu g/m^3$

Category	24 Hours	Annual
Net Value	9.54	1.57
Interim Significance Level	10.4[1]	2.08[1]
Result	Pass	Pass

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

H_2S Pollutant Modeling Results*
Values are in $\mu g/m^3$

Category	1 Hour
Max Quarterly Value	32.08
Interim Significance Level	42[1]
Result	Pass

[1]The California Ambient Air Quality Standard threshold for H_2S sources is 42 $\mu g/m^3$ for the 1-hour Maximum concentration.

III. Conclusion

The acute and chronic indices are below 1.0, and the cancer risk factor associated with the project is less than 1.0 in a million. **In accordance with the District's Risk Management Policy, the project 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.

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

IV. Attachments

A. RMR Request Form & Attachments
B. Emails
C. Prioritization
D. Risk Results
E. Facility Summary
F. H2S Calculator Spreadsheet
G. PM10 AAQA Modeling Results

Appendix H

Treatment Lagoon Design Check

Lagoon Design Check in Accordance with NRCS Guideline #359

Proposed Lagoon Volume

Volume of treatment lagoon = $(L \times W \times D) - (S \times D^2) \times (W + L) + (4 \times S^2 \times D^3 \div 3)$

Primary Treatment Lagoon Dimensions

Length	850	ft
Width	300	ft
Depth	18	ft
Slope	3	ft

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

Primary Lagoon Volume	**3,542,184 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	2,880	x	17	x	71%	x	50%	=	**17,381**
Dry Cow - FS Barns	266	x	9.2	x	71%	x	50%	=	**869**
Dry Cow - Corrals	398	x	9.2	x	48%	x	50%	=	**879**
Support Stock - FS Barns	680	x	7.1	x	100%	x	50%	=	**2,414**
Support Stock - Corrals	2,165	x	7.1	x	48%	x	50%	=	**3,689**
Calf (under 3 months)	135	x	1.0	x	100%	x	50%	=	**68**
Bulls	0	x	9.2	x	48%	x	50%	=	**0**
Total for Dairy									**25,299**

[1]The Volatile Solids (VS) excretion rates for Holstein cattle are based on Table 1.b – Section 3 of ASAE D384.2 (March 2005). VS excretion rates for milk cows, dry cows, & heifers 15-24 months were taken from directly from the table. The VS excretion rate for heifers 3-6 months was estimated based on total solids excretion. The VS excretion rate for heifers 7-14 months was estimated as the average of heifers 15-24 months and heifers 3-6 months. The table did not give values for total solids or volatile solids excreted by baby calves. The VS excretion rate for baby calves was estimated based on an estimated dry matter intake (DMI) of 1.7% of body weight and the ratio of DMI to VS excretion for 150 kg calves. The VS excretion rate for mature bulls was assumed to be similar to dry cows.

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

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

Lagoon Design Check in Accordance with NRCS Guideline #359

Minimum Treatment Volume Calculation

MTV = TVS/VSLR

Where:

MTV = Minimum Treatment Volume (ft^3)

TVS = daily Total Volatile solids Loading (lb/day) = 0.011 lb/ft3-day

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

Minimum Treatment Volume in Primary Lagoon					
Breed: Holstein **Type of Cow**	**Net VS Loading (lb/day)**		**VSLR** (lb/ft3-day)[1]		**MTV (ft^3)**
Milk Cows	17,381	÷	0.011	=	**1,580,073**
Dry Cow	869	÷	0.011	=	**78,978**
Heifer (15 to 24 months)	879	÷	0.011	=	**79,889**
Heifer (7 to 14 months)	2,414	÷	0.011	=	**219,455**
Heifer (3 to 6 months)	3,689	÷	0.011	=	**335,378**
Calf (under 3 months)	68	÷	0.011	=	**6,136**
Bulls	0	÷	0.011	=	**0**
Total for Dairy					**2,299,909**

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

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Sludge Accumulation Volume

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

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

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

SAV = VPL - MTV

Where:

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

SAV =	**VPL**	**-**	**MTV**	
SAV =	**3,542,184**	**2,299,909**	**=**	**1,242,275 (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	2,880	x	2.40	ft^3	=	6,912	ft^3/day
Dry Cows - FS	266	x	1.30	ft^3	=	346	ft^3/day
Dry Cows - C	398	x	0.78	ft^3	=	310	ft^3/day
Support stock - FS	680	x	0.78	ft^3	=	530	ft^3/day
Support stock - C	2,165	x	0.30	ft^3	=	650	ft^3/day
Calves	135	x	0.15	ft^3	=	20	ft^3/day
Bulls	0	x	1.30	ft^3	=	-	ft^3/day
Total	6,524					**8,768**	**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~~	2880 ~~milk cows~~	x	ft3	+	8,768	ft3		
~~milk cow *~~ day			7.48 ~~gal~~			day		
				=	28,019.7	ft3/day		

Formula:

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

HRT:

⇨

2,299,909 ~~ft3~~		day	=		=	82.0817811	days
		28,019.7 ~~ft3~~					

Appendix I

QNEC

Quarterly Net Emissions Change (QNEC)

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

QNEC = PE2 - PE1, where:

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

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

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

	Milking Parlor					
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	0	0	1,152	394
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	3.2	1.1
Quarterly Net Emissions Change (lb/qtr) 1:	0.0	0.0	0.0	0.0	288.0	98.5
2:	0.0	0.0	0.0	0.0	288.0	98.5
3:	0.0	0.0	0.0	0.0	288.0	98.5
4:	0.0	0.0	0.0	0.0	288.0	98.5

	Cow Housing					
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	13,803	0	42,089	83,831
Daily PE2 (lb/day)	0.0	0.0	37.5	0.0	115.3	229.5
Quarterly Net Emissions Change (lb/qtr) 1:	0.0	0.0	3,450.75	0.0	10,522.25	20,957.75
2:	0.0	0.0	3,450.75	0.0	10,522.25	20,957.75
3:	0.0	0.0	3,450.75	0.0	10,522.25	20,957.75
4:	0.0	0.0	3,450.75	0.0	10,522.25	20,957.75

	Liquid Manure Handling						
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Annual PE2 (lb/yr)	0	0	0	0	6,480	19,427	471
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	17.7	53.3	1.2
Quarterly Net Emissions Change (lb/qtr) 1:	0.0	0.0	0.0	0.0	1620.00	4,856.75	117.75
2:	0.0	0.0	0.0	0.0	1620.00	4,856.75	117.75
3:	0.0	0.0	0.0	0.0	1620.00	4,856.75	117.75
4:	0.0	0.0	0.0	0.0	1620.00	4,856.75	117.75

	Solid Manure Handling					
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	0	0	2,101	11,250
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	5.8	30.7
Quarterly Net Emissions Change (lb/qtr) 1:	0.0	0.0	0.0	0.0	525.25	2,812.5
2:	0.0	0.0	0.0	0.0	525.25	2,812.5
3:	0.0	0.0	0.0	0.0	525.25	2,812.5
4:	0.0	0.0	0.0	0.0	525.25	2,812.5

	Feed Storage and Handling					
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	0	0	58,171	0
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	159.4	0.0
Quarterly Net Emissions Change (lb/qtr) 1:	0.0	0.0	0.0	0.0	14,542.75	0.0
2:	0.0	0.0	0.0	0.0	14,542.75	0.0
3:	0.0	0.0	0.0	0.0	14,542.75	0.0
4:	0.0	0.0	0.0	0.0	14,542.75	0.0