

May 17, 2023

Adrian Silva
Silvas Holsteins Dairy
6706 Elaine Rd
Turlock, CA 95380

Re: Notice of Preliminary Decision - Authorities to Construct
Facility Number: N-6302
Project Number: N-1211083

Dear Mr. Silva:

Enclosed for your review and comment is the District's analysis of Silvas Holsteins Dairy's application for Authorities to Construct (ATCs) for the modification of an existing dairy operation. The modification includes increasing herd capacity from 880 milk cows, not to exceed a combined total of 1,095 mature cows (milk and dry), and 885 total support stock (heifers, calves, and bulls) to 1,900 milk cows, not to exceed a combined total of 2,200 mature cows (milk and dry), and 1,900 total support stock; replacing the existing milking parlor with a double 20 parallel (40 stalls) milking parlor; constructing new cow housing units; installing two anaerobic treatment lagoons; and expanding the footprint of cow housing units, at 6706 Elaine Rd, Turlock, CA.

The facility is also solicit public comment on the proposed issuance of the ATCs to comply with District Rule 4570 Confined Animal Facilities. This rule requires existing confined animal facilities to reduce emissions of volatile organic compounds by implementing multiple mitigation measures.

The notice of preliminary decision for this project has been posted on the District's website (www.valleyair.org). After addressing all comments made during the 30-day public notice period, the District intends to issue the Authorities 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. Mungi Hong of Permit Services at (559) 230-5897 or mungi.hong@valleyair.org.

Sincerely,



Brian Clements
Director of Permit Services

BC:mh

Enclosures

cc: Courtney Graham, CARB (w/ enclosure) via email
cc: Manny Sousa, Sousa Engineering Services, (w/ enclosure) via email

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

Facility Name: Silvas Holsteins Dairy
Mailing Address: 6706 Elaine Rd
Turlock, CA 95380

Date: April 25, 2023
Engineer: Mungi Hong
Lead Engineer: Brian Clerico

Applicant: Adrian Silva
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Application #: N-6302-1-2 through '-5-1

Project #: N-1211083

Deemed Complete: June 29, 2021

I. Proposal

Silvas Holsteins Dairy has requested Authority to Construct (ATC) permits to expand their dairy herd capacity from the current permitted limit of 880 milk cows not to exceed a combined total of 1,095 mature cows (milk and dry), 885 support stock (heifers, calves, and bulls) to a proposed limit of 1,900 milk cows not to exceed a combined total of 2,200 mature cows (milk and dry), and 1,900 support stock (heifers, calves, and bulls). The facility also proposed the following under this project (see a site plan in Appendix I):

- Convert the existing double 16 parallel (32 stalls) milking parlor to a double 20 parallel (40 stalls) milking parlor¹;
- Construct one new freestall barn (Freestall #17) over existing exercise pens;
- Construct one Saudi-style barn (Shade Barn #18) over an area that includes Shade Barns #13 and 14;
- Construct one Saudi-style barn (Shade Barn #19) over existing corrals;
- Construct one new freestall barn (Freestall #16) in a new area; and
- Modify the liquid manure handling system (permit N-6302-3) to implement the anaerobic treatment of liquid manure using an existing 396' x 285' x 12' lagoon and an existing 385' x 92' x 12' lagoon at the dairy.

¹ As seen below in Section V, ATC N-6302-1-1 will be used as the baseline permit.

Based on satellite images (see Appendix H), it was discovered that the facility had expanded the footprint of Shade Barn #2 by consolidating with Barn #2, installed Freestall #3 and Shade Barns #10 and 11 over existing exercise pens, and expanded the footprint of Shade Barn #10 by consolidating with Barn #1. These actions were taken without obtaining an ATC after the facility became subject to permits in 2010. Therefore, the following will be treated as proposed modifications under this project:

- Expanded the footprint of Shade Barn #2;
- Constructed Freestall #3 over exercise pens;
- Constructed Shade Barns #10 and 11 over exercise pens; and
- Expanded the footprint of Shade Barn #10.

Pursuant to Section 3.25 of Rule 2201, the proposed changes constitute a modification of the milking operation (N-6302-1), cow housing (N-6302-2), liquid manure handling (N-6302-3), solid manure handling (N-6302-4), and feed storage and handling (N-6302-5) permit units, due to changes in production rates, in methods of operation of existing emissions units, and structural changes to existing emission units, which would necessitate changes in permit conditions.

The draft ATCs are included in Appendix A and copies of ATC '-1-1' and Permits to Operate (PTOs) '-2-0 through '-5-0 are included in Appendix B.

II. Applicable Rules

Rule 1070	Inspections (12/17/92)
Rule 2010	Permits Required (12/17/92)
Rule 2201	New and Modified Stationary Source Review Rule (8/15/19)
Rule 2410	Prevention of Significant Deterioration (6/16/11)
Rule 2520	Federally Mandated Operating Permits (8/15/19)
Rule 2550	Federally Mandated Preconstruction Review for Major Sources of Air Toxics (6/18/98)
Rule 4001	New Source Performance Standards (4/14/99)
Rule 4002	National Emissions Standards for Hazardous Air Pollutants (5/20/04)
Rule 4101	Visible Emissions (2/17/05)
Rule 4102	Nuisance (12/17/92)
Rule 4550	Conservation Management Practices (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 facility is located at 6706 Elaine Rd in Turlock, CA. The facility is not located within 1,000 feet of the outer boundary of a K-12 school. Therefore, the public notification requirement of California Health and Safety Code 42301.6 is not applicable to this project.

IV. Process Description

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

Milking Parlor (N-6302-1)

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

Currently, the cows at this dairy are milked in a double 16 parallel (32 stalls) milking parlor. With this project, the dairy will modify the existing parlor to a double 20 parallel (40 stalls) milking parlor. The lactating cows will be milked two times per day in the milking parlor, which will have concrete floors sloped to a drain. Manure that is deposited in the milking parlor will be sprayed or flushed into the drain using fresh water after each milking. The effluent from the milking parlor will be carried through pipes to the lagoon system.

Cow Housing (N-6302-2)

Freestall Barns

In freestall barns, the cows are grouped in large pens with free access to feed bunks, water, and stalls for resting. A standard freestall barn design has a feed alley in the center of the barn separating two feed bunks on each side.

Open Corrals

An open corral is a large open area where cows are confined, also with unlimited access to feed bunks and water. Four open corrals in this dairy will be converted to a Saudi-style barn as a result of this project.

Saudi-Style Barns

The design of a Saudi-style barn was originally crafted for hot weather conditions in desert climates. These structures feature very high ceilings, with a ventilation gap running the length of the barn. The sides of the structure are open, and the high peak (typically 14-18 feet) enhances air flow. Saudi-style barns are very similar to freestall barns with the exception of the freestalls.

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

Liquid Manure Handling (N-6302-3)

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

Currently, the liquid manure handling system consists of mechanical separator(s), three lagoon, and land application of treated liquid manure. The facility has proposed to convert an existing 396' x 285' x 12' lagoon and an existing 385' x 92' x 12' lagoon to anaerobic treatment lagoons.

Solids Separation

Mechanical Separators

Manure water flushed from the milking parlor and cow housing areas will be pumped over the separator screen. The liquid passes through the screen and will eventually flow into a lagoon. The solids fall off the bottom of the screen onto a stacking pad, from where they will later be removed and spread out to dry.

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) California Field Office Technical Guide Conservation Practice Standard Code 359 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 ft³/day depending on the type of system and solids separation; and
- 4) Minimum operating depth of at least 6 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.

Silvas Holsteins Dairy has proposed to use an existing 396' x 285' x 12' lagoon and an existing 385' x 92' x 12' lagoon for anaerobic treatment. Primary treatment of all the facility's liquid manure will be accomplished using the proposed anaerobic treatment lagoon system. As shown in the anaerobic lagoon design check in Appendix K, the facility's treatment system meets the specifications set forth in NRCS practice standard 359.

Land Application

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

Solid Manure Handling (N-6302-4)

Solid manure is stored in stockpiles until ready to be applied to cropland as fertilizer, or shipped offsite. When applied to land, solid manure will be incorporated into the soil rapidly. The separated solids are dried and stockpiled for use as bedding in the freestall barns.

Feed Handling and Storage (N-6302-5)

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

V. Equipment Listing

Pre-Project Equipment Description:

Under District project N-1181525, the facility was issued ATC N-6302-1-1 for the modification of milking parlor configuration. Pursuant to the consultant, ATC N-6302-1-1 has been implemented, and therefore, ATC N-6302-1-1 will be used as the baseline permit. The following condition will be placed on ATC N-6302-1-2.

- Authority to Construct (ATC) N-6302-1-1 shall be implemented concurrently, or prior to the modification and startup of the equipment authorized by this Authority to Construct. [District Rule 2201]

N-6302-1-1: 880 COW MILKING OPERATION WITH ONE DOUBLE 16 PARALLEL (32 STALLS) MILKING PARLOR

- N-6302-2-0: COW HOUSING - 880 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 1,095 MATURE COWS (MILK AND DRY); 885 SUPPORT STOCK (HEIFERS, CALVES, AND BULLS); AND 4 FREESTALL BARNs WITH FLUSH/SCRAPE SYSTEM
- N-6302-3-0: LIQUID MANURE HANDLING SYSTEM CONSISTING OF MECHANICAL SEPARATOR(S); THREE LAGOONS; MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION
- N-6302-4-0: SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; SOLID MANURE APPLICATION TO LAND AND/OR HAULED OFFSITE
- N-6302-5-0: FEED STORAGE AND HANDLING CONSISTING OF COVERED FEED STORAGE OR COMMODITY BARN(S), SILAGE PILE(S) AND DRY GRAIN TANK(S)

Proposed Modification:

- N-6302-1-2: MODIFICATION OF 880 COW MILKING OPERATION WITH ONE DOUBLE 16 PARALLEL (32 STALLS) MILKING PARLOR: INCREASE MAXIMUM NUMBER OF MILK COW TO 1,900 DUE TO INCREASE IN HERD SIZE AUTHORIZED BY AUTHORITY TO CONSTRUCT N-6302-2-1 AND CONVERT THE EXISTING DOUBLE 16 PARALLEL (32 STALLS) MILKING PARLOR TO A DOUBLE 20 PARALLEL (40 STALLS) MILKING PARLOR
- N-6302-2-1: MODIFICATION OF COW HOUSING - 880 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 1,095 MATURE COWS (MILK AND DRY); 885 SUPPORT STOCK (HEIFERS, CALVES, AND BULLS); AND 4 FREESTALL BARNs WITH FLUSH/SCRAPE SYSTEM: INCREASE THE COW HERD LIMIT TO 1,900 MILK COWS, 2,200 MATURE COWS (MILK AND DRY), AND 1,900 SUPPORT STOCK; CONSTRUCT ONE SAUDI-STYLE BARN OVER EXISTING OPEN CORRALS; CONSTRUCT TWO FREESTALL BARNs AND SAUDI STYLE BARNs OVER EXISTING EXERCISE PENS; CONSTRUCT ONE SAUDI-STYLE BARN OVER SHADE BARNs #13 AND 14; CONSTRUCT ONE FREESTALL BARN IN A NEW AREA; AND EXPAND THE FOOTPRINT OF SHADE BARNs #2 AND 10
- N-6302-3-1: MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF MECHANICAL SEPARATOR(S); THREE LAGOONS; MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION: INCREASE IN LIQUID MANURE DUE TO INCREASE IN HERD SIZE AUTHORIZED BY AUTHORITY TO CONSTRUCT N-6302-2-1 AND INSTALL TWO ANAEROBIC TREATMENT LAGOONS

- N-6302-4-1: MODIFICATION OF SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; SOLID MANURE APPLICATION TO LAND AND/OR HAULED OFFSITE: INCREASE IN SOLID MANURE DUE TO INCREASE IN HERD SIZE AS AUTHORIZED BY AUTHORITY TO CONSTRUCT N-6302-2-1
- N-6302-5-1: MODIFICATION OF FEED STORAGE AND HANDLING CONSISTING OF COVERED FEED STORAGE OR COMMODITY BARN(S), SILAGE PILE(S) AND DRY GRAIN TANK(S): INCREASE IN TOTAL MIX RATION DUE TO INCREASE IN HERD SIZE AS AUTHORIZED BY AUTHORITY TO CONSTRUCT N-6302-2-1

Post-Project Equipment Description:

- N-6302-1-2: 1,900 COW MILKING OPERATION WITH ONE DOUBLE 20 PARALLEL (40 STALLS) MILKING PARLOR
- N-6302-2-1: COW HOUSING – 1,900 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 2,200 MATURE COWS (MILK AND DRY); 1,900 SUPPORT STOCK (HEIFERS, CALVES, AND BULLS); AND 6 FREESTALL BARNS AND 5 SAUDI-STYLE BARNS WITH FLUSH/SCRAPE SYSTEM
- N-6302-3-1: LIQUID MANURE HANDLING SYSTEM CONSISTING OF MECHANICAL SEPARATOR(S); TWO ANAEROBIC TREATMENT LAGOONS (396'X285'X12' AND 385'X92'X12') AND ONE LAGOON; MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION
- N-6302-4-1: SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; SOLID MANURE APPLICATION TO LAND AND/OR HAULED OFFSITE
- N-6302-5-1: FEED STORAGE AND HANDLING CONSISTING OF COVERED FEED STORAGE OR COMMODITY BARN(S), SILAGE PILE(S) AND DRY GRAIN TANK(S)

VI. Emission Control Technology Evaluation

Particulate matter (PM₁₀), volatile organic compounds (VOC), ammonia (NH₃) and hydrogen sulfide (H₂S) are the major pollutants of concern from dairy operations. PM₁₀ emissions are generated primarily from the action of cows' hooves on dust and dry manure, which is subsequently picked up by wind and entrained into the atmosphere. VOC emissions are generated from the ruminant digestive process (i.e. enteric emissions), decomposition and fermentation of feed, and decomposition of organic matter in manure. NH₃ and H₂S emissions are generated from microbial metabolization of nitrogen and sulfur compounds in manure. The quantity of these emissions depends directly on the herd size and profile.²

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.

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

Milking Parlor

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

Cow Housing

Freestall Barns

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

Saudi Style Barns

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

The only time cows leave their freestall barns/Saudi-style barns is to go to the milking parlor to get milked twice a day. The distance from the freestall barns/Saudi-style barns to the milking parlor is insignificant and usually involves walking through a wet process (concrete flush lanes). The only source of PM₁₀ emissions from this type of housing would be generated from the cow bedding.

Loafing Barns

Loafing barns are similar in design to freestall barns, except that the loafing barn floors are not paved and are not divided into stalls. This type of housing structure provides coverage for a very large surface area providing protection from the heat and creating a cooler environment. Emissions are reduced in two ways; the soil will contain more moisture (due to cooler temperature and moisture from manure) and less soil disturbance under the barn.

Frequent Cleaning (Flushing/Scraping)

Frequent flushing is also used for the removal of manure from the lanes and walkways in the housing barns. Frequent flushing creates a moist environment that greatly reduces or eliminates PM₁₀ emissions. In addition, flush water dissolves NH₃ 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 Animals According to NRC Guidelines

All animals are currently, and post-project will continue to be, fed in accordance with NRC guidelines using routine nutritional analysis for rations. Feeding the cows in accordance with NRC guidelines minimizes undigested protein and other undigested nutrients in the manure, which would emit NH₃ and VOCs upon decomposition. Per District practice, based on limited data a conservative control efficiency of 10% for VOC emissions and 28% for NH₃ emissions will be applied to the facility's overall VOC and NH₃ emission factors for feeding animals in accordance with NRC guidelines.

Liquid Manure Handling

Solids Separation

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

Anaerobic Treatment Lagoon

Primary treatment of all the facility's liquid manure will be accomplished using the proposed anaerobic treatment lagoon system. As shown in Appendix K, the facility's 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.

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 NH₃, VOC, and other compounds onto soil particles provides an opportunity for oxidation by the action of various microorganisms the soil.³

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 NH₃, H₂S and VOC emissions as manure decomposes, the reduction of nutrients in the manure is expected to reduce the emission of these pollutants.

In addition, the animals will be fed with steam-flaked, dry rolled, cracked or ground corn, or other ground cereal grains to minimize starch excretions in the manure and volatile fatty acids excreted in the manure. Silage piles will be covered with plastic tarps to minimize volatilization of pollutants from the pile surfaces.

Rule 4570 Mitigation Measures

The facility currently complies with all applicable Phase II mitigation measure requirements of District Rule 4570, as previously evaluated under project N-1104241. As shown in Appendix J, this project involves changes in the mitigation measures practiced at the facility. All mitigation measures are expected to control VOC emissions and many of the measures will also control NH₃.

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

VII. General Calculations

A. Assumptions

- Pre-project potential to emit calculations will be based on the permitted number and types of cows in the current cow housing permit (PTO N-6302-2-0).
- Post-project potential to emit calculations will be based on the applicant's proposal.
- Only emissions from the lagoons (N-6302-3) and emergency IC engine (N-6302-6) at the dairy will be used to determine if the facility is a major source since these units are considered the only source of non-fugitive emissions at the dairy.
- All PM₁₀ emissions from the dairy operation will be allocated to the cow housing permit unit (N-6302-2).

³ Page 9-38 of U.S. EPA's draft document entitled "Emissions From Animal Feeding Operations" (<https://www.epa.gov/sites/production/files/2020-10/documents/draftanimalfeed.pdf>)

- The conditions on the existing PTOs are based on the Rule 4570 Phase II mitigation measures originally proposed via application under project N-1104241. The proposed Rule 4570 Phase II mitigation measures under this project will be used in the current evaluation.
- All H₂S emissions will be allocated to the lagoons under the liquid manure permit (N-6302-3).
- The PM₁₀ control efficiency for shade structures is based on the SJVAPCD memo – *Dairy and Feedlot PM₁₀ Mitigation Practices and their Control Efficiencies*.
- The PM₁₀ emission factors for the dairy animals are based on a District document entitled “Dairy and Feedlot PM₁₀ Emissions Factors,” which compiled data from studies performed by Texas A&M ASAE and a USDA/UC Davis report quantifying dairy and feedlot emissions.
- The VOC emission factors for milk cows are from a District document titled “Air Pollution Control Officer’s Revision to the Dairy VOC Emission Factors, February 2012.”⁴ Volatile solids excretion ratios were used to derive the proportionate VOC emission factors for dry cows and support stock.
- Calculations for 1,900 support stock (heifers, calves, and bulls) use worst-case emission factors. The large heifer emission factors will be used for VOC and NH₃, and the cow in freestall barns emission factor will be used for PM₁₀.
- The NH₃ emission factors for milk cows are based on an internal document entitled “*Breakdown of Dairy VOC Emission Factor into Permit Units*.” The NH₃ emission factors for the other cows were developed by taking the ratio of manure generated by the different types of cows to the milk cow and multiplying it by the milk cow emission factor.
- All the Rule 4570 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.
- There is no new lagoon/storage pond or any change proposed to the surface area of an existing lagoon/storage pond. Two of the three existing lagoons will be converted to anaerobic treatment lagoons with this project.

B. Emission Factors

The dairy emissions calculation spreadsheet in Appendix J lists the PM₁₀, VOC, NH₃, and H₂S emission factors for the animals and feed at the dairy. These emission factors and the control efficiencies for the applicable management practices implemented at this dairy will be used to calculate the pre-project and post-project PM₁₀, VOC, NH₃, and H₂S emissions from the dairy.

C. Calculations

1. Pre-Project Potential to Emit (PE1)

A summary of the pre-project potential to emit from the modified permit units is shown in the following table, and the emissions calculations are included in Appendix J:

⁴[http://www.valleyair.org/busind/pto/emission_factors/2012-Final-Dairy-EE-Report/FinalDairyEFReport\(2-23-12\).pdf](http://www.valleyair.org/busind/pto/emission_factors/2012-Final-Dairy-EE-Report/FinalDairyEFReport(2-23-12).pdf)

Pre-Project Potential to Emit (PE1)								
Permit unit	PM ₁₀		VOC		NH ₃		H ₂ S	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
N-6302-1-1	0.0	0	1.0	370	0.3	120	0.0	0
N-6302-2-0	27.5	10,050	37.2	13,606	70.7	25,796	0.0	0
N-6302-3-0	0.0	0	9.6	3,505	25.4	9,248	0.8	303
N-6302-4-0	0.0	0	1.9	704	9.4	3,462	0.0	0
N-6302-5-0	0.0	0	72.5	26,443	0.0	0	0.0	0

2. Post-Project Potential to Emit (PE2)

A summary of the post-project potential to emit from the modified permits units is shown in the following table, and the emissions calculations are included in Appendix J:

Post-Project Potential to Emit (PE2)								
Permit unit	PM ₁₀		VOC		NH ₃		H ₂ S	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
N-6302-1-2	0.0	0	2.1	760	0.7	260	0.0	0
N-6302-2-1	7.2	2,575	78.1	28,521	147.6	53,875	0.0	0
N-6302-3-1	0.0	0	11.4	4,170	34.2	12,486	0.8	303
N-6302-4-1	0.0	0	3.7	1,370	19.8	7,321	0.0	0
N-6302-5-1	0.0	0	110.0	40,137	0.0	0	0.0	0

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

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

SSPE1 (lb/year)							
Permit Unit	NO _x	SO _x	PM ₁₀	CO	VOC	NH ₃	H ₂ S
N-6302-1-1	0	0	0	0	370	120	0
N-6302-2-0	0	0	10,050	0	13,606	25,796	0
N-6302-3-0	0	0	0	0	3,505	9,248	303
N-6302-4-0	0	0	0	0	704	3,462	0
N-6302-5-0	0	0	0	0	26,443	0	0
N-6302-6-0	3,968	2	188	1,206	452	0	0
SSPE1	3,968	2	10,238	1,206	45,080	38,626	303

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

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

Permit Unit	SSPE2 (lb/year)						
	NO _x	SO _x	PM ₁₀	CO	VOC	NH ₃	H ₂ S
N-6302-1-2	0	0	0	0	760	260	0
N-6302-2-1	0	0	2,575	0	28,521	53,875	0
N-6302-3-1	0	0	0	0	4,170	12,486	303
N-6302-4-1	0	0	0	0	1,370	7,231	0
N-6302-5-1	0	0	0	0	40,137	0	0
N-6302-6-0	3,968	2	188	1,206	452	0	0
SSPE2	3,968	2	2,763	1,206	75,410	73,852	303

5. Major Source Determination

Rule 2201 Major Source Determination:

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

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

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

(2) A major stationary source of air pollutants, as defined in section 302 of the Act, that directly emits, or has the potential to emit, 100 tpy or more of any air pollutant subject to regulation (including any major source of fugitive emissions of any such pollutant, as determined by rule by the Administrator). The fugitive emissions of a stationary source shall not be considered in determining whether it is a major stationary source for the purposes of section 302(j) of the Act, unless the source belongs to one of the following categories of stationary source: (i) Coal cleaning plants (with thermal dryers); (ii) Kraft pulp mills; (iii) Portland cement plants; (iv) Primary zinc smelters; (v) Iron and steel mills; (vi) Primary aluminum ore reduction plants; (vii) Primary copper smelters; (viii) Municipal incinerators capable of charging more than 250 tons of refuse per day; (ix) Hydrofluoric, sulfuric, or nitric acid plants; (x) Petroleum refineries; (xi) Lime plants; (xii) Phosphate

rock processing plants; (xiii) Coke oven batteries; (xiv) Sulfur recovery plants; (xv) Carbon black plants (furnace process); (xvi) Primary lead smelters; (xvii) Fuel conversion plants; (xviii) Sintering plants; (xix) Secondary metal production plants; (xx) Chemical process plants—The term chemical processing plant shall not include ethanol production facilities that produce ethanol by natural fermentation included in NAICS codes 325193 or 312140; (xxi) Fossil-fuel boilers (or combination thereof) totaling more than 250 million British thermal units per hour heat input; (xxii) Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels; (xxiii) Taconite ore processing plants; (xxiv) Glass fiber processing plants; (xxv) Charcoal production plants; (xxvi) Fossil-fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input; or (xxvii) Any other stationary source category, which as of August 7, 1980 is being regulated under section 111 or 112 of the Act.

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

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

Milking Parlor

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

Cow Housing

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

Manure Storage Areas

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

Land Application

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

Feed Handling and Storage

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

Silage is stored in several tarped/covered piles and/or plastic bags. One end/face of the pile/bag that is actively being used to prepare feed rations must remain open to allow extraction of the silage. A front-end loader is used to extract silage from the open face of the pile throughout the day as the feed rations for the various groups or categories of cows are prepared. A significant proportion of silage pile emissions is 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 the lagoons and emergency IC engine have already been determined to be non-fugitive. The facility’s non-fugitive SSPE are summarized in the following tables:

Non-Fugitive SSPE1 (lb/year)						
Category	NO_x	SO_x	PM₁₀	CO	VOC	H₂S
N-6302-3-0 – Lagoons	0	0	0	0	1,684 ⁵	303
N-6302-6-0 – Emergency IC Engine	3,968	2	188	1,206	452	0
Non-Fugitive SSPE2	3,968	2	188	1,206	2,136	303

Non-Fugitive SSPE2 (lb/year)						
Category	NO_x	SO_x	PM₁₀	CO	VOC	H₂S
N-6302-3-1 – Lagoons	0	0	0	0	1,995 ⁶	303
N-6302-6-0 – Emergency IC Engine	3,968	2	188	1,206	452	0
Non-Fugitive SSPE2	3,968	2	188	1,206	2,447	303

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

Rule 2201 Major Source Determination						
Category	NO_x	SO_x	PM₁₀	PM_{2.5}	CO	VOC
SSPE1 (lb/yr)	3,968	2	188	188	1,206	2,136
SSPE2 (lb/yr)	3,968	2	188	188	1,206	2,447
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 PM₁₀

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.

⁵ See Appendix J – ‘Pre-Project Potential to Emit (PE1)’ sheet

⁶ See Appendix J – ‘Post-Project Potential to Emit (PE2)’ sheet

Rule 2410 Major Source Determination:

The facility or the equipment evaluated under this project is not listed as one of the categories specified in 40 CFR 52.21 (b)(1)(iii). Therefore, the PSD Major Source threshold is 250 tpy for any regulated NSR pollutant. As mentioned above in Section VII.A, only emissions from the lagoons and emergency IC engine will be used to determine if this facility is an existing PSD major source.

PSD Major Source Determination (tons/year)						
	NO₂	VOC	SO₂	CO	PM	PM₁₀
Estimated Facility PE before Project Increase	2.0	1.1	0.0	0.6	0.1	0.1
PSD Major Source Thresholds	250	250	250	250	250	250
PSD Major Source?	No	No	No	No	No	No

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

6. Baseline Emissions (BE)

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

7. SB 288 Major Modification

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

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

8. Federal Major Modification / New Major Source

Federal Major Modification

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

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

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

New Major Source

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

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

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

- PM
- PM10
- Hydrogen sulfide (H2S)
- Total reduced sulfur (including H2S)
- VOC

I. Project Emissions Increase - New Major Source Determination

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

The facility or the equipment evaluated under this project is not listed as one of the categories specified in 40 CFR 52.21 (b)(1)(i). Therefore, the following PSD Major Source thresholds are applicable and fugitive emissions are not considered when determining if the operation is a PSD Major Source.

PSD Major Source Determination: Potential to Emit (tons/year)					
	PM	PM₁₀	H₂S	S	VOC
Total PE from New and Modified Units	0.0	0.0	0.2	0.2	1.0
PSD Major Source threshold	250	250	250	250	250
New PSD Major Source?	No	No	No	No	No

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

10. Quarterly Net Emissions Change (QNEC)

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

VIII. Compliance Determination

Rule 1070 Inspections

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

This rule allows the District to perform inspections for the purpose of obtaining information necessary to determine whether air pollution sources are in compliance with applicable rules and regulations. The rule also allows the District to require record keeping, to make inspections and to conduct tests of air pollution sources. Therefore, the following conditions will be listed on the 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 4.0, a written permit shall be obtained from the APCO. No Permit to Operate shall be granted either by the APCO or the Hearing Board for any source operation described in Section 3.0, constructed or installed without authorization as required by Section 3.0 until the information required is presented to the APCO and such source operation is altered, if necessary, and made to conform to the standards set forth in Rule 2070 (Standards for Granting Applications) and elsewhere in these rules and regulations.

The facility has obtained PTOs for the existing operations, and has submitted an ATC permit application for the proposed modifications. 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

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

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

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

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

The facility has proposed to install one new freestall barn (Freestall #16). Based on the PE values in Appendix J, as shown in the table below, BACT is triggered for Freestall #16 for VOC and NH₃.

Permit Unit	Emissions Unit Requiring BACT	BACT Pollutant
Cow Housing (N-6302-2)	Freestall #16	VOC and NH ₃

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

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

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

Based on the AIPE values in Appendix J, BACT is triggered for the following emissions units and pollutants.

Permit Unit	Emissions Unit Requiring BACT	BACT Pollutant
Cow Housing (N-6302-2)	Freestalls #4 and 6	NH ₃
	Freestall #7 and Shade Barns #10, 11, 18, and 19	VOC and NH ₃
Liquid Manure Handling (N-6302-3)	Lagoons	VOC and NH ₃
	Liquid Land Application	VOC and NH ₃
Solid Manure Handling (N-6302-4)	Separated Solid Piles	NH ₃
	Solid Land Application	NH ₃
Feed Storage and Handling (N-6302-5)	Total Mixed Ration (TMR) feeding	VOC

d. SB 288/Federal Major Modification

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

2. BACT Guideline

The following BACT guidelines apply to this project. A copy of each guideline is included in Appendix C.

- BACT Guideline 5.8.2 [Cow Housing – Freestall and Saudi-Style Barns] applies to Freestalls #4, 6, 7, and 16 and Shade Barns #10, 11, 18, and 19 in the cow housing operation.
- BACT Guideline 5.8.6 [Liquid Manure Handling – Lagoon/Storage Pond] applies to the lagoons in the liquid manure handling system.
- BACT Guideline 5.8.7 [Liquid Manure Handling – Liquid/Slurry Land Application] applies to the liquid land application in the liquid manure handling system.
- BACT Guideline 5.8.8 [Solid Manure Handling – Storage/Separated Solids Piles] applies to the separated solids piles in the solid manure handling system.
- BACT Guideline 5.8.9 [Solid Manure Handling – Land Application] applies to the land application in the solid manure handling system.
- BACT Guideline 5.8.11 [Feed Storage and Handling – Feed/TMR] applies to the feed/TMR in the feed storage and handling operation.

3. Top-Down BACT Analysis

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

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

Cow Housing (N-6302-2)

Shade Barn #19

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

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

Freestall #7 and Shade Barns #10, 11, and 18

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

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

Freestalls #4 and 6

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

Freestall #16

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

Liquid Manure Handling (N-6302-3)

Lagoons

VOC: Anaerobic treatment lagoons designed according to NRCS Guideline, and solids removal/separation system (mechanical separator(s))

NH₃: All animals fed in accordance with NRCS or other District-approved guidelines

Liquid Land Application

VOC: Irrigation of crops using liquid/slurry manure from the secondary lagoon preceded by uncovered anaerobic treatment lagoons designed to meet Natural Resources Conservation Service (NRCS) standards

NH₃: All animals fed in accordance with NRCS or other District-approved guidelines

Solid Manure Handling (N-6302-4)

Separated Solid Piles

NH₃: All animals fed in accordance with NRCS or other District-approved guidelines

Solid Land Application

NH₃: Rapid incorporation of solid manure into the soil after land application, and all animals fed in accordance with NRCS or other District-approved guidelines

Feed Storage and Handling (N-6302-5)

Feed/TMR

VOC: District Rule 4570 Measures for Feed/TMR

B. Offsets

1. Offset Applicability

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

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

Offset Determination (lb/year)					
	NO _x	SO _x	PM ₁₀	CO	VOC
SSPE2	3,968	2	2,763	1,206	75,410
Offset Thresholds	20,000	54,750	29,200	200,000	20,000
Offsets Triggered?	No	No	No	No	Yes

2. Quantity of District Offsets Required

VOC emissions exceed the offset threshold; however, per Section 4.6.9, offsets are not required for agricultural sources unless they are a major source. As determined in Section VII.C.5 above, this facility is not a major source for any pollutant. Therefore, offsets are not required.

C. Public Notification

1. Applicability

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

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

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

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

b. PE > 100 lb/day

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

c. Offset Threshold

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

Offset Thresholds				
Pollutant	SSPE1 (lb/year)	SSPE2 (lb/year)	Offset Threshold	Public Notice Required?
NO _x	3,968	3,968	20,000 lb/year	No
SO _x	2	2	54,750 lb/year	No
PM ₁₀	10,238	2,763	29,200 lb/year	No
CO	1,206	1,206	200,000 lb/year	No
VOC	45,080	75,410	20,000 lb/year	No

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

d. SSIPE > 20,000 lb/year

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

SSIPE Public Notice Thresholds					
Pollutant	SSPE2 (lb/year)	SSPE1 (lb/year)	SSIPE (lb/year)	SSIPE Public Notice Threshold	Public Notice Required?
NO _x	3,968	3,968	0	20,000 lb/year	No
SO _x	2	2	0	20,000 lb/year	No
PM ₁₀	2,763	10,238	-7,475	20,000 lb/year	No
CO	1,206	1,206	0	20,000 lb/year	No
VOC	75,410	45,080	30,330	20,000 lb/year	Yes
NH ₃	73,852	38,626	35,226	20,000 lb/year	Yes
H ₂ S	303	303	0	20,000 lb/year	No

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

e. Title V Significant Permit Modification

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

2. Public Notice Action

As discussed above, public noticing is required for this project since the SSIPEs for VOC and NH₃ are exceeding 20,000 lb/year. Therefore, public notice documents will be submitted to the California Air Resources Board (CARB) and a public notice will be electronically published on the District’s website prior to the issuance of the ATC for this equipment.

D. Daily Emission Limits (DELs)

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

Milking Operation (N-6302-1-2)

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

Cow Housing (N-6302-2-1)

- {modified 4486} Permittee shall pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers. [District 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 each cleaning, or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]
- {modified 4554} Permittee shall implement at least one of the following corral mitigation measures: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 square feet or less and shall slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 square feet per animal; 2) maintain corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface except during periods of rainy weather. [District Rules 2201 and 4570]
- {modified 4515} Shade structures shall be installed in any of the following ways: 1) constructed with a light permeable roofing material; 2) uphill of any slope in the corral; 3) installed so that the structure has a North/South orientation. OR Permittee shall clean manure from under corral shades at least once every fourteen (14) days, when weather permits access into the corral. [District Rules 2201 and 4570]
- {modified 4518} Permittee shall manage corrals such that the manure depth in the corral does not exceed twelve (12) inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rules 2201 and 4570]

The facility has requested a modification to the current Rule 4570 freestall barn and corral mitigation measures. Therefore, the following conditions will be placed on ATC N-6302-2-1.

- {modified 4487} Permittee shall flush, scrape or vacuum freestall lanes immediately prior to, immediately after or during each milking. [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 4509} Permittee shall clean concreted lanes such that the depth of manure does not exceed twelve (12) inches at any point or time. [District Rules 2201 and 4570]

Also, the following conditions will be placed on the ATC to ensure compliance with the BACT/T-BACT requirements.

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

- For Freestalls #3, 4, 6, 7, 16, and 17 and Shade Barns #10, 11, 18, and 19, the feed lanes and walkways at this dairy shall be constructed of concrete. [District Rule 2201]
- For Freestalls #3, 4, 6, 7, 16, and 17 and Shade Barns #10, 11, 18, and 19, permittee shall flush or scrape the lanes and walkways at least four times per day for mature cows (milk and dry cows) and at least once per day for support stock (heifers). [District Rules 2201 and 4570]
- For Freestall #17 and Shade Barn #19, permittee shall scrape exercise pens at least once every two weeks using a pull-type scraper in the morning hours, except when prevented by wet conditions. [District Rules 2201 and 4570]
- For Freestalls #3, 4, 6, 7, and 16 and Shade Barns #10, 11, and 18 shall not have any attached exercise pens. [District Rules 2201 and 4570]

As the facility has proposed a modification to the current Rule 4570 freestall barn and corral mitigation measures, the following conditions listed on the current PTO will not be included in ATC N-6302-2-1.

- {4489} Permittee shall flush or scrape freestall flush lanes at least three (3) times per day. [District Rule 4570]
- {4494} 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 fourteen (14) days. [District Rule 4570]
- {4508} Permittee shall scrape, vacuum or flush concrete lanes in corrals at least once every day for mature cows and every seven (7) days for support stock. [District Rule 4570]

In addition, since a maximum number of calves are already listed in the equipment description for the cow housing permit, the following condition listed on the current PTO is redundant and will be removed.

- {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 2010]

Liquid Manure Handling (N-6302-3-1)

- {modified 4538} Permittee shall remove solids with a solid separator system, prior to the manure entering the lagoon. [District Rules 2201 and 4570]
- {modified 4550} Permittee shall not allow liquid manure to stand in the fields for more than twenty-four (24) hours after irrigation. [District Rules 2201 and 4570]

The following conditions are required by BACT/T-BACT; therefore, these conditions will be placed on ATC N-6302-3-1.

- Permittee shall use an anaerobic treatment lagoon designed according to NRCS Guideline No. 359. [District Rules 2201 and 4570]
- Permittee shall only apply liquid manure that has been treated with an anaerobic treatment lagoon system. [District Rules 2201 and 4570]

Solid Manure Handling (N-6302-4-1)

- {modified 4541} Permittee shall incorporate all solid manure within seventy-two (72) hours of land application. [District Rules 2201 and 4570]

As required by Rule 4570, since this dairy becomes a large Confined Animal Facility (CAF) (1,000 milk cows or larger) as a result of this project, the facility has selected a new solids mitigation measure (see 'VOC Mitigation Measures' sheet in Appendix J). Therefore, the following condition will be included in ATC N-6302-4-1.

- {modified 4529} Within seventy two (72) hours of removal of separated solids from the drying process, permittee shall either 1) remove separated solids from the facility, or 2) cover separated solids outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed twenty-four (24) hours per event. [District Rules 2201 and 4570]

Feed Storage and Handling (N-6302-5-1)

- {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 feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]
- {modified 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 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]

The facility has requested a modification to the current Rule 4570 feed mitigation measures. Therefore, the following condition will replace an existing Rule 4570 feed mitigation measure condition and therefore will be included in the ATC.

- {modified 4462} Permittee shall feed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. [District Rules 2201 and 4570]

Also, as mentioned above, the following condition listed on the current PTO will be replaced and therefore will not be included in the ATC.

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

E. Compliance Assurance

1. Source Testing

No source testing is currently required for dairy operations.

2. Monitoring

No monitoring is required to demonstrate compliance with Rule 2201.

3. Recordkeeping

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

Milking Operation (N-6302-1-2)

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

Cow Housing (N-6302-2-1)

- {modified 4495} Permittee shall record either of the following: 1) the dates when manure that is not dry is removed from individual cow freestall beds or 2) the dates when the freestall bedding is raked, harrowed, scraped, or graded. [District Rules 2201 and 4570]
- {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 are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning or demonstrate that corrals are cleaned at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]
- {modified 4555} Permittee shall either 1) maintain sufficient records to demonstrate that corrals are maintained to ensure proper drainage preventing water from standing for more than forty-eight hours or 2) maintain records of dates pens are groomed (i.e., harrowed, raked, or scraped, etc.). [District Rules 2201 and 4570]
- {modified 4516} If permittee has selected to comply using shades constructed with a light permeable roofing material, then permittee shall maintain records, such as design specifications, demonstrating that the shade structures are equipped with such roofing material or if Permittee has selected to comply by cleaning the manure from under the corral shades, then Permittee shall maintain records demonstrating that manure is cleaned from under the shades at least once every fourteen (14) days, as long as weather permits access to corrals. [District Rules 2201 and 4570]
- {modified 4519} Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rules 2201 and 4570]
- {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]

As discussed above, the facility has proposed a modification to the current Rule 4570 freestall barn and corral mitigation measures. Therefore, the following conditions will be placed on ATC N-6302-2-1.

- {modified 4488} Permittee shall maintain records sufficient to demonstrate that freestall lanes are flushed, scraped or vacuumed immediately prior to, immediately after or during each milking. [District Rules 2201 and 4570]
- {modified 4510} Permittee shall measure and document the depth of manure on the concrete lanes at least once every ninety (90) days. [District Rules 2201 and 4570]

Also, the following conditions will be placed on the ATC to ensure compliance with the BACT/T-BACT requirements.

- {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]
- For Freestalls #3, 4, 6, 7, 16, and 17 and Shade Barns #10, 11, 18, and 19, permittee shall maintain sufficient records to demonstrate that the lanes and walkways are flushed or scraped at least four times per day for mature cows (milk and dry cows) and at least once per day for support stock (heifers). [District Rules 2201 and 4570]
- For Freestall #17 and Shade Barn #19, permittee shall maintain sufficient records to demonstrate that exercise pens are scraped at least once every two weeks using a pull-type scraper during morning hours, except when prevented by wet conditions. [District Rules 2201 and 4570]

In addition, as seen above, the facility has proposed a modification to the current Rule 4570 freestall barn and corral mitigation measures. Therefore, the following conditions listed on the current PTO will not be included in ATC N-6302-2-1.

- {4490} Permittee shall keep records or maintain an operating plan that requires freestall flush lanes to be flushed or scraped at least three times per day. [District Rule 4570]
- {4556} Permittee shall maintain records demonstrating that concrete lanes in corrals are scraped, vacuumed, or flushed at least once every day for mature cows and at least once every seven (7) days for support stock. [District Rule 4570]

Liquid Manure Handling (N-6302-3-1)

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

Also, the following conditions will be placed on the ATC to ensure compliance with the BACT requirements.

- Permittee shall maintain records, such as design specifications, calculations, including Minimum Treatment Volume (MTV), Hydraulic Retention Time (HRT) demonstrating that the anaerobic treatment lagoon meets the requirements listed in the NRCS Field Office Technical Guide Code 359. [District Rules 2201 and 4570]
- Permittee shall maintain records that only liquid manure treated with an anaerobic treatment lagoon or aerobic lagoon or digester system is applied to fields. [District Rules 2201 and 4570]

Solid Manure Handling (N-6302-4-1)

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

As discussed, since this dairy becomes a large Confined Animal Facility (CAF) (1,000 milk cows or larger) as a result of this project, the facility has selected a new solids mitigation measure (see 'VOC Mitigation Measures' sheet in Appendix J). Therefore, the following condition will be added on the ATC.

- {modified 4530} Permittee shall keep records of dates when separated solids are removed from the facility or permittee shall maintain records to demonstrate that separated solids piles outside the pens are covered with a weatherproof covering from October through May. [District Rules 2201 and 4570]

Feed Storage and Handling (N-6302-5-1)

- {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 record that requires feed to be pushed within three feet of feedlane fence within two hours of putting out the feed, or use of a feed trough or other structure designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]
- {modified 4459} Permittee shall maintain an operating plan or record of when feeding of total mixed rations began within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
- {modified 4461} Permittee shall maintain records demonstrating grain is/was stored in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]

- {modified 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 manufacturers instructions for application of the additive. [District Rules 2201 and 4570]

As discussed above, the facility has requested a modification to the current Rule 4570 feed mitigation measures. Therefore, the following condition will replace an existing Rule 4570 feed mitigation measure condition and therefore will be included in the ATC.

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

Also, as mentioned above, the following condition listed on the current PTO will be replaced and therefore will not be included in the ATC.

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

N-6302-1-2 through '-5-1

- {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 to demonstrate compliance with Rule 2201.

F. Ambient Air Quality Analysis (AAQA)

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

The proposed location is in an attainment area for NO_x, CO, and SO_x. As shown by the AAQA summary sheet the proposed equipment will not cause a violation of an air quality standard for NO_x, CO, or SO_x.

The proposed location is in a non-attainment area for the state's PM₁₀ as well as federal and state PM_{2.5} thresholds. As shown by the AAQA summary sheet the proposed equipment will not cause a violation of an air quality standard for PM₁₀ and PM_{2.5}.

Rule 2410 Prevention of Significant Deterioration

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

Rule 2520 Federally Mandated Operating Permits

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

Rule 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.

The facility is not considered a reconstructed source because the cost of the proposed construction is less than 50% of the combined cost of the housing structures, liquid manure handling system, solid manure handling system, and feed storage structures. Therefore, this section does not apply.

Rule 4001 New Source Performance Standards (NSPS)

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

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

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

Rule 4101 Visible Emissions

Section 5.0 stipulates that no person shall discharge into the atmosphere emissions of any air contaminant aggregating more than 3 minutes in any hour which is as dark as or darker than Ringelmann 1 (or 20% opacity).

Pursuant to Section 4.12, emissions subject to or specifically exempt from Regulation VIII (Fugitive PM10 Prohibitions) are considered to be exempt.

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

An on-field agricultural source is defined in Section 3.35 of District Rule 8011 as follows:

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

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

Rule 4102 Nuisance

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

California Health & Safety Code 41700 (Health Risk Assessment)

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

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

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

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

Units	Prioritization Score	Acute Hazard Index	Chronic Hazard Index	Maximum Individual Cancer Risk	T-BACT Required	Special Permit Requirements
1	0.88	0.00	0.00	5.74E-07	No	No
2	39.40	0.40	0.23	1.64E-05	Yes ¹	No
3	30.11	0.01	0.00	1.59E-06	Yes	No
4	0.00	0.01	0.00	N/A ²	No	No
5 ³	N/A ³	N/A ³	N/A ³	N/A ³	No	No
Project Totals	70.40	0.42	0.24	1.86E-05		
Facility Totals	>1	0.42	0.24	1.86E-05		

Notes:

1. T-BACT is determined on a corral by corral basis.
2. Maximum Individual Cancer Risk was not calculated for Unit 4 since there is no risk factor or the risk factor is so low that it has been determined to be insignificant for this type of unit.
3. There is no risk associated with Unit 5 as the District does not have an approved toxic speciation profile for dairy feed and storage handling operations.

Discussion of T-BACT

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

For this project T-BACT is triggered for VOC for Freestalls #3, 7, 16, and 17 and the 396'X285'X12' lagoon. T-BACT is satisfied with BACT for PM₁₀ and VOC (see Appendix D), which is:

Freestalls #3, 7, and 16

- 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 exercise pens (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing corrals to maintain a dry surface;
 - Rule 4570 Measures

Freestall #17

- 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 exercise pens (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing corrals to maintain a dry surface;
 - Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions; and
 - Rule 4570 Measures

396'X285'X12' Lagoon

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

The permit conditions satisfying the above T-BACT requirements are included in the Rule 2201 Daily Emissions Limit section of this application review. In accordance with District policy APR 1905, no further analysis is required, and compliance with District Rule 4102 requirements is expected.

See Appendix E: Health Risk Assessment Summary

Rule 4550 Conservation Management Practices (CMP)

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

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

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

The facility received District approval for its CMP plan on December 28, 2009. Continued compliance with the requirements of District Rule 4550 is expected.

Rule 4570 Confined Animal Facilities (CAF)

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

Section 5.1.2 states a thirty-day (30) public noticing and commenting period shall be required for all large CAFs receiving their initial Permit-to-Operate or Authority-to-Construct.

The facility has always been permitted for less than 1,000 milk cows, and therefore does not meet the definition of a large dairy CAF. However, as a result of this project, the facility will have a permitted capacity of 1,900 milk cows, which is above the District's threshold of 1,000 milk cows for a large dairy CAF. Therefore, public noticing is required for this project.

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

- 5.4.1 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,

- 5.4.2 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,
- 5.4.3 The emission mitigation measure is not suspended for longer than recommended by the licensed veterinarian or certified nutritionist for animal health reasons,
- 5.4.4 If such a situation exists, or is expected to exist for longer than thirty (30) days, the owners/operators shall, within that thirty (30) day period, submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the mitigation measure that was suspended, and
- 5.4.5 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 ATCs N-6302-1-2, '-2-1, '-3-1, '-4-1, and '-5-1.

- {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]

Sections 7.2.1 through 7.2.3 states general recording requirements for CAFs subject to Section 5.0 as seen below.

- 7.2.1 Permits: Owners/operators shall maintain copies of all facility permits.
- 7.2.2 Number of Animals: Owner/operators shall maintain 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.
- 7.2.3 Owner/operators shall maintain records sufficient to demonstrate compliance with all applicable mitigation measures.

The following condition will be placed on ATC N-6302-2-1.

- 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]

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

Section 7.9 states owners/operators of a CAF subject to the requirements of Section 5.0 shall keep and maintain the required in Sections 7.1 through 7.8.4, as applicable, for a minimum of five (5) years and the records shall be made available to the APCO and EPA upon request. The following condition will be placed on ATCs N-6302-1-2, '-2-1, '-3-1, '-4-1, and '-5-1.

- {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]

This facility was issued permits to operate (PTOs) under District project N-1104241 which incorporated the requirements of District Rule 4570. As mentioned in Section VI, the facility has proposed some changes to the existing mitigation measures practiced at the facility permit, and the facility has proposed additional mitigation measures. The mitigation measures selected by the applicant are shown in this Rule discussion below.

ATC N-6302-1-2

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

ATC N-6302-2-1

- {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]
- {modified 4486} Permittee shall pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers. [District Rules 2201 and 4570]
- {modified 4487} Permittee shall flush, scrape or vacuum freestall lanes immediately prior to, immediately after or during each milking. [District Rules 2201 and 4570]
- {modified 4488} Permittee shall maintain records sufficient to demonstrate that freestall lanes are flushed, scraped or vacuumed immediately prior to, immediately after or during each milking. [District Rules 2201 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 4495} Permittee shall record either of the following: 1) the dates when manure that is not dry is removed from individual cow freestall beds or 2) the dates when the freestall bedding is raked, harrowed, scraped, or graded. [District Rules 2201 and 4570]
- {modified 4499} Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rules 2201 and 4570]
- {modified 4500} Permittee shall maintain records demonstrating that water pipes and troughs are inspected and leaks are repaired at least once every seven (7) days. [District Rules 2201 and 4570]
- {modified 4501} Permittee shall clean manure from corrals at least four (4) times per year with at least sixty (60) days between each cleaning, or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]
- {modified 4502} Permittee shall demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning or demonstrate that corrals are cleaned at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]
- {modified 4554} Permittee shall implement at least one of the following corral mitigation measures: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 square feet or less and shall slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 square feet per animal; 2) maintain corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface except during periods of rainy weather. [District Rules 2201 and 4570]
- {modified 4555} Permittee shall either 1) maintain sufficient records to demonstrate that corrals are maintained to ensure proper drainage preventing water from standing for more than forty-eight hours or 2) maintain records of dates pens are groomed (i.e., harrowed, raked, or scraped, etc.). [District Rules 2201 and 4570]
- {modified 4509} Permittee shall clean concreted lanes such that the depth of manure does not exceed twelve (12) inches at any point or time. [District Rules 2201 and 4570]
- {modified 4510} Permittee shall measure and document the depth of manure on the concrete lanes at least once every ninety (90) days. [District Rules 2201 and 4570]

- {modified 4515} Shade structures shall be installed in any of the following ways: 1) constructed with a light permeable roofing material; 2) uphill of any slope in the corral; 3) installed so that the structure has a North/South orientation. OR Permittee shall clean manure from under corral shades at least once every fourteen (14) days, when weather permits access into the corral. [District Rules 2201 and 4570]
- {modified 4516} If permittee has selected to comply using shades constructed with a light permeable roofing material, then permittee shall maintain records, such as design specifications, demonstrating that the shade structures are equipped with such roofing material or if Permittee has selected to comply by cleaning the manure from under the corral shades, then Permittee shall maintain records demonstrating that manure is cleaned from under the shades at least once every fourteen (14) days, as long as weather permits access to corrals. [District Rules 2201 and 4570]
- {modified 4518} Permittee shall manage corrals such that the manure depth in the corral does not exceed twelve (12) inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rules 2201 and 4570]
- {modified 4519} Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rules 2201 and 4570]
- {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]

ATC N-6302-3-1

- Permittee shall use an anaerobic treatment lagoon designed according to NRCS Guideline No. 359. [District Rules 2201 and 4570]
- Permittee shall maintain records, such as design specifications, calculations, including Minimum Treatment Volume (MTV), Hydraulic Retention Time (HRT) demonstrating that the anaerobic treatment lagoon meets the requirements listed in the NRCS Field Office Technical Guide Code 359. [District Rules 2201 and 4570]
- {modified 4538} Permittee shall remove solids with a solid separator system, prior to the manure entering the lagoon. [District Rules 2201 and 4570]
- Permittee shall only apply liquid manure that has been treated with an anaerobic treatment lagoon system. [District Rules 2201 and 4570]
- Permittee shall maintain records that only liquid manure treated with an anaerobic treatment lagoon or aerobic lagoon or digester system is applied to fields. [District Rules 2201 and 4570]

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

ATC N-6302-4-1

- {modified 4529} Within seventy two (72) hours of removal of separated solids from the drying process, permittee shall either 1) remove separated solids from the facility, or 2) cover separated solids outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed twenty-four (24) hours per event. [District Rules 2201 and 4570]
- {modified 4530} Permittee shall keep records of dates when separated solids are removed from the facility or permittee shall maintain records to demonstrate that separated solids piles outside the pens are covered with a weatherproof covering from October through May. [District Rules 2201 and 4570]
- {modified 4541} Permittee shall incorporate all solid manure within seventy-two (72) hours of land application. [District Rules 2201 and 4570]
- {modified 4542} Permittee shall maintain records to demonstrate that all solid manure has been incorporated within seventy-two (72) hours of land application. [District Rules 2201 and 4570]

ATC N-6302-5-1

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

- {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 record of when feeding of total mixed rations began 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 4461} Permittee shall maintain records demonstrating grain is/was stored in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]
- {modified 4462} Permittee shall feed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. [District Rules 2201 and 4570]
- {modified 4463} Permittee shall maintain records to demonstrate animals are fed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
- {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 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 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]

- {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 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 manufacturers instructions for application of the additive. [District Rules 2201 and 4570]

California Health & Safety Code 42301.6 (School Notice)

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

California Environmental Quality Act (CEQA)

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

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

Greenhouse Gas (GHG) Significance Determination

District is a Responsible Agency

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

District CEQA Findings

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

Pursuant to CEQA Guidelines §15250, the District is a Responsible Agency for the Project via its Permits Rule (Rule 2010) and New Source Review Rule (Rule 2201), (CEQA Guidelines §15381). As a Responsible Agency the District complies with CEQA by considering the environmental document prepared by the Lead Agency, and by reaching its own conclusion on whether and how to approve the project (CCR §15096).

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

Indemnification Agreement/Letter of Credit Determination

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

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

IX. Recommendation

Compliance with all applicable rules and regulations is expected. Issue ATCs N-6302-1-2, ‘-2-1, ‘-3-1, ‘-4-1, and ‘-5-1 subject to the permit conditions on the attached draft ATCs in Appendix A.

X. Billing Information

Annual Permit Fees			
Permit Number	Fee Schedule	Fee Description	Annual Fee
N-6302-1-2	3020-06	COW MILKING OPERATION	\$128
N-6302-2-1	3020-06	COW HOUSING	\$128
N-6302-3-1	3020-06	LIQUID MANURE HANDLING	\$128
N-6302-4-1	3020-06	SOLID MANURE HANDLING	\$128
N-6302-5-1	3020-06	FEED STROAGE AND HANDLING	\$128

Appendixes

- A: Draft ATCs
- B: ATC N-6302-1-1 and PTOs ‘-2-0 through ‘-5-0
- C: BACT Guidelines
- D: BACT Analysis
- E: HRA Summary
- F: SSPE Calculations
- G: Quarterly Net Emissions Change
- H: Satellite Images
- I: Site Plan
- J: Dairy Calculator
- K: Anaerobic Lagoon Design Check

APPENDIX A
Draft ATCs

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT
DRAFT

PERMIT NO: N-6302-1-2

LEGAL OWNER OR OPERATOR: SILVAS HOLSTEINS DAIRY
MAILING ADDRESS: 6706 ELAINE RD
TURLOCK, CA 95380

LOCATION: 6706 ELAINE RD
TURLOCK, CA 95380

EQUIPMENT DESCRIPTION:

MODIFICATION OF 880 COW MILKING OPERATION WITH ONE DOUBLE 16 PARALLEL (32 STALLS) MILKING PARLOR: INCREASE MAXIMUM NUMBER OF MILK COW TO 1,900 DUE TO INCREASE IN HERD SIZE AUTHORIZED BY AUTHORITY TO CONSTRUCT N-6302-2-1 AND CONVERT THE EXISTING DOUBLE 16 PARALLEL (32 STALLS) MILKING PARLOR TO A DOUBLE 20 PARALLEL (40 STALLS) MILKING PARLOR

CONDITIONS

1. Authority to Construct (ATC) N-6302-1-1 shall be implemented concurrently, or prior to the modification and startup of the equipment authorized by this Authority to Construct. [District Rule 2201]
2. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
3. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
4. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

CONDITIONS CONTINUE ON NEXT PAGE

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

Samir Sheikh, Executive Director / APCO

Brian Clements, Director of Permit Services

N-6302-1-2 : May 17 2023 8:35AM - HONGM : Joint Inspection NOT Required

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

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San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT

PERMIT NO: N-6302-2-1

LEGAL OWNER OR OPERATOR: SILVAS HOLSTEINS DAIRY
MAILING ADDRESS: 6706 ELAINE RD
TURLOCK, CA 95380

LOCATION: 6706 ELAINE RD
TURLOCK, CA 95380

EQUIPMENT DESCRIPTION:

MODIFICATION OF COW HOUSING - 880 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 1,095 MATURE COWS (MILK AND DRY); 885 SUPPORT STOCK (HEIFERS, CALVES, AND BULLS); AND 4 FREESTALL BARN WITH FLUSH/SCRAPE SYSTEM: INCREASE THE COW HERD LIMIT TO 1,900 MILK COWS, 2,200 MATURE COWS (MILK AND DRY), AND 1,900 SUPPORT STOCK; CONSTRUCT ONE SAUDI-STYLE BARN OVER EXISTING OPEN CORRALS; CONSTRUCT TWO FREESTALL BARN AND SAUDI STYLE BARN OVER EXISTING EXERCISE PENS; CONSTRUCT ONE SAUDI-STYLE BARN OVER SHADE BARN #13 AND 14; CONSTRUCT ONE FREESTALL BARN IN A NEW AREA; AND EXPAND THE FOOTPRINT OF SHADE BARN #2 AND 10

CONDITIONS

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

CONDITIONS CONTINUE ON NEXT PAGE

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

Samir Sheikh, Executive Director / APCO

Brian Clements, Director of Permit Services

N-6302-2-1 : May 17 2023 8:35AM - HONGM : Joint Inspection NOT Required

4. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
5. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
6. 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. For Freestalls #3, 4, 6, 7, 16, and 17 and Shade Barns #10, 11, 18, and 19, the feed lanes and walkways at this dairy shall be constructed of concrete. [District Rule 2201]
8. For Freestalls #3, 4, 6, 7, 16, and 17 and Shade Barns #10, 11, 18, and 19, permittee shall flush or scrape the lanes and walkways at least four times per day for mature cows (milk and dry cows) and at least once per day for support stock (heifers). [District Rules 2201 and 4570]
9. For Freestalls #3, 4, 6, 7, 16, and 17 and Shade Barns #10, 11, 18, and 19, permittee shall maintain sufficient records to demonstrate that the lanes and walkways are flushed or scraped at least four times per day for mature cows (milk and dry cows) and at least once per day for support stock (heifers). [District Rules 2201 and 4570]
10. For Freestall #17 and Shade Barn #19, permittee shall scrape exercise pens at least once every two weeks using a pull-type scraper in the morning hours, except when prevented by wet conditions. [District Rules 2201 and 4570]
11. For Freestall #17 and Shade Barn #19, permittee shall maintain sufficient records to demonstrate that exercise pens are scraped at least once every two weeks using a pull-type scraper during morning hours, except when prevented by wet conditions. [District Rules 2201 and 4570]
12. Freestalls #3, 4, 6, 7, and 16 and Shade Barns #10, 11, and 18 shall not have any attached exercise pens. [District Rules 2201 and 4570]
13. Permittee shall pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers. [District Rules 2201 and 4570]
14. Permittee shall flush, scrape or vacuum freestall lanes immediately prior to, immediately after or during each milking. [District Rules 2201 and 4570]
15. Permittee shall maintain records sufficient to demonstrate that freestall lanes are flushed, scraped or vacuumed immediately prior to, immediately after or during each milking. [District Rules 2201 and 4570]
16. 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]
17. Permittee shall record either of the following: 1) the dates when manure that is not dry is removed from individual cow freestall beds or 2) the dates when the freestall bedding is raked, harrowed, scraped, or graded. [District Rules 2201 and 4570]
18. Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rules 2201 and 4570]
19. 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]
20. Permittee shall clean manure from corrals at least four (4) times per year with at least sixty (60) days between each cleaning, or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]

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CONDITIONS CONTINUE ON NEXT PAGE

21. Permittee shall demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning or demonstrate that corrals are cleaned at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]
22. Permittee shall implement at least one of the following corral mitigation measures: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 square feet or less and shall slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 square feet per animal; 2) maintain corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface except during periods of rainy weather. [District Rules 2201 and 4570]
23. Permittee shall either 1) maintain sufficient records to demonstrate that corrals are maintained to ensure proper drainage preventing water from standing for more than forty-eight hours or 2) maintain records of dates pens are groomed (i.e., harrowed, raked, or scraped, etc.). [District Rules 2201 and 4570]
24. Permittee shall clean concreted lanes such that the depth of manure does not exceed twelve (12) inches at any point or time. [District Rules 2201 and 4570]
25. Permittee shall measure and document the depth of manure on the concrete lanes at least once every ninety (90) days. [District Rules 2201 and 4570]
26. Shade structures shall be installed in any of the following ways: 1) constructed with a light permeable roofing material; 2) uphill of any slope in the corral; 3) installed so that the structure has a North/South orientation. OR Permittee shall clean manure from under corral shades at least once every fourteen (14) days, when weather permits access into the corral. [District Rules 2201 and 4570]
27. If permittee has selected to comply using shades constructed with a light permeable roofing material, then permittee shall maintain records, such as design specifications, demonstrating that the shade structures are equipped with such roofing material or if Permittee has selected to comply by cleaning the manure from under the corral shades, then Permittee shall maintain records demonstrating that manure is cleaned from under the shades at least once every fourteen (14) days, as long as weather permits access to corrals. [District Rules 2201 and 4570]
28. Permittee shall manage corrals such that the manure depth in the corral does not exceed twelve (12) inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rules 2201 and 4570]
29. Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rules 2201 and 4570]
30. 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]
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]

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San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT
DRAFT

PERMIT NO: N-6302-3-1

LEGAL OWNER OR OPERATOR: SILVAS HOLSTEINS DAIRY
MAILING ADDRESS: 6706 ELAINE RD
TURLOCK, CA 95380

LOCATION: 6706 ELAINE RD
TURLOCK, CA 95380

EQUIPMENT DESCRIPTION:

MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF MECHANICAL SEPARATOR(S); THREE LAGOONS; MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION: INCREASE IN LIQUID MANURE DUE TO INCREASE IN HERD SIZE AUTHORIZED BY AUTHORITY TO CONSTRUCT N-6302-2-1 AND INSTALL TWO ANAEROBIC TREATMENT LAGOONS

CONDITIONS

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

CONDITIONS CONTINUE ON NEXT PAGE

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

Samir Sheikh, Executive Director / APCO

Brian Clements, Director of Permit Services

N-6302-3-1 : May 17 2023 8:35AM - HONGM : Joint Inspection NOT Required

5. Permittee shall use an anaerobic treatment lagoon designed according to NRCS Guideline No. 359. [District Rules 2201 and 4570]
6. Permittee shall maintain records, such as design specifications, calculations, including Minimum Treatment Volume (MTV), Hydraulic Retention Time (HRT) demonstrating that the anaerobic treatment lagoon meets the requirements listed in the NRCS Field Office Technical Guide Code 359. [District Rules 2201 and 4570]
7. Permittee shall remove solids with a solid separator system, prior to the manure entering the lagoon. [District Rules 2201 and 4570]
8. Permittee shall only apply liquid manure that has been treated with an anaerobic treatment lagoon system. [District Rules 2201 and 4570]
9. Permittee shall maintain records that only liquid manure treated with an anaerobic treatment lagoon or aerobic lagoon or digester system is applied to fields. [District Rules 2201 and 4570]
10. 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]
11. Permittee shall maintain records to demonstrate liquid manure did not stand in the fields for more than twenty-four (24) hours after irrigation. [District Rules 2201 and 4570]
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 Rules 2201 and 4570]

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San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT
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PERMIT NO: N-6302-4-1

LEGAL OWNER OR OPERATOR: SILVAS HOLSTEINS DAIRY
MAILING ADDRESS: 6706 ELAINE RD
TURLOCK, CA 95380

LOCATION: 6706 ELAINE RD
TURLOCK, CA 95380

EQUIPMENT DESCRIPTION:

MODIFICATION OF SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; SOLID MANURE APPLICATION TO LAND AND/OR HAULED OFFSITE: INCREASE IN SOLID MANURE DUE TO INCREASE IN HERD SIZE AS AUTHORIZED BY AUTHORITY TO CONSTRUCT N-6302-2-1

CONDITIONS

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

CONDITIONS CONTINUE ON NEXT PAGE

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

Samir Sheikh, Executive Director / APCO

Brian Clements, Director of Permit Services

N-6302-4-1 : May 17 2023 8:35AM - HONGM : Joint Inspection NOT Required

5. Within seventy two (72) hours of removal of separated solids from the drying process, permittee shall either 1) remove separated solids from the facility, or 2) cover separated solids outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed twenty-four (24) hours per event. [District Rules 2201 and 4570]
6. Permittee shall keep records of dates when separated solids are removed from the facility or permittee shall maintain records to demonstrate that separated solids piles outside the pens are covered with a weatherproof covering from October through May. [District Rules 2201 and 4570]
7. Permittee shall incorporate all solid manure within seventy-two (72) hours of land application. [District Rules 2201 and 4570]
8. Permittee shall maintain records to demonstrate that all solid manure has been incorporated within seventy-two (72) hours of land application. [District Rules 2201 and 4570]
9. 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]

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San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT
DRAFT

PERMIT NO: N-6302-5-1

LEGAL OWNER OR OPERATOR: SILVAS HOLSTEINS DAIRY

MAILING ADDRESS: 6706 ELAINE RD
TURLOCK, CA 95380

LOCATION: 6706 ELAINE RD
TURLOCK, CA 95380

EQUIPMENT DESCRIPTION:

MODIFICATION OF FEED STORAGE AND HANDLING CONSISTING OF COVERED FEED STORAGE OR COMMODITY BARN(S), SILAGE PILE(S) AND DRY GRAIN TANK(S): INCREASE IN TOTAL MIX RATION DUE TO INCREASE IN HERD SIZE AS AUTHORIZED BY AUTHORITY TO CONSTRUCT N-6302-2-1

CONDITIONS

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

CONDITIONS CONTINUE ON NEXT PAGE

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

Samir Sheikh, Executive Director / APCO

Brian Clements, Director of Permit Services

N-6302-5-1 : May 17 2023 8:35AM - HONGM : Joint Inspection NOT Required

5. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
6. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
7. Permittee shall push feed so that it is within three feet of feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]
8. Permittee shall maintain an operating plan or record that requires feed to be pushed within three feet of feedlane fence within two hours of putting out the feed, or use of a feed trough or other structure designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]
9. Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
10. Permittee shall maintain an operating plan or record of when feeding of total mixed rations began within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
11. Permittee shall store grain in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]
12. Permittee shall maintain records demonstrating grain is/was stored in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]
13. Permittee shall feed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. [District Rules 2201 and 4570]
14. Permittee shall maintain records to demonstrate animals are fed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
15. 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]

CONDITIONS CONTINUE ON NEXT PAGE

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]
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 manufacturer's 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]

APPENDIX B
ATC N-6302-1-1 and PTOs '-2-0 through '-5-0



AUTHORITY TO CONSTRUCT

PERMIT NO: N-6302-1-1

ISSUANCE DATE: 08/10/2018

LEGAL OWNER OR OPERATOR: SILVAS HOLSTEINS DAIRY

MAILING ADDRESS: 6706 ELAINE RD
TURLOCK, CA 95380

LOCATION: 6706 ELAINE RD
TURLOCK, CA 95380

EQUIPMENT DESCRIPTION:

MODIFICATION OF A 880 COW MILKING OPERATION WITH ONE DOUBLE PARALLEL (24 STALL) MILKING PARLOR: CONVERT THE EXISTING DOUBLE PARALLEL (24-STALL) MILKING PARLOR TO A DOUBLE PARALLEL (32-STALL) MILKING PARLOR WITH NO INCREASE IN HERD SIZE

CONDITIONS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
4. Permittee shall flush or hose milk parlor immediately prior to, immediately after, or during each milking. [District Rule 4570]
5. Permittee shall provide verification that milk parlors are flushed or hosed prior to, immediately after, or during each milking. [District Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

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

Samir Sheikh, Executive Director / APCO

Arnaud Marjollet, Director of Permit Services

N-6302-1-1 : Aug 10 2018 11:12AM -- PROCOPIS : Joint Inspection NOT Required

6. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]
7. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley Air Pollution Control District

PERMIT UNIT: N-6302-2-0

EXPIRATION DATE: 12/31/2024

EQUIPMENT DESCRIPTION:

COW HOUSING - 880 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 1,095 MATURE COWS (MILK AND DRY); 885 SUPPORT STOCK (HEIFERS, CALVES, AND BULLS); AND 4 FREESTALL BARNs WITH FLUSH SYSTEM

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]
4. If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
5. Permittee shall pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers. [District Rule 4570]
6. Permittee shall flush or scrape freestall flush lanes at least three (3) times per day. [District Rule 4570]
7. Permittee shall keep records or maintain an operating plan that requires freestall flush lanes to be flushed or scraped at least three times per day. [District Rule 4570]
8. Permittee shall remove manure that is not dry from individual cow freestall beds or shall rake, harrow, scrape, or grade freestall bedding at least once every fourteen (14) days. [District Rule 4570]
9. Permittee shall record either of the following: 1) the dates when manure that is not dry is removed from individual cow freestall beds or 2) the dates when the freestall bedding is raked, harrowed, scraped, or graded. [District Rule 4570]
10. Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rule 4570]
11. Permittee shall maintain records demonstrating that water pipes and troughs are inspected and leaks are repaired at least once every seven (7) days. [District Rule 4570]
12. Permittee shall clean manure from corrals at least four (4) times per year with at least sixty (60) days between each cleaning, or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rule 4570]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

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

13. Permittee shall demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning or demonstrate that corrals are cleaned at least once between April and July and at least once between September and December. [District Rule 4570]
14. Permittee shall implement at least one of the following corral mitigation measures: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 square feet or less and shall slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 square feet per animal; 2) maintain corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface except during periods of rainy weather. [District Rule 4570]
15. Permittee shall either 1) maintain sufficient records to demonstrate that corrals are maintained to ensure proper drainage preventing water from standing for more than forty-eight hours or 2) maintain records of dates pens are groomed (i.e., harrowed, raked, or scraped, etc.). [District Rule 4570]
16. Permittee shall scrape, vacuum or flush concrete lanes in corrals at least once every day for mature cows and every seven (7) days for support stock. [District Rule 4570]
17. Permittee shall maintain records demonstrating that concrete lanes in corrals are scraped, vacuumed, or flushed at least once every day for mature cows and at least once every seven (7) days for support stock. [District Rule 4570]
18. Shade structures shall be installed in any of the following ways: 1) constructed with a light permeable roofing material; 2) uphill of any slope in the corral; 3) installed so that the structure has a North/South orientation. OR Permittee shall clean manure from under corral shades at least once every fourteen (14) days, when weather permits access into the corral. [District Rule 4570]
19. If permittee has selected to comply using shades constructed with a light permeable roofing material, then permittee shall maintain records, such as design specifications, demonstrating that the shade structures are equipped with such roofing material or if Permittee has selected to comply by cleaning the manure from under the corral shades, then Permittee shall maintain records demonstrating that manure is cleaned from under the shades at least once every fourteen (14) days, as long as weather permits access to corrals. [District Rule 4570]
20. Permittee shall manage corrals such that the manure depth in the corral does not exceed twelve (12) inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rule 4570]
21. Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rule 4570]
22. Permittee shall maintain a record of the number of animals of each species and production group at the facility and shall maintain quarterly records of any changes to this information. [District Rule 4570]
23. 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 2010]
24. 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]

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

San Joaquin Valley Air Pollution Control District

PERMIT UNIT: N-6302-3-0

EXPIRATION DATE: 12/31/2024

EQUIPMENT DESCRIPTION:

LIQUID MANURE HANDLING SYSTEM CONSISTING OF MECHANICAL SEPARATOR(S); THREE LAGOONS; MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]
4. If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
5. Permittee shall remove solids with a solid separator system, prior to the manure entering the lagoon. [District Rule 4570]
6. Permittee shall not allow liquid manure to stand in the fields for more than twenty-four (24) hours after irrigation. [District Rule 4570]
7. Permittee shall maintain records to demonstrate liquid manure did not stand in the fields for more than twenty-four (24) hours after irrigation. [District Rule 4570]
8. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]

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

San Joaquin Valley Air Pollution Control District

PERMIT UNIT: N-6302-4-0

EXPIRATION DATE: 12/31/2024

EQUIPMENT DESCRIPTION:

SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; SOLID MANURE APPLICATION TO LAND AND/OR HAULED OFFSITE

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]
4. If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
5. Permittee shall incorporate all solid manure within seventy-two (72) hours of land application. [District Rule 4570]
6. Permittee shall maintain records to demonstrate that all solid manure has been incorporated within seventy-two (72) hours of land application. [District Rule 4570]
7. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]

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

San Joaquin Valley Air Pollution Control District

PERMIT UNIT: N-6302-5-0

EXPIRATION DATE: 12/31/2024

EQUIPMENT DESCRIPTION:

FEED STORAGE AND HANDLING CONSISTING OF COVERED FEED STORAGE OR COMMODITY BARN(S), SILAGE PILE(S) AND DRY GRAIN TANK(S)

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]
4. If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
5. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 4570]
6. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rule 4570]
7. Permittee shall push feed so that it is within three feet of feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals. [District Rule 4570]
8. Permittee shall maintain an operating plan or record that requires feed to be pushed within three feet of feedlane fence within two hours of putting out the feed, or use of a feed trough or other structure designed to maintain feed within reach of the animals. [District Rule 4570]
9. Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rule 4570]
10. Permittee shall maintain an operating plan or record of when feeding of total mixed rations began within two hours of grinding and mixing rations. [District Rule 4570]
11. Permittee shall store grain in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rule 4570]
12. Permittee shall maintain records demonstrating grain is/was stored in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rule 4570]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

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

13. Permittee shall remove uneaten wet feed from feed bunks within twenty-four (24) hours after the end of a rain event. [District Rule 4570]
14. Permittee shall maintain records demonstrating that uneaten wet feed was removed from feed bunks within twenty-four (24) hours after the end of a rain event. [District Rule 4570]
15. For bagged silage/feedstuff, permittee shall utilize a sealed feed storage system (e.g., ag bag). [District Rule 4570]
16. Permittee shall cover all silage piles, except for the area where feed is being removed from the pile, with a plastic tarp that is at least five (5) mils (0.005 inches) thick, multiple plastic tarps with a cumulative thickness of at least 5 mils (0.005 inches), or an oxygen barrier film covered with a UV resistant material. Silage piles shall be covered within seventy-two (72) hours of last delivery of material to the pile. Sheets of material used to cover silage shall overlap so that silage is not exposed where the sheets meet. [District Rule 4570]
17. Permittee shall maintain records of the thickness and type of cover used to cover each silage pile. Permittee shall also maintain records of the date of the last delivery of material to each silage pile and the date each pile is covered. [District Rule 4570]
18. Permittee shall select and implement one of the following mitigation measures for building each silage pile at the facility: Option 1) build the silage pile such that the average bulk density is at least 44 lb/cu ft for corn silage and 40 lb/cu ft for other silage types, as measured in accordance with Section 7.11 of District Rule 4570; Option 2) Adjust filling parameters when creating the silage pile to achieve an average bulk density of at least 44 lb/cu ft for corn silage and at least 40 lb/cu ft for other silage types as determined using a District-approved spreadsheet; or Option 3) build silage piles using crops harvested with the applicable minimum moisture content, maximum Theoretical Length of Chop (TLC), and roller opening identified in District Rule 4570, Table 4.1, 1.d and manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. Records of the option chosen as a mitigation measure for building each silage pile shall be maintained. [District Rule 4570]
19. For each silage pile that Option 1 (Measured Bulk Density) is chosen as a mitigation measure for building the pile, records of the measured bulk density shall be maintained. [District Rule 4570]
20. For each silage pile that Option 2 (Bulk Density Determined by Spreadsheet) is chosen as a mitigation measure for building the pile, records of the filling parameters entered into the District-approved spreadsheet to determine the bulk density shall be maintained. [District Rule 4570]
21. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall harvest corn used for the pile at an average moisture content of at least 65% and harvest other silage crops for the pile at an average moisture content of at least 60%. [District Rule 4570]
22. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records of the average percent moisture of crops harvested for silage shall be maintained. [District Rule 4570]
23. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall adjust setting of equipment used to harvest crops for the pile to incorporate the following parameters for Theoretical Length of Chop (TLC) and roller opening, as applicable: 1) Corn with no processing: TLC not exceeding 1/2 inch, 2) Processed Corn: TLC not exceeding 3/4 inch and roller opening of 1-4 mm, 3) Alfalfa/Grass: TLC not exceeding 1.0 inch, 4) Other silage crops: TLC not exceeding 1/2 inch. [District Rule 4570]
24. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records that equipment used to harvest crops for the pile was set to the required TLC and roller opening for the type of crop harvested shall be maintained. [District Rule 4570]
25. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rule 4570]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

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

26. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall maintain a plan that requires that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rule 4570]
27. Permittee shall select and implement at least two of the following mitigation measures for management of silage piles at the facility: Option 1) manage silage piles such that only one silage pile has an uncovered face and the total exposed surface area is less than 2,150 square feet, or manage multiple uncovered silage piles such that the total exposed surface area of all uncovered silage piles is less than 4,300 square feet; Option 2) use a shaver/facer to remove silage from the silage pile, or shall use another method to maintain a smooth vertical surface on the working face of the silage pile; or Option 3) inoculate silage with homolactic lactic acid bacteria in accordance with manufacturer recommendations to achieve a concentration of at least 100,000 colony forming units per gram of wet forage, apply propionic acid, benzoic acid, sorbic acid, sodium benzoate, or potassium sorbate at the rate specified by the manufacturer to reduce yeast counts when forming silage piles, or apply other additives at rates that have been demonstrated to reduce alcohol concentrations in silage and/or VOC emissions from silage and have been approved by the District and EPA. Records of the options chosen for managing each silage pile shall be maintained. [District Rule 4570]
28. If Option 1 (Limiting Exposed Area of Silage) is chosen as a mitigation measure for managing silage piles, the permittee shall calculate and record the maximum (largest part of pile) total exposed area of each silage pile. Records of the maximum calculated area shall be maintained. [District Rule 4570]
29. For each silage pile that Option 2 (Shaver/Facer or Smooth Face) is chosen as a mitigation measure for managing the pile, the permittee shall maintain records that a shaver/facer was used to remove silage from the pile or shall visually inspect the pile at least daily to verify that the working face was smooth and maintain records of the visual inspections. [District Rule 4570]
30. For each silage pile that Option 3 (Silage Additives) is chosen as a mitigation measure for managing the pile, records shall be maintained of the type additive (e.g. inoculants, preservative, other District & EPA-approved additive), the quantity of the additive applied to the pile, and a copy of the manufacturers instructions for application of the additive. [District Rule 4570]
31. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]

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

APPENDIX C
BACT Guidelines

Best Available Control Technology (BACT) Guideline 5.8.2
Last Update: 12/18/2013

Cow Housing - Freestall and Saudi-Style Barns

Pollutant	Achieved in Practice or in the SIP	Technologically Feasible	Alternate Basic Equipment
PM10	1) Concrete feed lanes and walkways; 2) Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions		
VOC	1) Concrete feed lanes and walkways; 2) Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, Scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning lanes and walkways for support stock (heifers) at least once per day); 3) Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines; 4) Properly sloping exercise pens		

Pollutant	Achieved in Practice or in the SIP	Technologically Feasible	Alternate Basic Equipment
	<p>(minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing corrals to maintain a dry surface;</p> <p>5) Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions; and</p> <p>6) Rule 4570 Measures</p>		

NH3

1) Concrete feed lanes and walkways; 2) Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, Scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning lanes and walkways for support stock (heifers) at least once per day); 3) Feeding all animals in

Pollutant	Achieved in Practice or in the SIP	Technologically Feasible	Alternate Basic Equipment
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accordance with National Research Council (NRC) or other District-approved guidelines;

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

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

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

This is a Summary Page for this Class of Source.

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.8.6*

Last Update: 12/18/2013

Liquid Manure Handling - Lagoon/Storage Pond

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

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

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

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.8.7*

Last Update: 12/18/2013

Liquid Manure Handling - Liquid/Slurry Land Application

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

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

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

Best Available Control Technology (BACT) Guideline 5.8.8
Last Update: 12/18/2013

Solid Manure Handling - Storage/Separated Solids Piles

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

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

This is a Summary Page for this Class of Source.

**Best Available Control Technology (BACT) Guideline 5.8.9
Last Update: 12/18/2013**

Solid Manure Handling - Land Application

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

Pollutant	Achieved in Practice or in the SIP	Technologically Feasible	Alternate Basic Equipment
NH3	Rapid incorporation of solid manure into the soil after land application, and all animals fed in accordance with NRCS or other District-approved guidelines		

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

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San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.8.11*

Last Update: 12/18/2013

Feed Storage and Handling - Feed/TMR

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

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

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

APPENDIX D
BACT Analysis

TOP-DOWN BACT Analysis

A Top-Down BACT analysis is required for Freestall #7 and Shade Barns #9, 10, 11, and 18 for VOC and NH₃ emissions. Shade Barn #9 has an exercise pen attached, whereas Freestall #7 and Shade Barns #10, 11, and 18 do not have any exercise pens attached. Therefore, Shade Barn #9 will be addressed separately. A Top-Down BACT analysis is required for Freestalls #4 and #6 for NH₃ emissions only; therefore, these housing units will be addressed together. Lastly, a Top-Down BACT analysis is required for Freestalls #3, 16, and 17 for VOC emissions only. Freestall #17 has an exercise pen attached, whereas Freestalls #3 and 16 do not have any exercise pens attached. Therefore, Freestall #17 will be discussed separately.

BACT analysis for Freestall #7 and Shade Barns #10, 11, and 18:

1. VOC Emissions

a. Step 1 – Identify all control technologies

BACT Guideline 5.8.2 identifies the following controls for VOC emissions from freestall barns and Saudi-style barns:

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

Description of Control Technologies

1) Concrete Feed Lanes and Walkways

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

2) Frequent Cleaning of Lanes and Walkways

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

In addition to cleaning the lanes and walkways, the flush and scrape systems also serve as an emission control for reducing VOC emissions. The manure deposited in the lanes, which is a source of VOC emissions, is removed from the cow housing area by the flush or scrape system. Flush systems also reduce PM₁₀ and ammonia emissions. Additionally, many of the VOCs emitted from fresh cow manure, such as alcohols (ethanol and methanol) and many Volatile Fatty Acids (VFAs), are highly soluble in water. Therefore, when a flush system is used, a large percentage of these compounds will dissolve in the flush water and will not be emitted from the cow housing permit unit. The flush water can then carry the manure and the dissolved volatile compounds to an anaerobic treatment lagoon or other manure stabilization process for treatment.

It must be noted that the system for cleaning the lanes and walkways will only control the VOCs emitted from the manure it will have little or no effect on enteric emissions produced from the cows' digestive processes. As stated above, the lanes and walkways in the cow housing areas are typically cleaned twice per day. Cleaning the lanes four times per day will increase the frequency that manure is removed from the cow housing permit unit. Although the control efficiency for VOCs may actually be much higher, increasing the cleaning frequency of the lanes will be conservatively assumed to have a control efficiency of 10% for VOCs emitted from manure until better data becomes available.

3) Animals Fed in Accordance with 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.⁷ This undigested protein also produces ammonia and hydrogen sulfide emissions.

⁷ "Emissions of Volatile Organic Compounds Originating from UK Livestock Agriculture", Hobbs, P.J. 2004 – Journal of the Science of Food and Agriculture

The level of microbial action in the manure corresponds to the level of organic nitrogen content in the manure; the lower the level of nitrogen the lower the level of microbial action and the lower the production of VOCs, ammonia, and hydrogen sulfide.

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

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

4) Properly sloping exercise pens

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

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

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

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

b. Step 2 – Eliminate Technologically Infeasible Options

There are no attached exercise pens to Freestall #7. According to the facility, there will be no attached exercise pens to Shade Barns #10, 11, and 18. Therefore, Option 5 will be eliminated. The rest of the options are not technologically infeasible.

c. Step 3 – Rank remaining options by control effectiveness

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

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The applicant has proposed to implement the following options:

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

The proposal satisfies BACT for Freestall #7 and Shade Barns #10, 11, and 18 for VOC emissions.

2. NH₃ Emissions

a. Step 1 – Identify all control technologies

BACT Guideline 5.8.2 identifies the following controls for NH₃ emissions from freestall barns and Saudi-style barns:

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

Description of Control Technologies

1) Concrete Feed Lanes and Walkways

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

2) Frequent Cleaning of Lanes and Walkways

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

per day, but the cleaning frequency can vary between one to four times per day. The lanes for support stock are usually flushed or scraped once per day or less frequently.

In addition to cleaning the freestall and Saudi style lanes and walkways, the flush or scrape systems also serve as an emission control for reducing emissions. The manure deposited in the lanes, which is a source of NH₃ emissions, is removed from the cow housing area by the flush or scrape system. Additionally, ammonia is highly soluble in water. Therefore, when a flush system is used, a large portion of ammonia will be flushed away with the flush water and will not be emitted from the cow housing permit unit.

3) Animals fed in accordance with 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.

4) Properly sloping exercise pens

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

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

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

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

b. Step 2 - Eliminate technologically infeasible options

There are no attached exercise pens to Freestall #7. According to the facility, there will be no attached exercise pens to Shade Barns #10, 11, and 18. Therefore, Option 5 will be eliminated. The rest of the options are not technologically infeasible.

c. Step 3 - Rank remaining options by control effectiveness

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

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The applicant has proposed to implement the following options:

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

The proposal satisfies BACT for Freestall #7 and Shade Barns #10, 11, and 18 for NH₃ emissions.

BACT analysis for Freestalls #4 and 6:

NH₃ Emissions

a. Step 1 – Identify all control technologies

BACT Guideline 5.8.2 identifies the following controls for NH₃ emissions from freestall barns and Saudi-style barns:

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

Description of Control Technologies

1) Concrete Feed Lanes and Walkways

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

2) Frequent Cleaning of Lanes and Walkways

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

freestall and Saudi style lanes for milk and dry cows are typically flushed or scraped twice per day, but the cleaning frequency can vary between one to four times per day. The lanes for support stock are usually flushed or scraped once per day or less frequently.

In addition to cleaning the freestall and Saudi style lanes and walkways, the flush or scrape systems also serve as an emission control for reducing emissions. The manure deposited in the lanes, which is a source of NH₃ emissions, is removed from the cow housing area by the flush or scrape system. Additionally, ammonia is highly soluble in water. Therefore, when a flush system is used, a large portion of ammonia will be flushed away with the flush water and will not be emitted from the cow housing permit unit.

3) Animals fed in accordance with 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.

4) Properly sloping exercise pens

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

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

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

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

b. Step 2 - Eliminate technologically infeasible options

There are no attached exercise pens to these housing units. Therefore, Option 5 will be eliminated. The rest of the options are not technologically infeasible.

c. Step 3 - Rank remaining options by control effectiveness

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

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The applicant has proposed to implement the following options:

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

The proposal satisfies BACT for Freestalls #4 and 6 for NH₃ emissions.

BACT analysis for Freestalls #3 and 16:

VOC Emissions

a. Step 1 – Identify all control technologies

BACT Guideline 5.8.2 identifies the following controls for VOC emissions from freestall barns and Saudi-style barns:

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

Description of Control Technologies

1) Concrete Feed Lanes and Walkways

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

2) Frequent Cleaning of Lanes and Walkways

Many dairy operations use flush or scrape systems to remove manure from the freestall and Saudi-style lanes and walkways. When dairies use a flush system, a large volume of water is introduced at the head of the paved area of the freestall and Saudi style barn, and the cascading water removes the manure. The required volume of flush water varies with the size and slope of the area to be flushed. When dairies use a scrape system for manure management, manure is typically scraped from the cow housing lanes using a tractor or skid steer with a scraping attachment, or using an automatic mechanical scraper. The automatic scraper usually consists of a hinged v-shaped scraper driven by a cable or chain. The mechanical scraper is periodically dragged forward to draw manure to the end of a lane. After completing a pass, the chain or cable reverses direction and pulls the scraper back in the opposite direction. The scraped manure is either temporarily stored in a pile where liquids

are allowed to drain off, or loaded onto a truck or tractor for transport or land application. The freestall and Saudi style lanes for milk and dry cows are typically flushed or scraped twice per day, but the cleaning frequency can vary between one to four times per day. The lanes for support stock are usually flushed or scraped once per day or less frequently.

In addition to cleaning the freestall and Saudi style lanes and walkways, the flush or scrape systems also serve as an emission control for reducing emissions. The manure deposited in the lanes, which is a source of NH₃ emissions, is removed from the cow housing area by the flush or scrape system. Additionally, ammonia is highly soluble in water. Therefore, when a flush system is used, a large portion of ammonia will be flushed away with the flush water and will not be emitted from the cow housing permit unit.

3) Animals fed in accordance with 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.

4) Properly sloping exercise pens

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

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

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

Increasing the frequency that exercise pens are scraped is expected to reduce emissions of gaseous pollutants from the surface and PM that results from the cattle hooves acting on the surface of the exercise pens; however, requiring an excessively high frequency may negate

these emission reductions because of the NO_x and PM emitted from combustion of fuel for the tractor and PM emissions resulting from use of the tractor on the exercise pen surface.

b. Step 2 - Eliminate technologically infeasible options

There are no attached exercise pens to these housing units. Therefore, Option 5 will be eliminated. The rest of the options are not technologically infeasible.

c. Step 3 - Rank remaining options by control effectiveness

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The applicant has proposed to implement the following options:

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

The proposal satisfies BACT for Freestalls #3 and 16 for VOC emissions.

BACT analysis for Freestall #17:

This top-down BACT determination is being performed to ensure T-BACT requirements from the Risk Management Review analysis are met. Freestall #17 is being evaluated separately from the other housing units because it has connected exercise pens.

VOC Emissions

a. Step 1 – Identify all control technologies

BACT Guideline 5.8.2 identifies the following controls for VOC emissions from freestall barns and Saudi-style barns:

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

Description of Control Technologies

1) Concrete Feed Lanes and Walkways

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

2) Frequent Cleaning of Lanes and Walkways

Many dairy operations use flush or scrape systems to remove manure from the freestall and Saudi-style lanes and walkways. When dairies use a flush system, a large volume of water is introduced at the head of the paved area of the freestall and Saudi style barn, and the cascading water removes the manure. The required volume of flush water varies with the size and slope of the area to be flushed. When dairies use a scrape system for manure management, manure is typically scraped from the cow housing lanes using a tractor or skid steer with a scraping attachment, or using an automatic mechanical scraper. The automatic

scraper usually consists of a hinged v-shaped scraper driven by a cable or chain. The mechanical scraper is periodically dragged forward to draw manure to the end of a lane. After completing a pass, the chain or cable reverses direction and pulls the scraper back in the opposite direction. The scraped manure is either temporarily stored in a pile where liquids are allowed to drain off, or loaded onto a truck or tractor for transport or land application. The freestall and Saudi style lanes for milk and dry cows are typically flushed or scraped twice per day, but the cleaning frequency can vary between one to four times per day. The lanes for support stock are usually flushed or scraped once per day or less frequently.

In addition to cleaning the freestall and Saudi style lanes and walkways, the flush or scrape systems also serve as an emission control for reducing emissions. The manure deposited in the lanes, which is a source of NH₃ emissions, is removed from the cow housing area by the flush or scrape system. Additionally, ammonia is highly soluble in water. Therefore, when a flush system is used, a large portion of ammonia will be flushed away with the flush water and will not be emitted from the cow housing permit unit.

3) Animals fed in accordance with 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.

4) Properly sloping exercise pens

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

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

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

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

b. Step 2 - Eliminate technologically infeasible options

The above options are technologically feasible; therefore, no options will be eliminated.

c. Step 3 - Rank remaining options by control effectiveness

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The applicant has proposed to implement the following options:

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

6) Rule 4570 Measures

Therefore, the proposal satisfies BACT for Freestall #17 for VOC emissions.

BACT analysis for Shade Barn #19:

1. VOC Emissions

a. Step 1 – Identify all control technologies

BACT Guideline 5.8.2 identifies the following controls for VOC emissions from freestall barns and Saudi-style barns:

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

Description of Control Technologies

1) Concrete Feed Lanes and Walkways

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

2) Frequent Cleaning of Lanes and Walkways

Many dairy operations use flush or scrape systems to remove manure from the freestall and Saudi-style lanes and walkways. When dairies use a flush system, a large volume of water is introduced at the head of the paved area of the freestall and Saudi style barn, and the cascading water removes the manure. The required volume of flush water varies with the size and slope of the area to be flushed. When dairies use a scrape system for manure management, manure is typically scraped from the cow housing lanes using a tractor or skid steer with a scraping attachment, or using an automatic mechanical scraper. The automatic scraper usually consists of a hinged v-shaped scraper driven by a cable or chain. The mechanical scraper is periodically dragged forward to draw manure to the end of a lane. After completing a pass, the chain or cable reverses direction and pulls the scraper back in the opposite direction. The scraped manure is either temporarily stored in a pile where liquids

are allowed to drain off, or loaded onto a truck or tractor for transport or land application. The freestall and Saudi style lanes for milk and dry cows are typically flushed or scraped twice per day, but the cleaning frequency can vary between one to four times per day. The lanes for support stock are usually flushed or scraped once per day or less frequently.

In addition to cleaning the freestall and Saudi style lanes and walkways, the flush or scrape systems also serve as an emission control for reducing emissions. The manure deposited in the lanes, which is a source of NH₃ emissions, is removed from the cow housing area by the flush or scrape system. Additionally, ammonia is highly soluble in water. Therefore, when a flush system is used, a large portion of ammonia will be flushed away with the flush water and will not be emitted from the cow housing permit unit.

3) Animals fed in accordance with 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.

4) Properly sloping exercise pens

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

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

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

Increasing the frequency that exercise pens are scraped is expected to reduce emissions of gaseous pollutants from the surface and PM that results from the cattle hooves acting on the surface of the exercise pens; however, requiring an excessively high frequency may negate

these emission reductions because of the NOx and PM emitted from combustion of fuel for the tractor and PM emissions resulting from use of the tractor on the exercise pen surface.

b. Step 2 - Eliminate technologically infeasible options

The above options are technologically feasible; therefore, no options will be eliminated.

c. Step 3 - Rank remaining options by control effectiveness

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The applicant has proposed to implement the following options:

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

Therefore, the proposal satisfies BACT for Freestall #19 for VOC emissions.

2. NH₃ Emissions

a. Step 1 – Identify all control technologies

BACT Guideline 5.8.2 identifies the following controls for NH₃ emissions from freestall barns and Saudi-style barns:

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

Description of Control Technologies

1) Concrete Feed Lanes and Walkways

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

2) Frequent Cleaning of Lanes and Walkways

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

per day, but the cleaning frequency can vary between one to four times per day. The lanes for support stock are usually flushed or scraped once per day or less frequently.

In addition to cleaning the freestall and Saudi style lanes and walkways, the flush or scrape systems also serve as an emission control for reducing emissions. The manure deposited in the lanes, which is a source of NH₃ emissions, is removed from the cow housing area by the flush or scrape system. Additionally, ammonia is highly soluble in water. Therefore, when a flush system is used, a large portion of ammonia will be flushed away with the flush water and will not be emitted from the cow housing permit unit.

3) Animals fed in accordance with 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.

4) Properly sloping exercise pens

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

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

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

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

b. Step 2 - Eliminate technologically infeasible options

The above options are technologically feasible; therefore, no options will be eliminated.

c. Step 3 - Rank remaining options by control effectiveness

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The applicant has proposed to implement the following options:

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

Therefore, the proposal satisfies BACT for Shade Barn #19 for NH₃ emissions.

BACT analysis for the lagoons:

1. VOC Emissions

a. Step 1 – Identify all control technologies

BACT Guideline 5.8.6 identifies the following controls for VOC emissions from lagoons and storage ponds:

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

Description of Control Technologies

1) 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 (CH₄), carbon dioxide (CO₂), 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 ft³/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.

Settling Basin Separation

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

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

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

Weeping Wall Separation

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

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

2) 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.

3) 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 (CH₄), carbon dioxide (CO₂), 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 (N₂), Oxygen (O₂), Hydrogen Sulfide (H₂S), and Ammonia (NH₃). 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 H₂S 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 CO₂ 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.

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

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 BOD₅ 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-BOD₅/acre-day. According to Table 4-5 (March 2008) of the NRCS AWMFH, the total manure produced by a milk cow (1,000-lb animal unit) in a day has a BOD₅ of 2.9 lb/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 1,900 milk cows in the San Joaquin Valley can be calculated as follows:

$$\begin{aligned} \text{BOD}_5 \text{ loading (lb/day)} &= 1,900 \text{ milk cows} \times 2.9 \text{ lb-BOD}_5/\text{cow-day} \times 0.80 \\ &= 4,408 \text{ lb-BOD}_5/\text{day} \end{aligned}$$

$$\begin{aligned} \text{Minimum Surface Area (acres)} &= 4,408 \text{ lb-BOD}_5/\text{day} \div 55 \text{ lb-BOD}_5/\text{acre-day} \\ &= 80.1 \text{ acres} \end{aligned}$$

As shown above, the minimum surface area required for a naturally aerobic lagoon to treat manure from the proposed number of milk cows is 80.1 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 (BOD₅)

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 (BOD₅) 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.

Generally, an aerobic lagoon will be required to 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 BOD₅ loading. As discussed above, the total daily manure produced by a milk cow will have a BOD₅ of 2.9 lb/day and a lagoon handling flushed manure from 1,900 milk cows will have a loading rate of approximately 5,510 lb-BOD₅/day (2,499 kg-BOD₅/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-O₂/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. To be conservative, the yearly energy requirement for a mechanically aerated lagoon system treating flushed manure from 1,900 milk cows is calculated as follows:

$$2,499 \text{ kg-BOD}_5/\text{day} \div (0.68 \text{ kg-O}_2/\text{kW-hr}) \times (365 \text{ day/year}) = 1,341,375 \text{ kW-hr/year.}$$

Cost of Electricity

The cost of electricity will be based upon the average price for industrial electricity in California as of July 2021, as taken from the Energy Information Administration (EIA) website:⁸

$$\text{Average cost of electricity} = \$0.1447/\text{kW-hr}$$

The electricity cost for complete aeration is calculated as follows:

$$1,341,375 \text{ kW-hr/year} \times \$0.1447/\text{kW-hr} = \$194,097/\text{year}$$

⁸http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_06_b

VOC Emissions Reductions

It will be conservatively assumed that a mechanically aerated lagoon providing 1 lb of oxygen for every 1 lb of BOD₅ 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 BOD₅ loading rate for complete aeration. Thus, the actual control from providing 1 lb of oxygen for every 1 lb of BOD₅ loading is probably in the 50% range.

The annual VOC emissions reductions from mechanically aerated lagoon(s) treating the manure from 1,900 milk cows are calculated as follows:

$$\begin{aligned}\text{Annual VOC Emissions Reduction} &= [\text{Number of cows}] \times [\text{Lagoon/Storage Pond VOC EF} \\ &\quad (\text{lb/cow-year})] \times [\text{Complete Aeration Control} \\ &\quad \text{Efficiency for Lagoon/Storage Pond}] \\ &= 1,900 \text{ cows} \times 1.30 \text{ lb-VOC/cow-yr} \times 90\% \text{ control} \\ &= 2,223 \text{ lb-VOC/yr}\end{aligned}$$

Cost of Reductions

$$\begin{aligned}\text{Cost of reductions} &= (\$194,097/\text{year}) \div [(2,223 \text{ lb-VOC/year}) \times (1 \text{ ton}/2,000 \text{ lb})] \\ &= \$174,626/\text{ton}\end{aligned}$$

As shown in the preceding section, based on the cost of electricity alone, the cost of the VOC reductions for this control option is greater than the \$22,600/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 California Energy Commission (CEC) Public Interest Energy Research (PIER) Program Dairy Methane Digester System Program Evaluation Report (February 2009)⁹. Based on information from installations in California, the CEC PIER Dairy Methane Digester Program Evaluation Report gives an average cost of \$756/cow¹⁰ for installation of covered lagoon anaerobic digesters (see Table 9 - Total Project Costs and Cost per Cow and per kW).

⁹ <http://web.archive.org/web/20190228022353/https://www.energy.ca.gov/2009publications/CEC-500-2009-009/CEC-500-2009-009.PDF>

¹⁰ The cost of covered lagoon digester installation was \$585/cow in February 2009, based on "Dairy Power Production Program – Dairy Methane System Program Evaluation Report" (CEC-500-2009-009, February 2009). However, based on Consumer Price Index Inflation Calculator (https://www.bls.gov/data/inflation_calculator.htm) from February 2009 to September 2021, the cost of covered lagoon digester installation has increased to \$756/cow.

The capital cost estimates of a covered lagoon digester treating the manure of 1,900 cows is calculated as follows:

Capital cost estimate: \$756/cow x 1,900 cows = \$1,436,400

The annualized capital cost estimates will be calculated below. The capital cost for the installation of the covered lagoon digester will be spread over the expected life of the system using the capital recovery equation. The expected life of the entire system will be estimated at 10 years though the cover may require replacement during this period. A 4% interest rate is assumed in the equation and the assumption will be made that the equipment has no salvage value at the end of the ten-year cycle.

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

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

Where:

A = Equivalent annual capital cost of the control equipment

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

i = Interest rate (assumed to be 4%)

n = Equipment life (assumed to be 10 years)

$$\begin{aligned} A &= [\$1,436,400 \times 0.04 \times (1.04)^{10}] \div [(1.04)^{10} - 1] \\ &= \$177,095/\text{year} \end{aligned}$$

Operation and Maintenance

The capital cost estimates for operation and maintenance of a covered lagoon digester are based on information from the California Energy Commission (CEC) Public Interest Energy Research (PIER) Program Dairy Methane Digester System Program Evaluation Report (February 2009)⁹. Based on information from the CEC PIER Dairy Methane Digester Program Evaluation Report, an average cost for operation and maintenance of covered lagoon anaerobic digesters is \$33,250 per project (see Section 5 *Case Studies: Covered Lagoon Digesters*).

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 Report⁹, 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:

$$\begin{aligned}\text{Electrical Produced} &= 670.3 \text{ kW-hr} / (\text{milk cow-yr}) \times 1,900 \text{ milk cows} \\ &= 1,273,570 \text{ kW-hr/yr}\end{aligned}$$

Potential Cost Savings from Production of Electricity

The value of electricity generated will be calculated using the previously cited EIA rate of \$0.1447/kW-hr.

$$\begin{aligned}\text{Potential Cost Savings} &= 1,273,570 \text{ kW-hr/yr} \times \$0.1447/\text{kW-hr} \\ &= \$184,286/\text{yr}\end{aligned}$$

Annualized Capital Cost + Operation and Maintenance Cost - Potential Savings from Electricity Produced is \$33,941 (\$177,095 + \$33,250 - \$184,286).

VOC Emissions Reductions

The annual VOC emissions reductions are calculated as follows:

$$\begin{aligned}\text{Annual VOC Emissions Reduction} &= [\text{Number of cows}] \times [\text{Lagoon/Storage Pond VOC EF} \\ &\quad (\text{lb/cow-year})] \times [\text{Covered Lagoon Digester Efficiency} \\ &\quad \text{for Lagoon/Storage Pond}] \\ &= 1,900 \text{ cows} \times 1.30 \text{ lb-VOC/cow-yr} \times 80\% \text{ control} \\ &= 1,976 \text{ lb-VOC/yr}\end{aligned}$$

Cost of Reductions

$$\begin{aligned}\text{Cost of reductions} &= (\$33,941/\text{year}) \div [(1,976 \text{ lb-VOC/year}) \times (1 \text{ ton}/2,000 \text{ lb})] \\ &= \$34,353/\text{ton}\end{aligned}$$

As shown above, the cost of the VOC reductions for this control option is greater than the \$22,600/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. Therefore, cost effectiveness analyses are not required.

e. Step 5 - Select BACT

The applicant has proposed to convert an existing 396' x 285' x 12' lagoon and an existing 385' x 92' x 12' lagoon to anaerobic treatment lagoons designed according to NRCS guidelines and the use of a solids removal/separation system (settling basin(s)). Therefore, BACT is satisfied.

2. NH₃ Emissions

a. Step 1 – Identify all control technologies

BACT Guideline 5.8.6 identifies the following control for NH₃ emissions from lagoons and storage ponds:

- All animals fed in accordance with NRCS or other District-approved guidelines – achieved in practice

Description of Control Technology

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

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

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

b. Step 2 - Eliminate technologically infeasible options

There is no technologically infeasible option to eliminate from step 1.

c. Step 3 - Rank remaining options by control effectiveness

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The facility has proposed to feed all animals in accordance with NRCS; therefore, BACT is satisfied.

BACT analysis for the liquid land application:

1. VOC Emissions

a. Step 1 – Identify all control technologies

BACT Guideline 5.8.7 identifies the following controls for VOC emissions from land application of liquid manure:

- 1) Irrigation of crops using liquid manure from an aerobic treatment lagoon or mechanically aerated lagoon – technologically feasible
- 2) Irrigation of crops using liquid manure from a holding/storage pond after being treated in a covered lagoon/digester – technologically feasible
- 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 – achieved in practice

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 (O₂). The process of aerobic decomposition results in the conversion of organic compounds in the wastewater into carbon dioxide (CO₂), and (H₂O), nitrates, sulfates, and inert biomass (sludge). This process is sometimes referred to as nitrification (especially when discussing NH₃ transformation). Complete aerobic decomposition (100% aeration) removes nearly all malodors and also virtually eliminates VOC, H₂S, and NH₃ 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 (BOD₅) 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 BOD₅ 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 (CH₄), carbon dioxide (CO₂), 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 (N₂), Oxygen (O₂), Hydrogen Sulfide (H₂S), and Ammonia (NH₃). 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 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 (CH₄), carbon dioxide (CO₂), 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 ft³/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 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 (1.40 lb/cow-yr) is not significantly different from the emission rate from lagoons/storage ponds (1.30 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 (1.40 lb/cow-yr) is not significantly different from the emission rate from lagoons/storage ponds (1.30 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 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. Therefore, a cost effectiveness analysis is 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. Therefore, BACT is satisfied.

2. NH₃ Emissions

a. Step 1 – Identify all control technologies

BACT Guideline 5.8.7 identifies the following control for NH₃ emissions from land application of liquid manure:

- All animals fed in accordance with NRCS or other District-approved guidelines

Description of Control Technology

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

There is no technologically infeasible option to eliminate from step 1.

c. Step 3 - Rank remaining options by control effectiveness

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The facility has proposed to feed all animals in accordance with NRCS; therefore, BACT is satisfied.

BACT analysis for the separated solids piles:

NH₃ Emissions

a. Step 1 – Identify all control technologies

BACT Guideline 5.8.8 identifies the following control for NH₃ emissions from storage/separated solids piles:

- All animals fed in accordance with NRCS or other District-approved guidelines – achieved in practice

Description of Control Technology

All animals fed in accordance with NRCS or other District-approved guidelines

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

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

b. Step 2 - Eliminate technologically infeasible options

There is no technologically infeasible option to eliminate from step 1.

c. Step 3 - Rank remaining options by control effectiveness

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The facility has proposed to feed all animals in accordance with NRCS; therefore, BACT for the separated solids piles for NH₃ is satisfied.

BACT analysis for the solid land application:

NH₃ Emissions

a. Step 1 – Identify all control technologies

BACT Guideline 5.8.9 identifies the following control for NH₃ emissions from land application of solid manure:

- Rapid incorporation of solid manure into the soil after land application, and all animals fed in accordance with NRCS or other District-approved guidelines – achieved in practice

Description of Control Technology

Rapid incorporation of solid manure into the soil after land application, and all animals fed in accordance with NRCS or other District-approved guidelines

Rapid incorporation of solid manure into the soil after land application

Various types of spreading techniques, such as box spreaders, flail type spreaders, side discharge spreaders, and spinner spreaders, are used to apply solid manure to cropland. Regardless of which technique is used, this practice requires the immediate incorporation of the manure into the soil, reducing emissions and surface run-off while minimizing the loss of nitrogen into the atmosphere. Based on a study by a local Valley dairy, there is a great potential of reducing emissions by incorporating slurry manure rapidly into the soil. A similar reduction may be obtained by the rapid incorporation of solid manure. This technology is expected to yield a NH₃ control efficiency ranging from 49% to upwards of 98%.¹¹

All animals fed in accordance with NRCS or other District-approved guidelines

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

A diet that is formulated to feed proper amounts of ruminantly degradable protein will result in improved nitrogen utilization by the animal and corresponding reduction in urea and organic nitrogen content of the manure, which will reduce the production of VOCs and ammonia. The latest NRCS guidelines for the selection of an optimal bovine diet should be 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.

¹¹ 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 (https://www.valleyair.org/busind/pto/dpag/dairy_permitting_advisory_group.htm).

b. Step 2 - Eliminate technologically infeasible options

There is no technologically infeasible option to eliminate from step 1.

c. Step 3 - Rank remaining options by control effectiveness

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The facility has proposed to incorporate solid manure into the soil after land application, and all animals fed in accordance with NRCS; therefore, BACT for the solid land application for NH₃ is satisfied.

BACT analysis for the total mixed ration (TMR) feeding:

VOC Emissions

a. Step 1 – Identify all control technologies

BACT Guideline 5.8.11 identifies the following controls for VOC emissions from TMR feeding:

- District Rule 4570 Measures for Feed/TMR

Description of Control Technology

District Rule 4570 Measures for Feed/TMR

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

b. Step 2 – Eliminate Technologically Infeasible Options

There is no technologically infeasible option to eliminate from step 1.

c. Step 3 – Rank remaining options by control effectiveness

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The facility has proposed District Rule 4570 mitigation measures for feed/TMR; therefore, BACT is satisfied.

APPENDIX E
HRA Summary

San Joaquin Valley Air Pollution Control District

Risk Management Review and Ambient Air Quality Analysis

To: Mungi Hong – Permit Services
 From: Diana Walker – Technical Services
 Date: January 7, 2022
 Facility Name: SILVAS HOLSTEINS DAIRY
 Location: 6706 ELAINE RD, TURLOCK
 Application #(s): N-6302-1-2, -2-1, -3-1, -4-1, -5-1
 Project #: N-1211083

1. Summary

1.1 RMR

Units	Prioritization Score	Acute Hazard Index	Chronic Hazard Index	Maximum Individual Cancer Risk	T-BACT Required	Special Permit Requirements
1	0.88	0.00	0.00	5.74E-07	No	No
2	39.40	0.40	0.23	1.64E-05	Yes ¹	No
3	30.11	0.01	0.00	1.59E-06	Yes	No
4	0.00	0.01	0.00	N/A ²	No	No
5 ³	N/A ³	N/A ³	N/A ³	N/A ³	No	No
Project Totals	70.40	0.42	0.24	1.86E-05		
Facility Totals	>1	0.42	0.24	1.86E-05		

Notes:

- T-BACT is determined on a corral by corral basis.
- Maximum Individual Cancer Risk was not calculated for Unit 4 since there is no risk factor or the risk factor is so low that it has been determined to be insignificant for this type of unit.
- There is no risk associated with Unit 5 as the District does not have an approved toxic speciation profile for dairy feed and storage handling operations.

1.2 AAQA

Pollutant	Air Quality Standard (State/Federal)				
	1 Hour	3 Hours	8 Hours	24 Hours	Annual
CO	N/A ¹		N/A ¹		
NO _x	N/A ¹				N/A ¹
SO _x	N/A ¹	N/A ¹		N/A ¹	N/A ¹
PM10				Pass ²	Pass ²
PM2.5				Pass ³	Pass ³

Notes:

- Only emissions from PM10 and PM2.5 were calculated and used to compare to State and Federal Air Quality Standards.
- Modeled PM10 concentrations were below the District SIL for fugitive sources of 10.4 µg/m³ for the 24-hour average concentration and 2.08 µg/m³ for the annual concentration.
- Modeled PM2.5 concentrations were below the District SIL for fugitive sources of 2.5 µg/m³ for the 24-hour average concentration and 0.63 µg/m³ for the annual concentration.

To ensure that human health risks will not exceed District allowable levels; the following shall be included as requirements for:

Unit # 1-2, 2-1, 3-1, 4-1, and 5-1

1. No special requirements.

T-BACT is required for Units 2 (Freestall 3, 7, 16, and 17) and 3 because of the emissions from 1,2-Dibromo-3-chloropropane, Acrylonitrile, Ethylene Dibromide and Naphthalene which are VOCs.

2. Project Description

Technical Services received a revised request on October 20, 2021 to perform a Risk Management Review (RMR) and Ambient Air Quality Analysis (AAQA) for the following:

- Unit -1-2: MODIFICATION OF 880 COW MILKING OPERATION WITH ONE DOUBLE PARALLEL (24 STALL) MILKING PARLOR: INCREASE THE MILK COW HERD LIMIT
- Unit -2-1: MODIFICATION OF COW HOUSING - 880 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 1,095 MATURE COWS (MILK AND DRY); 885 SUPPORT STOCK (HEIFERS, CALVES, AND BULLS); AND 4 FREESTALL BARN WITH FLUSH SYSTEM: INCREASE THE COW HERD LIMIT TO 1,900 MILK COWS, 2,010 MATURE COWS (MILK AND DRY), AND 2,090 SUPPORT STOCK; CONSTRUCT TWO SAUDI-STYLE BARN OVER EXISTING OPEN CORRALS; CONSTRUCT ONE FREESTALL BARN OVER AN EXISTING EXERCISE PEN; AND CONSTRUCT ONE FREESTALL BARN IN A NEW AREA
- Unit -3-1: MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF MECHANICAL SEPARATOR(S); THREE LAGOONS; MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION: ALLOW FOR THE INCREASE IN EMISSIONS AS A RESULT OF THE MODIFICATIONS AUTHORIZED BY ATC N-6302-2-1
- Unit -4-1: MODIFICATION OF SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; SOLID MANURE APPLICATION TO LAND AND/OR HAULED OFFSITE: ALLOW FOR THE INCREASE IN EMISSIONS AS A RESULT OF THE MODIFICATIONS AUTHORIZED BY ATC N-6302-2-1
- Unit -5-1: MODIFICATION OF FEED STORAGE AND HANDLING CONSISTING OF COVERED FEED STORAGE OR COMMODITY BARN(S), SILAGE PILE(S) AND DRY GRAIN TANK(S): ALLOW FOR THE INCREASE IN EMISSIONS AS A RESULT OF THE MODIFICATIONS AUTHORIZED BY ATC N-6302-2-1

3. RMR Report

3.1 Analysis

The District performed an analysis pursuant to the District's Risk Management Policy for Permitting New and Modified Sources (APR 1905, May 28, 2015) to determine the possible cancer and non-cancer health impact to the nearest resident or worksite. This policy requires that an assessment be performed on a unit by unit basis, project basis, and on a facility-wide basis. If a preliminary prioritization analysis demonstrates that:

- A unit's prioritization score is less than the District's significance threshold and;
- The project's prioritization score is less than the District's significance threshold and;

- The facility's total prioritization score is less than the District's significance threshold

Then, generally no further analysis is required.

The District's significant prioritization score threshold is defined as being equal to or greater than 1.0. If a preliminary analysis demonstrates that either the unit's or the project's or the facility's total prioritization score is greater than the District threshold, a screening or a refined assessment is required

If a refined assessment is greater than one in a million but less than 20 in one million for carcinogenic impacts (Cancer Risk) and less than 1.0 for the Acute and Chronic hazard indices (Non-Carcinogenic) on a unit by unit basis, project basis and on a facility-wide basis the proposed application is considered less than significant. For units that exceed a cancer risk of 1 in one million, Toxic Best Available Control Technology (TBACT) must be implemented.

Toxic emissions for this project were calculated using the following methods:

- Toxic emissions for the Cow Housing, Lagoons, and Milk Parlor were calculated using emission factors derived from the District's evaluation of dairy research studies conducted by California colleges and universities. PM based toxic emissions for the Cow Housing were calculated using emission factors generated from using the worst case composite of the 1997 EPA speciation of Kern County feedlot soil.

These emissions were input into the San Joaquin Valley APCD's Hazard Assessment and Reporting Program (SHARP). In accordance with the District's Risk Management Policy, risks from the proposed unit's toxic emissions were prioritized using the procedure in the 2016 CAPCOA Facility Prioritization Guidelines. The prioritization score for this proposed 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 2013-2017 from Modesto (rural dispersion coefficient selected) to determine the dispersion factors (i.e., the predicted concentration or X divided by the normalized source strength or Q) for a receptor grid. These dispersion factors were input into the SHARP Program, which then used the Air Dispersion Modeling and Risk Tool (ADMRT) of the Hot Spots Analysis and Reporting Program Version 2 (HARP 2) to calculate the chronic and acute hazard indices and the carcinogenic risk for the project.

The following parameters were used for the review:

Source Process Rates					
Unit ID	Process ID	Process Material	Process Units	Hourly Process Rate	Annual Process Rate
1	1	Milk Parlor VOC	Lbs	0.045	390
2	17	Shade Barn 19 VOC	Lbs	0.213	1,875
2	17	Shade Barn 19 NH ₃	Lbs	0.28	2,436
2	2	Freestall 3 VOC	Lbs	0.24	2,071
2	2	Freestall 3 PM ₁₀	Lbs	0.008	58
2	2	Freestall 3 NH ₃	Lbs	0.51	4,437
2	1	Freestall 4 VOC	Lbs	0.075	657
2	1	Freestall 4 NH ₃	Lbs	0.158	1,373
2	3	Freestall 6 VOC	Lbs	0.075	657
2	3	Freestall 6 NH ₃	Lbs	0.158	1,373
2	4	Freestall 7 VOC	Lbs	0.10	896
2	4	Freestall 7 NH ₃	Lbs	0.22	1,901
2	5	Freestall 12 VOC	Lbs	0.008	62
2	5	Freestall 12 NH ₃	Lbs	0.013	107
2	6	Shade Barn 2 PM ₁₀	Lbs	0.004	34
2	7	Shade Barn 10 VOC	Lbs	0.171	1,495
2	7	Shade Barn 10 PM ₁₀	Lbs	0.013	96
2	7	Shade Barn 10 NH ₃	Lbs	0.221	1,938
2	8 & 9	Shade Barn 11 VOC	Lbs	0.175	1,528
2	8 & 9	Shade Barn 11 PM ₁₀	Lbs	0.008	82
2	8 & 9	Shade Barn 11 NH ₃	Lbs	0.30	2,644
2	10	Shade Barn 18 VOC	Lbs	0.142	1,238
2	10	Shade Barn 18 PM ₁₀	Lbs	0.004	14
2	10	Shade Barn 18 NH ₃	Lbs	0.18	1,606
2	13	Freestall 17 VOC	Lbs	0.45	3,944
2	13	Freestall 17 PM ₁₀	Lbs	0.063	548
2	13	Freestall 17 NH ₃	Lbs	0.97	8,451
2	18	Freestall 16 VOC	Lbs	0.292	2,564
2	18	Freestall 16 PM ₁₀	Lbs	0.008	71
2	18	Freestall 16 NH ₃	Lbs	0.63	5,493
3	1, 2, 3	Lagoons 1, 2, and 3 VOC	Lbs	0.029	256
3	1, 2, 3	Lagoon 1, 2, and 3 NH ₃	Lbs	0.175	1,533
3	4	Liquid Land App VOC	Lbs	0.033	292
3	4	Liquid Land App NH ₃	Lbs	0.19	1,643
4	1	Solid Land App VOC	Lbs	0.042	365
4	1	Solid Land App NH ₃	Lbs	0.23	2,008
4	4	Solid Manure VOC	Lbs	0.021	256
4	4	Solid Manure NH ₃	Lbs	0.204	1,789

Polygon Area Source Parameters				
Unit ID	Unit Description	Release Height (m)	No. Vertices	Area (m²)
1	Milk Parlor 1	1.00	4	583
2	Freestall 3	1.00	5	1,689
2	Shade Barn 19 (Corral 1, 2, 3, and 4)	1.00	4	9,468
2	Shade Barn 18 (Shade Barn 13 + 14)	1.00	4	1,259
2	Shade Barn 10	1.00	4	1,570
2	Shade Barn 11 A & B	1.00	4	1,036
2	Freestall 12	1.00	4	843
2	Freestall 4	1.00	5	3,265
2	Freestall 6	1.00	4	2,777
2	Freestall 7	1.00	4	1,598
2	Freestall 16	1.00	4	1,509
2	Freestall 17 A & B	1.00	7	7,689
3	Lagoon 2	0.00	7	9,274
3	Land App Liquid	0.00	20	425,822
3	Lagoon 3	0.00	6	2,549
3	Lagoon 1	0.00	5	1,911
4	Land App Solid	0.00	20	425,822
4	Solid Pile Storage	0.00	6	11,006

4. AAQA Report

The District modeled the impact of the proposed project on the National Ambient Air Quality Standard (NAAQS) and/or California Ambient Air Quality Standard (CAAQS) in accordance with District Policy APR-1925 (Policy for District Rule 2201 AAQA Modeling) and EPA's Guideline for Air Quality Modeling (Appendix W of 40 CFR Part 51). The District uses a progressive three level approach to perform AAQAs. The first level (Level 1) uses a very conservative approach. If this analysis indicates a likely exceedance of an AAQS or Significant Impact Level (SIL), the analysis proceeds to the second level (Level 2) which implements a more refined approach. For the 1-hour NO₂ standard, there is also a third level that can be implemented if the Level 2 analysis indicates a likely exceedance of an AAQS or SIL.

The modeling analyses predicts the maximum air quality impacts using the appropriate emissions for each standard's averaging period. Required model inputs for a refined AAQA include background ambient air quality data, land characteristics, meteorological inputs, a receptor grid, and source parameters including emissions.

Technical Services performed modeling for directly emitted criteria pollutants with the emission rates below:

Emission Rates (lbs/hour)						
Unit ID	Process	NOx	SOx	CO	PM10	PM2.5
2	1	N/A ¹	N/A ¹	N/A ¹	0.103	0.0206 ²

Emission Rates (lbs/year)						
Unit ID	Process	NOx	SOx	CO	PM10	PM2.5
2	1	N/A ¹	N/A ¹	N/A ¹	903	180.6 ²

Notes:

1. Only emissions from PM 10 and PM 2.5 were calculated and used to compare to State and Federal Air Quality Standards.
2. Per the permit engineer, the PM 2.5 emissions are determined to be 20% of the total PM10 emissions.

5. Conclusion

5.1 RMR

The cumulative acute and chronic indices for this facility, including this project, are below 1.0; and the cumulative cancer risk for this facility, including this project, is less than 20 in a million. However, the cancer risk for one or more units in this project is greater than 1.0 in a million. **In accordance with the District's Risk Management Policy, the project is approved with Toxic Best Available Control Technology (T-BACT).**

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.

5.2 AAQA

The ambient air quality impacts from PM₁₀ emissions at the proposed dairy does not exceed the District's 24-hour or Annual interim threshold for fugitive dust sources.

6. Attachments

- A. Modeling request from the project engineer
- B. Additional information from the applicant/project engineer
- C. Prioritization score w/ toxic emissions summary
- D. Facility Summary

APPENDIX F
SSPE Calculations

SSPE Calculation

N-6302-6-0: 1,800 BHP CATERPILLAR MODEL 3306PC DIESEL-FIRED EMERGENCY STANDBY IC ENGINE POWERING AN ELECTRICAL GENERATOR

A. Assumption

- Non-emergency operating schedule is 100 hours/year (current PTO).
- Thermal efficiency of engine is commonly 35%.
- PM₁₀ fraction of diesel exhaust is 0.96 (CARB, 1988).
- Density of diesel fuel is 7.1 lb/gal.
- Fuel heating value is 137,000 Btu/gal.
- EPA F-factor (adjusted to 60°F) is 9,051 dscf/MMBtu.

B. Emission Factors

Diesel-fired IC Engine Emission Factors		
	g/bhp-hr	Source
NO _x	10.00	Project N-1104241
SO _x	0.0051	Mass Balance Equation Below
PM ₁₀	0.475	Project N-1104241
CO	3.04	Project N-1104241
VOC	1.14	Project N-1104241

$$\frac{0.000015 \text{ lb-S}}{\text{lb-fuel}} \times \frac{7.1 \text{ lb-fuel}}{\text{gallon}} \times \frac{2 \text{ lb-SO}_2}{1 \text{ lb-S}} \times \frac{1 \text{ gal}}{137,000 \text{ Btu}} \times \frac{1 \text{ bhp input}}{0.35 \text{ bhp out}} \times \frac{2,542.5 \text{ Btu}}{\text{bhp-hr}} \times \frac{453.6 \text{ g}}{\text{lb}} = 0.0051 \frac{\text{g-SO}_x}{\text{bhp-hr}}$$

C. Potential Emissions (PE)

$$\text{Annual PE (lb-pollutant/yr)} = \text{EF (g-pollutant/bhp-hr)} \times \text{rating (bhp)} \times \text{operation (hr/yr)} \div 453.6 \text{ g/lb}$$

PE				
Pollutant	Emissions Factor (g/bhp-hr)	Rating (bhp)	Annual Hours of Operation (hrs/year)	Annual PE (lb/yr)
NO _x	10.00	1,800	100	3,968
SO _x	0.0051	1,800	100	2
PM ₁₀	0.475	1,800	100	188
CO	3.04	1,800	100	1,206
VOC	1.14	1,800	100	452

APPENDIX G
Quarterly Net Emissions Change (QNEC)

Quarterly Net Emissions Change (QNEC)

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

QNEC = PE2 - PE1, where:

QNEC = Quarterly Net Emissions Change for each emissions unit, lb/qtr.

PE2 = Post-Project Potential to Emit for each emissions unit, lb/qtr.

PE1 = Pre-Project Potential to Emit for each emissions unit, lb/qtr.

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

$$PE2_{\text{quarterly}} = PE2_{\text{annual}} \div 4 \text{ quarters/year}$$

$$PE1_{\text{quarterly}} = PE1_{\text{annual}} \div 4 \text{ quarters/year}$$

N-6302-1-2

Quarterly NEC [QNEC]			
Pollutant	PE2 (lb/yr)	PE1 (lb/yr)	QNEC (lb/qtr)
NO _x	0	0	0.0
SO _x	0	0	0.0
PM ₁₀	0	0	0.0
CO	0	0	0.0
VOC	760	370	97.5

N-6302-2-1

Quarterly NEC [QNEC]			
Pollutant	PE2 (lb/yr)	PE1 (lb/yr)	QNEC (lb/qtr)
NO _x	0	0	0.0
SO _x	0	0	0.0
PM ₁₀	2,575	10,050	-1,868.75
CO	0	0	0.0
VOC	28,521	13,606	3,728.75

N-6302-3-1

Quarterly NEC [QNEC]			
Pollutant	PE2 (lb/yr)	PE1 (lb/yr)	QNEC (lb/qtr)
NO _x	0	0	0.0
SO _x	0	0	0.0
PM ₁₀	0	0	0.0
CO	0	0	0.0
VOC	4,170	3,505	166.25

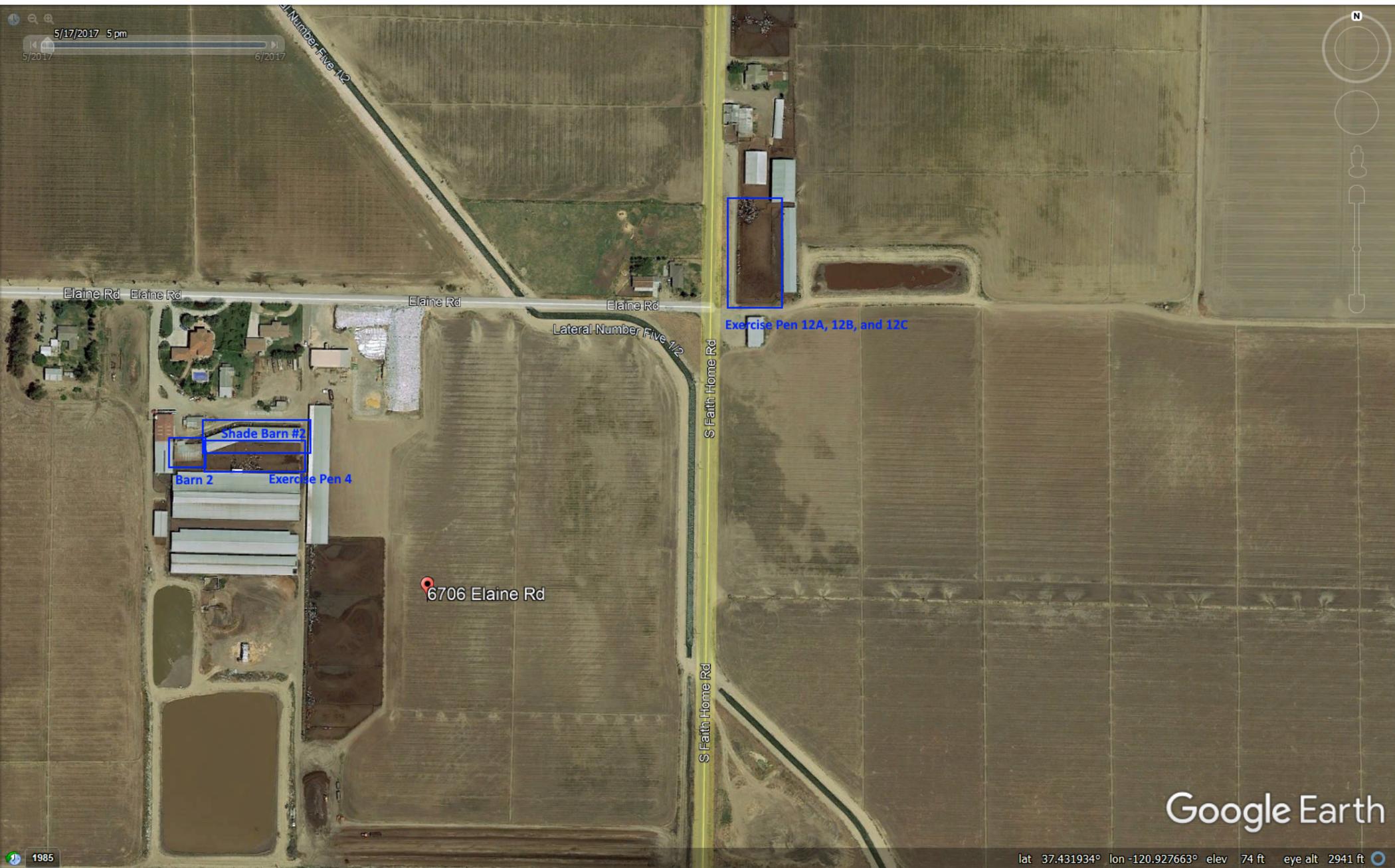
N-6302-4-1

Quarterly NEC [QNEC]			
Pollutant	PE2 (lb/yr)	PE1 (lb/yr)	QNEC (lb/qtr)
NO _x	0	0	0.0
SO _x	0	0	0.0
PM ₁₀	0	0	0.0
CO	0	0	0.0
VOC	1,370	704	166.5

N-6302-5-1

Quarterly NEC [QNEC]			
Pollutant	PE2 (lb/yr)	PE1 (lb/yr)	QNEC (lb/qtr)
NO _x	0	0	0.0
SO _x	0	0	0.0
PM ₁₀	0	0	0.0
CO	0	0	0.0
VOC	40,137	26,443	3,423.5

APPENDIX H
Satellite Images



5/17/2017 5 pm

5/2017

6/2017

Elaine Rd Elaine Rd

Elaine Rd

Elaine Rd

Lateral Number Five 1/2

S Faith Home Rd

S Faith Home Rd

Shade Barn #2

Barn 2

Exercise Pen 4

Exercise Pen 12A, 12B, and 12C

6706 Elaine Rd

Google Earth

lat 37.431934° lon -120.927663° elev 74 ft eye alt 2941 ft

1985

8/31/2018 5:00:00 pm



Elaine Rd Elaine Rd

Elaine Rd

Elaine Rd

Shade Barn #10 and 11

Lateral Number Five 1/2

S Faith Home Rd

Shade Barn #2

Freestall #3

6706 Elaine Rd

S Faith Home Rd

Google Earth

1985

lat 37.431809° lon -120.925797° elev 72 ft eye alt 2962 ft



7/18/2019 5pm

6/2019

7/2019

Serial Number Five 112

Elaine Rd Elaine Rd

Elaine Rd

Shade Barn #10

Barn 1

6706 Elaine Rd

S. Faith Home Rd

S. Faith Home Rd

Google Earth

lat 37.432082° lon -120.927447° elev 75 ft eye alt 3008 ft

1985



9/27/2020 5pm

Trail Number Five 112

Shade Barn #10

Elaine Rd Elaine Rd

Elaine Rd

6706 Elaine Rd

S Faith Home Rd

S Faith Home Rd

Google Earth

lat 37.431322° lon -120.922992° elev 72 ft eye alt 3008 ft

1985



APPENDIX I
Site Plan

APPENDIX J
Dairy Calculator

Pre-Project Facility Information

- Does this facility house Holstein or Jersey cows?
Most facilities house Holstein cows unless explicitly stated on the PTO or application.
- Does the facility have an anaerobic treatment lagoon?
- Does the facility land apply liquid manure?
Answering "yes" assumes worst case.
- Does the facility land apply solid manure?
Answering "yes" assumes worst case.
- Is any scraped manure sent to a lagoon/storage pond?
Answering "yes" assumes worst case.

Pre-Project Herd Size							
Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals		
Milk Cows	860		20		880		
Dry Cows	215				215		
Support Stock (Heifers, Calves, and Bulls)			885		885		
Large Heifers					0		
Medium Heifers					0		
Small Heifers					0		
Bulls					0		
	Calf Hutches				Calf Corrals		Total # of Calves
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	
Calves							0

Total Herd Summary	
Total Milk Cows	880
Total Mature Cows	1,095
Support Stock (Heifers, Calves, and Bulls)	885
Total Calves	0
Total Dairy Head	1,980

Pre-Project Silage Information			
Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	1	30	180
Alfalfa	1	30	60
Wheat	1	35	24

Post-Project Facility Information

- Does this facility house Holstein or Jersey cows?
Most facilities house Holstein cows unless explicitly stated on the PTO or application.
- Does the facility have an anaerobic treatment lagoon?
- Does the facility land apply liquid manure?
Answering "yes" assumes worst case.
- Does the facility land apply solid manure?
Answering "yes" assumes worst case.
- Is any scraped manure sent to a lagoon/storage pond?
Answering "yes" assumes worst case.
- Does this project result in an increase or relocation of uncovered surface area for any lagoon/storage pond?

Post-Project Herd Size							
Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals		
Milk Cows	1,900				1,900		
Dry Cows		300			300		
Support Stock (Heifers, Calves, and Bulls)	1,090	810			1,900		
Large Heifers					0		
Medium Heifers					0		
Small Heifers					0		
Bulls					0		
	Calf Hutches				Calf Corrals		Total # of Calves
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	
Calves							0

Total Herd Summary	
Total Milk Cows	1,900
Total Mature Cows	2,200
Support Stock (Heifers, Calves, and Bulls)	1,900
Total Calves	0
Total Dairy Head	4,100

Post-Project Silage Information			
Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	1	20	80
Alfalfa	1	20	80
Wheat	1	20	80

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

VOC Mitigation Measures and Control Efficiencies

Milking Parlor				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	VOC Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
Enteric Emissions Mitigations				
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	(D) Feed according to NRC guidelines	10%	10%
Total Control Efficiency			10%	10%
Milking Parlor Floor Mitigations				
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	(D) Feed according to NRC guidelines	10%	10%
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	(D) Flush or hose milk parlor immediately prior to, immediately after, or during each milking. <i>Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF.</i>	10%	0%
Total Control Efficiency			19%	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				
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Feed according to NRC guidelines	10%	10%
Total Control Efficiency			10%	10%
Corrals/Pens Mitigations				
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Feed according to NRC guidelines	10%	10%
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Inspect water pipes and troughs and repair leaks at least once every seven days. <i>Note: If selected for dairies > 999 milk cows, CE is already included in EF.</i>	10%	0%
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	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. <i>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:</i> Scrape corrals twice a year with at least 90 days between cleanings, excluding in-corral mounds. <i>Note: No additional control given for increased cleaning frequency (e.g. BACT requirement).</i>	10%	0%
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Scrape, vacuum, or flush concrete lanes in corrals at least once every day for mature cows and every seven days for support stock, or clean concrete lanes such that the depth of manure does not exceed 12 inches at any point or time. <i>Note: No additional control given for increased cleaning frequency (e.g. BACT requirement).</i>	10%	10%
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Implement one of the following: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 sq ft or less and slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 sq ft; 2) maintain corrals to ensure proper drainage preventing water from standing more than 48 hrs; 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface. <i>Note: If selected for dairies > 999 milk cows, CE already included in EF.</i>	10%	0%
<input type="checkbox"/>	<input type="checkbox"/>	Install shade structures such that they are constructed with a light permeable roofing material. <i>Note: If selected for dairies > 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.</i>	10%	5%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Install all shade structures uphill of any slope in the corral. <i>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.</i>		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Clean manure from under corral shades at least once every 14 days, when weather permits access into corral. <i>Note: If selected for dairies > 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.</i>		
<input type="checkbox"/>	<input type="checkbox"/>	Install shade structure so that the structure has a North/South orientation. <i>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.</i>	10%	0%
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Manage corrals such that the manure depth in the corral does not exceed 12 inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. The manure facility must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. <i>Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF.</i>		
<input type="checkbox"/>	<input type="checkbox"/>	Knockdown fence line manure build-up prior to it exceeding a height of 12 inches at any time or point. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. The facility must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible.		
<input type="checkbox"/>	<input type="checkbox"/>	Use lime or a similar absorbent material in the corral according to the manufacturer's recommendation to minimize moisture in the corrals.	0%	0%
<input type="checkbox"/>	<input type="checkbox"/>	Apply thymol to the corral soil in accordance with the manufacturer's recommendation.	0%	0%
Total Control Efficiency			52.17%	23.05%
Bedding Mitigations				
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Feed according to NRC guidelines	10%	10%
<input type="checkbox"/>	<input type="checkbox"/>	Use non-manure-based bedding and non-separated solids based bedding for at least 90% of the bedding material, by weight, for freestalls (e.g. rubber mats, almond shells, sand, or waterbeds).	0%	0%

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

Liquid Manure Handling				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	VOC Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
Lagoons/Storage Ponds Mitigations				
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Feed according to NRC guidelines	10%	10%
<input type="checkbox"/>	<input type="checkbox"/>	Use phototropic lagoon	0%	0%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Use an anaerobic treatment lagoon designed according to NRCS Guideline No. 359, or aerobic treatment lagoon, or mechanically aerated lagoon, or covered lagoon digester vented to a control device with minimum 95% control	0%	40%
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	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.	10%	0%
<input type="checkbox"/>	<input type="checkbox"/>	Maintain lagoon pH between 6.5 and 7.5	0%	0%
Total Control Efficiency			19.00%	46.00%
Liquid Manure Land Application Mitigations				
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Feed according to NRC guidelines	10%	10%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Only apply liquid manure that has been treated with an anaerobic or aerobic treatment lagoon, aerobic lagoon, or digester system	0%	40%
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	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.	10%	0%
<input type="checkbox"/>	<input type="checkbox"/>	Apply liquid/slurry manure via injection with drag hose or similar apparatus	0%	0%
Total Control Efficiency			19.00%	46.00%

BACT Requirement

BACT Requirement

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				
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Feed according to NRC guidelines	10%	10%
<input type="checkbox"/>	<input type="checkbox"/>	LARGE CAFO ONLY: Within 72 hours of removal from housing, either a) remove dry manure from the facility, or b) cover dry manure outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed 24 hours per event.	0%	0%
Total Control Efficiency			10.00%	10.00%
Separated Solids Piles Mitigations				
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Feed according to NRC guidelines	10%	10%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	LARGE CAFO ONLY: Within 72 hours of removal from the drying process, either a) remove separated solids from the facility, or b) cover separated solids outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed 24 hours per event.	0%	10%
Total Control Efficiency			10.00%	19.00%
Solid Manure Land Application Mitigations				
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Feed according to NRC guidelines	10%	10%
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	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).	10%	0%
<input type="checkbox"/>	<input type="checkbox"/>	Only apply solid manure that has been treated with an anaerobic treatment lagoon, aerobic lagoon or digester system.	0%	0%
<input type="checkbox"/>	<input type="checkbox"/>	Apply no solid manure with a moisture content of more than 50%	0%	0%
Total Control Efficiency			19.00%	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		

<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<p>2. Cover the surface of silage piles, except for the area where feed is being removed from the pile, with a plastic tarp that is at least 5 mils thick (0.005 inches), multiple plastic tarps with a cumulative thickness of at least 5 mils (0.005 inches), or an oxygen barrier film covered with a UV resistant material within 72 hours of last delivery of material to the pile, and implement one of the following:</p> <p>a) build silage piles such that the average bulk density is at least 44 lb/cu-ft for corn silage and 40 lb/cu-ft for other silage types, as measured in accordance with Section 7.10 of Rule 4570.</p> <p>b) when creating a silage pile, adjust filling parameters to assure a calculated average bulk density of at least 44 lb/cu-ft for corn silage and at least 40 lb/cu-ft for other silage types, using a spreadsheet approved by the District,</p> <p>c) harvest silage crop at > 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.</p> <p>For dairies - implement <u>two</u> of the following: For heifer/calf ranches - implement <u>one</u> of the following:</p> <p>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.</p> <p>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</p> <p>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 propionic acid, benzoic acid, sorbic acid, sodium benzoate, or potassium sorbate at a rate specified by the manufacturer to reduce yeast counts when forming silage pile; or b) apply other additives at specified rates that have been demonstrated to reduce alcohol concentrations in silage and/or VOC emissions from silage and have been approved by the District and EPA.</p>	39.0%	39.0%
Total Control Efficiency*		39.00%	39.00%	

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

		TMR Mitigations		
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	(D) Push feed so that it is within 3 feet of feedlane fence within 2 hrs of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the cows.	10%	10%
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	(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.	10%	0%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Feed steam-flaked, dry rolled, cracked or ground corn or other ground cereal grains.	0%	10%
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Remove uneaten wet feed from feed bunks within 24 hrs after the end of a rain event.	10%	0%
<input type="checkbox"/>	<input type="checkbox"/>	(D) For total mixed rations that contain at least 30% by weight of silage, feed animals total mixed rations that contain at least 45% moisture.	0%	0%
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Feed according to NRC guidelines. Note: If selected for dairies, control efficiency already included in EF.	0%	0%
Total Control Efficiency			27.10%	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				
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Feed according to NRC guidelines	28%	28%
Total Control Efficiency			28%	28%

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

Liquid Manure Handling				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	NH3 Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
Lagoons/Storage Ponds Mitigations				
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Feed according to NRC guidelines	28%	28%
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Use phototropic lagoon OR Remove solids from the waste system with a solid separator system, prior to the waste entering the lagoon.	80%	80%
Total Control Efficiency			85.6%	85.6%
Liquid Manure Land Application Mitigations				
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Feed according to NRC guidelines	28%	28%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Only apply liquid manure that has been treated with an anaerobic treatment lagoon	0%	42%
Total Control Efficiency			28.00%	58.24%

BACT Requirement

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				
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Feed according to NRC guidelines	28%	28%
<input type="checkbox"/>	<input type="checkbox"/>	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			28.00%	28.00%

Dairy Emission Factors

		lb/hd-yr Dairy Emissions Factors for Holstein Cows																												
		Milk Cows				Dry Cows				Large Heifers (15 to 24 months)				Medium Heifers (7 to 14 months)				Small Heifers (3 to 6 months)				Calves (0 - 3 months)				Bulls				
		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		
<1000 milk cows	>1000 milk cows	EF1	EF2	<1000 milk cows	>1000 milk cows	EF1	EF2	<1000 milk cows	>1000 milk cows	EF1	EF2	<1000 milk cows	>1000 milk cows	EF1	EF2	<1000 milk cows	>1000 milk cows	EF1	EF2	<1000 milk cows	>1000 milk cows	EF1	EF2	<1000 milk cows	>1000 milk cows	EF1	EF2			
Milking Parlor	VOC	Enteric Emissions in Milking Parlors	0.43	0.41	0.39	0.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Milking Parlor Floor	0.04	0.03	0.03	0.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Total	0.47	0.44	0.42	0.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	NH3	0.19	0.19	0.14	0.14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Cow Housing	VOC	Enteric Emissions in Cow Housing	3.89	3.69	3.50	3.32	2.33	2.23	2.10	2.01	1.81	1.71	1.63	1.54	1.23	1.17	1.11	1.05	0.69	0.65	0.62	0.58	0.32	0.31	0.29	0.28	1.10	1.04	0.99	0.94
		Corrals/Pens	10.00	6.60	4.78	5.08	5.40	3.59	2.58	2.76	4.20	2.76	2.01	2.12	2.85	1.88	1.36	1.45	1.60	1.04	0.77	0.80	0.75	0.50	0.36	0.39	2.55	1.67	1.22	1.29
		Bedding	1.05	1.00	0.85	0.81	0.57	0.54	0.46	0.44	0.44	0.42	0.36	0.34	0.30	0.28	0.24	0.23	0.17	0.16	0.14	0.13	0.08	0.08	0.06	0.06	0.27	0.25	0.22	0.20
		Lanes	0.84	0.80	0.68	0.65	0.45	0.44	0.37	0.35	0.35	0.33	0.29	0.27	0.24	0.23	0.19	0.18	0.13	0.13	0.11	0.10	0.06	0.06	0.05	0.05	0.21	0.20	0.17	0.16
		Total	15.78	12.09	9.81	9.86	8.75	6.80	5.51	5.57	6.81	5.22	4.28	4.27	4.62	3.56	2.91	2.91	2.59	1.98	1.63	1.62	1.22	0.95	0.77	0.78	4.13	3.16	2.60	2.59
		NH3	41.90	41.90	15.08	15.08	21.20	21.20	7.63	7.63	11.00	11.00	3.96	3.96	7.90	7.90	2.84	2.84	6.00	6.00	2.16	2.16	1.80	1.80	0.65	0.65	15.30	15.30	5.51	5.51
		NH3	6.30	6.30	2.37	2.37	3.20	3.20	1.20	1.20	1.70	1.70	0.64	0.64	1.20	1.20	0.45	0.45	0.90	0.90	0.34	0.34	0.30	0.30	0.11	0.11	2.30	2.30	0.87	0.87
		NH3	5.10	5.10	3.67	3.67	2.60	2.60	1.87	1.87	1.30	1.30	0.94	0.94	1.00	1.00	0.72	0.72	0.70	0.70	0.50	0.50	0.20	0.20	0.14	0.14	1.90	1.90	1.37	1.37
		Total	53.30	53.30	21.13	21.13	27.00	27.00	10.71	10.71	14.00	14.00	5.54	5.54	10.10	10.10	4.02	4.02	7.60	7.60	3.00	3.00	2.30	2.30	0.90	0.90	19.50	19.50	7.74	7.74
	Liquid Manure Handling	VOC	Lagoons/Storage Ponds	1.52	1.30	1.23	0.70	0.82	0.71	0.66	0.38	0.64	0.54	0.52	0.29	0.43	0.37	0.35	0.20	0.24	0.21	0.20	0.11	0.11	0.10	0.09	0.05	0.40	0.33	0.32
Liquid Manure Land Application			1.64	1.40	1.33	0.76	0.89	0.76	0.72	0.41	0.69	0.58	0.56	0.32	0.47	0.40	0.38	0.22	0.26	0.22	0.21	0.12	0.12	0.11	0.10	0.06	0.42	0.35	0.34	0.19
Total			3.16	2.70	2.56	1.46	1.71	1.47	1.38	0.79	1.33	1.13	1.08	0.61	0.90	0.77	0.73	0.42	0.51	0.43	0.41	0.23	0.24	0.21	0.19	0.11	0.82	0.68	0.66	0.37
		NH3	8.20	8.20	1.18	1.18	4.20	4.20	0.60	0.60	2.20	2.20	0.32	0.32	1.50	1.50	0.22	0.22	1.20	1.20	0.17	0.17	0.35	0.35	0.05	0.05	3.00	3.00	0.43	0.43
		NH3	8.90	8.90	6.41	3.72	4.50	4.50	3.24	1.88	2.30	2.30	1.66	0.96	1.70	1.70	1.22	0.71	1.30	1.30	0.94	0.54	0.37	0.37	0.27	0.15	3.23	3.23	2.33	1.35
	Total	17.10	17.10	7.59	4.90	8.70	8.70	3.84	2.48	4.50	4.50	1.97	1.28	3.20	3.20	1.44	0.93	2.50	2.50	1.11	0.72	0.72	0.72	0.72	0.27	0.20	6.23	6.23	2.76	1.78
Solid Manure Handling	VOC	Solid Manure Storage	0.16	0.15	0.14	0.14	0.09	0.08	0.08	0.07	0.07	0.06	0.06	0.06	0.05	0.04	0.04	0.04	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.04	0.04	0.04	0.04
		Separated Solids Piles	0.06	0.06	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02
		Solid Manure Land Application	0.39	0.33	0.32	0.30	0.21	0.18	0.17	0.16	0.16	0.14	0.13	0.12	0.11	0.09	0.09	0.08	0.06	0.05	0.05	0.05	0.03	0.03	0.02	0.02	0.10	0.08	0.08	0.07
	Total	0.61	0.54	0.51	0.48	0.33	0.29	0.28	0.26	0.26	0.23	0.22	0.20	0.17	0.15	0.15	0.14	0.10	0.09	0.08	0.08	0.05	0.04	0.04	0.04	0.16	0.14	0.14	0.12	
		NH3	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
		NH3	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
	Total	2.09	2.09	1.50	1.50	1.06	1.06	0.76	0.76	0.55	0.55	0.40	0.40	0.39	0.39	0.28	0.28	0.30	0.30	0.22	0.22	0.09	0.09	0.06	0.06	0.76	0.76	0.55	0.55	
	Total	3.42	3.42	2.83	2.83	1.73	1.73	1.43	1.43	0.90	0.90	0.75	0.75	0.64	0.64	0.53	0.53	0.48	0.48	0.40	0.40	0.15	0.15	0.12	0.12	1.25	1.25	1.04	1.04	

Silage and TMR (Total Mixed Ration) Emissions (µg/m²·2-min)					
Feed Storage and Handling	VOC	Silage Type	Uncontrolled	EF1	EF2
		Corn Silage	34,681	21,155	21,155
Alfalfa Silage	17,458	10,649	10,649		
Wheat Silage	43,844	26,745	26,745		
TMR	13,056	9,518	10,575		

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

PM ₁₀ Emission Factors (lb/hd-yr)		
Type of Cow	Dairy EF	Source
Cows in Freestalls	1.37	Based on a Summer 2003 study by Texas A&M ASAE at a West Texas Dairy
Milk/Dry in Loafing Barns	2.73	SJVAPCD
Heifers/Bulls in Loafing Barns	5.28	SJVAPCD
Calves in Loafing Barns	0.69	SJVAPCD
Milk/Dry in Corrals	5.46	Based on a Summer 2003 study by Texas A&M ASAE at a West Texas Dairy
Support Stock (Heifers/Bulls) in Open Corrals	10.55	Based on a USDA/UC Davis report quantifying dairy and feedlot emissions in Tulare & Kern Counties (April '01)
Large Heifers in Open Corrals	8.01	SJVAPCD
Calf (under 3 mo.) open corrals	1.37	SJVAPCD
Calf on-ground hutches	0.343	SJVAPCD
Calf above-ground flushed	0.069	SJVAPCD
Calf above-ground scraped	0.206	SJVAPCD

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

Post-Project PM10 Mitigation Measures

Post-Project PM10 Mitigation Measures															
Housing Name(s) or #s	Type of Housing	Type of cow	Total # of cows in Each Housing Structure(s)	Maximum Design Capacity of Each Structure	# of Combined Housing Structures in row	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk	
1	Freestall 4	freestall	milk cows	385	385		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2	Freestall 3 (Exercise Pen 4)	freestall	milk cows	210	210		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3	Freestall 6	freestall	milk cows	385	385		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4	Freestall 7	freestall	milk cows	260	260		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5	Freestall 12	freestall	dry cows	110	110		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6	Shade Barn 2	saudi style barn	support stock	140	140		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7	Shade Barn 10 (Exercise Pen 12 A)	saudi style barn	support stock	350	350		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8	Shade Barn 11 A (Exercise Pen 12 B)	saudi style barn	dry cows	190	190		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9	Shade Barn 11 B (Exercise Pen 12 C)	saudi style barn	support stock	110	110		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10	Shade Barn 18 A (Shade Barn 13 + 14 A)	saudi style barn	support stock	350	350		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
11	Shade Barn 18 B (Shade Barn 13 + 14 B)	saudi style barn	milk cows				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
12	Freestall 17 A (Exercise pen 7 A)	freestall	support stock	70	70		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
13	Freestall 17 B (Exercise Pen 7 B)	freestall	milk cows	400	400		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
14	Barn 1	loafing barn	support stock	30	30		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
15	Hospital Barn (not used)	loafing barn	milk cows	20	20		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
16	Removed (Barn 2)	loafing barn	support stock	20	20		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
17	Shade Barn 19 (Corrals 1, 2, 3, and 4)	saudi style barn	support stock	880	880		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

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

Housing Name(s) or #s	Type of Housing	Type of cow	Total # of cows in Each Housing Structure(s)	Maximum Design Capacity of Each Structure	# of Combined Housing Structures in row	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk	
1	Freestall 16	freestall	milk cows	260	260	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Post-Project Total # of Cows			4,100	(The post-project total includes dairy cows already on-site and new cows from the expansion.)											

Post-Project PM10 Control Efficiencies and Emission Factors

Housing Name(s) or #s	Type of Housing	Type of cow	Total # of cows in Each Housing Structure(s)	Maximum Design Capacity of Each Structure	Uncontrolled EF (lb/hd-yr)	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk	Controlled EF (lb/hd-yr)
1	Freestall 4	freestall	milk cows	385	385	1.370				80%					0.27
2	Freestall 3 (Exercise Pen 4)	freestall	milk cows	210	210	1.370				80%					0.27
3	Freestall 6	freestall	milk cows	385	385	1.370				80%					0.27
4	Freestall 7	freestall	milk cows	260	260	1.370				80%					0.27
5	Freestall 12	freestall	dry cows	110	110	1.370				80%					0.27
6	Shade Barn 2	saudi style barn	support stock	140	140	1.370									1.37
7	Shade Barn 10 (Exercise Pen 12 A)	saudi style barn	support stock	350	350	1.370				80%					0.27
8	Shade Barn 11 A (Exercise Pen 12 B)	saudi style barn	dry cows	190	190	1.370				80%					0.27
9	Shade Barn 11 B (Exercise Pen 12 C)	saudi style barn	support stock	110	110	1.370				80%					0.27
10	Shade Barn 18 A (Shade Barn 13 + 14 A)	saudi style barn	support stock	350	350	1.370				80%					0.27
11	Shade Barn 18 B (Shade Barn 13 + 14 B)	saudi style barn	milk cows							80%					
12	Freestall 17 A (Exercise pen 7 A)	freestall	support stock	70	70	1.370									1.37
13	Freestall 17 B (Exercise Pen 7 B)	freestall	milk cows	400	400	1.370									1.37
14	Barn 1	loafing barn	support stock	30	5,280										5.28
15	Hospital Barn (not used)	loafing barn	milk cows	20	2,730										2.73
16	Removed (Barn 2)	loafing barn	support stock	20	5,280										5.28
17	Shade Barn 19 (Corrals 1, 2, 3, and 4)	saudi style barn	support stock	880	1,370							15%			1.17

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

Housing Name(s) or #s	Type of Housing	Type of cow	Total # of cows in Each Housing Structure(s)	Maximum Design Capacity of Each Structure	Uncontrolled EF (lb/hd-yr)	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk	Controlled EF (lb/hd-yr)
1	Freestall 16	freestall	milk cows	260	260	1.370				80%					0.27

Pre-Project Potential to Emit - Cow Housing

Pre-Project Potential to Emit - Cow Housing												
Housing Name(s) or #(s)	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)	
1	Freestall 4	milk cows	320	9.81	21.13	1.37	8.6	3,139	18.5	6,761	1.2	438
2	Exercise Pen 4	milk cows	0	9.81	21.13	5.46	0.0	0	0.0	0	0.0	0
3	Freestall 6	milk cows	320	9.81	21.13	1.37	8.6	3,139	18.5	6,761	1.2	438
4	Freestall 7	milk cows	170	9.81	21.13	1.37	4.6	1,668	9.8	3,592	0.6	233
5	Freestall 12	dry cows	100	5.51	10.71	1.37	1.5	551	2.9	1,071	0.4	137
6	Shade Barn 2	dry cows	115	5.51	10.71	1.37	1.7	634	3.4	1,232	0.4	158
7	Exercise Pen 12 A	support stock	0	4.28	5.54	10.55	0.0	0	0.0	0	0.0	0
8	Exercise Pen 12 B	dry cows	0	5.51	10.71	5.46	0.0	0	0.0	0	0.0	0
9	Exercise Pen 12 C	support stock	0	4.28	5.54	10.55	0.0	0	0.0	0	0.0	0
10	Shade Barn 13 + 14 A	support stock	60	4.28	5.54	1.37	0.7	257	0.9	332	0.2	82
11	Shade Barn 13 + 14 B	milk cows	50	9.81	21.13	1.37	1.3	491	2.9	1,056	0.2	69
12	Exercise Pen 7 A	support stock	335	4.28	5.54	10.55	3.9	1,434	5.1	1,855	9.7	3,534
13	Exercise Pen 7 B	milk cows				5.46						
14	Barn 1	support stock	30	4.28	5.54	5.28	0.4	128	0.5	166	0.4	158
15	Hospital Barn	milk cows	20	9.81	21.13	2.73	0.5	196	1.2	423	0.2	55
16	Barn 2	support stock	20	4.28	5.54	5.28	0.2	86	0.3	111	0.3	106
17	Corrals 1, 2, 3, and 4	support stock	440	4.28	5.54	10.55	5.2	1,883	6.7	2,436	12.7	4,642
Pre-Project Total # of Cows		1,980					37.2	13,606	70.7	25,796	27.5	10,050

*Multiple emissions units (freestalls, corrals, calf hutch areas, etc.) are combined in these rows.

Pre-Project Totals						
Total # of Cows	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
1,980	37.2	13,606	70.7	25,796	27.5	10,050

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 4	milk cows	385	9.86	21.13	0.27	10.4	3,796	22.3	8,134	0.3	105
2	Freestall 3 (Exercise Pen 4)	milk cows	210	9.86	21.13	0.27	5.7	2,071	12.2	4,437	0.2	58
3	Freestall 6	milk cows	385	9.86	21.13	0.27	10.4	3,796	22.3	8,134	0.3	105
4	Freestall 7	milk cows	260	9.86	21.13	0.27	7.0	2,564	15.0	5,493	0.2	71
5	Freestall 12	dry cows	110	5.57	10.71	0.27	1.7	613	3.2	1,178	0.1	30
6	Shade Barn 2	support stock	140	4.27	5.54	1.37	1.6	598	2.1	775	0.5	192
7	Shade Barn 10 (Exercise Pen 12 A)	support stock	350	4.27	5.54	0.27	4.1	1,495	5.3	1,938	0.3	96
8	Shade Barn 11 A (Exercise Pen 12 B)	dry cows	190	5.57	10.71	0.27	2.9	1,058	5.6	2,035	0.1	52
9	Shade Barn 11 B (Exercise Pen 12 C)	support stock	110	4.27	5.54	0.27	1.3	470	1.7	609	0.1	30
10	Shade Barn 18 A (Shade Barn 13 + 14 A)	support stock	350	4.27	5.54	0.27	4.1	1,495	5.3	1,938	0.3	96
11	Shade Barn 18 B (Shade Barn 13 + 14 B)	milk cows	0	9.86	21.13	0.00	0.0	0	0.0	0	0.0	0
12	Freestall 17 A (Exercise pen 7 A)	support stock	70	4.27	5.54	1.37	0.8	299	1.1	388	0.3	96
13	Freestall 17 B (Exercise Pen 7 B)	milk cows	400	9.86	21.13	1.37	10.8	3,944	23.2	8,451	1.5	548
14	Barn 1	support stock	0	4.27	5.54	5.28	0.0	0	0.0	0	0.0	0
15	Hospital Barn (not used)	milk cows	0	9.86	21.13	2.73	0.0	0	0.0	0	0.0	0
16	Removed (Barn 2)	support stock	0	4.27	5.54	5.28	0.0	0	0.0	0	0.0	0
17	Shade Barn 19 (Corrals 1, 2, 3, and 4)	support stock	880	4.27	5.54	1.17	10.3	3,758	13.3	4,872	2.8	1,025
	Post-Project # of Cows (non-expansion)		3,840				71.1	25,957	132.6	48,382	7.0	2,504

*Multiple emissions units (freestalls, corrals, calf hutch areas, etc.) are combined in these rows.

Post-Project Potential to Emit - Cow Housing: New Housing Units at an Expanding Dairy												
	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 16	milk cows	260	9.86	21.13	0.27	7.0	2,564	15.0	5,493	0.2	71
	Total # of Cows From Expansion		260				7.0	2,564	15.0	5,493	0.2	71

*Multiple emissions units (freestalls, corrals, calf hutch areas, etc.) are combined in these rows.

Post-Project Totals						
Total # of Cows	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
4,100	78.1	28,521	147.6	53,875	7.2	2,575

Calculations:

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

Pre-Project Worst Case BACT Calculations - Cow Housing

This table uses the worst case emission factor for each cow type and the maximum design capacity of the housing unit. This should only be used for BACT calculation purposes.

Worst-Case Pre-Project Potential to Emit - Cow Housing													
Housing Name(s) or #(s)	Type of Cow	Capacity per housing unit	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)		
1	Freestall 4	milk cows	320	9.81	21.13	1.37	8.6	3,139	18.5	6,761	1.2	438	
2	Exercise Pen 4	milk cows	210	9.81	21.13	5.46	5.6	2,060	12.2	4,437	3.1	1,147	
3	Freestall 6	milk cows	320	9.81	21.13	1.37	8.6	3,139	18.5	6,761	1.2	438	
4	Freestall 7	milk cows	170	9.81	21.13	1.37	4.6	1,668	9.8	3,592	0.6	233	
5	Freestall 12	dry cows	100	9.81	21.13	1.37	2.7	981	5.8	2,113	0.4	137	
6	Shade Barn 2	dry cows	115	9.81	21.13	1.37	3.1	1,128	6.7	2,430	0.4	158	
7	Exercise Pen 12 A	support stock	100	9.81	21.13	10.55	2.7	981	5.8	2,113	2.9	1,055	
8	Exercise Pen 12 B	dry cows	100	9.81	21.13	5.46	2.7	981	5.8	2,113	1.5	546	
9	Exercise Pen 12 C	support stock	100	9.81	21.13	10.55	2.7	981	5.8	2,113	2.9	1,055	
10	Shade Barn 13 + 14 A	support stock	60	9.81	21.13	1.37	1.6	589	3.5	1,268	0.2	82	
11	Shade Barn 13 + 14 B	milk cows	50	9.81	21.13	1.37	1.3	491	2.9	1,056	0.2	69	
12	Exercise Pen 7 A	support stock	335	9.81	21.13	10.55	9.0	3,286	19.4	7,078	9.7	3,534	
13	Exercise Pen 7 B	milk cows	335	9.81	21.13	5.46	9.0	3,286	19.4	7,078	5.0	1,829	
14	Barn 1	support stock	30	9.81	21.13	5.28	0.8	294	1.7	634	0.4	158	
15	Hospital Barn	milk cows	20	9.81	21.13	2.73	0.5	196	1.2	423	0.2	55	
16	Barn 2	support stock	20	9.81	21.13	5.28	0.5	196	1.2	423	0.3	106	
17	Corrals 1, 2, 3, and 4	support stock	440	9.81	21.13	10.55	11.8	4,316	25.5	9,296	12.7	4,642	
							75.8	27,712	163.7	59,689	42.9	15,682	

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

Pre-Project Totals					
VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
75.8	27,712	163.7	59,689	42.9	15,682

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

Post-Project Worst Case BACT Calculations - Existing Cow Housing

This table uses the worst case emission factor for each cow type and the maximum design capacity of the housing unit. This should only be used for BACT calculation purposes.

Post-Project Worst Case BACT Calculations - Existing Cow Housing																			
Housing Name(s) or #(s)	Type of Cow	Capacity per housing unit	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)	VOC AIPE	NH3 AIPE	PM10 AIPE	BACT Triggered for VOC?	BACT Triggered for NH3?	BACT Triggered for PM10?		
1	Freestall 4	milk cows	385	9.86	21.13	0.27	10.4	3,796	22.3	8,134	0.3	104	1.8	3.8	0.1	No	Yes	No	
2	Freestall 3 (Exercise Pen 4)	milk cows	210	9.86	21.13	0.27	5.7	2,071	12.2	4,437	0.2	57	0.1	0.0	0.0	No	No	No	
3	Freestall 6	milk cows	385	9.86	21.13	0.27	10.4	3,796	22.3	8,134	0.3	104	1.8	3.8	0.1	No	Yes	No	
4	Freestall 7	milk cows	260	9.86	21.13	0.27	7.0	2,564	15.0	5,493	0.2	70	2.4	5.2	0.1	Yes	Yes	No	
5	Freestall 12	dry cows	110	9.86	21.13	0.27	3.0	1,085	6.4	2,324	0.1	30	0.3	0.6	0.0	No	No	No	
6	Shade Barn 2	support stock	140	9.86	21.13	1.37	3.8	1,380	8.1	2,958	0.5	192	0.7	1.4	0.1	No	No	No	
7	Shade Barn 10 (Exercise Pen 12 A)	support stock	350	9.86	21.13	0.27	9.5	3,451	20.3	7,395	0.3	95	6.8	14.5	0.2	Yes	Yes	No	
8	Shade Barn 11 A (Exercise Pen 12 B)	dry cows	190	9.86	21.13	0.27	5.1	1,873	11.0	4,014	0.1	51	2.4	5.2	0.0	Yes	Yes	No	
9	Shade Barn 11 B (Exercise Pen 12 C)	support stock	110	9.86	21.13	0.27	3.0	1,085	6.4	2,324	0.1	30	0.3	0.6	0.0	Yes	Yes	No	
10	Shade Barn 18 A (Shade Barn 13 + 14 A)	support stock	350	9.86	21.13	0.27	9.5	3,451	20.3	7,395	0.3	95	7.9	16.8	0.3	Yes	Yes	No	
11	Shade Barn 18 B (Shade Barn 13 + 14 B)	milk cows	0	9.86	21.13	1.37	0.0	0	0.0	0	0.0	0	-1.3	-2.9	-0.2	Yes	Yes	No	
12	Freestall 17 A (Exercise pen 7 A)	support stock	70	9.86	21.13	1.37	1.9	690	4.1	1,479	0.3	96	-7.1	-15.3	-1.0	No	No	No	
13	Freestall 17 B (Exercise Pen 7 B)	milk cows	400	9.86	21.13	1.37	10.8	3,944	23.2	8,451	1.5	548	1.8	3.8	0.2	No	No	No	

14	Barn 1	support stock	30	9.86	21.13	5.28	0.8	296	1.7	634	0.4	158	0.0	0.0	0.0	No	No	No
15	Hospital Barn (not used)	milk cows	20	9.86	21.13	5.28	0.5	197	1.2	423	0.3	106	0.0	0.0	0.1	No	No	No
16	Removed (Barn 2)	support stock	20	9.86	21.13	5.28	0.5	197	1.2	423	0.3	106	0.0	0.0	0.0	No	No	No
17	Shade Barn 19 (Corrals 1, 2, 3, and 4)	support stock	880	9.86	21.13	1.17	23.8	8,677	50.9	18,593	2.8	1,030	12.0	25.4	1.4	Yes	Yes	No
							105.7	38,553	226.6	82,611	8.0	2,872						

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

Calculations:

Annual PE 2 for each pollutant (lb/yr) = Controlled EF (lb/hd-yr) x # of cows (hd)

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

	Housing Name(s) or #(s)	Type of Cow	Capacity per housing unit	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)	BACT Triggered for VOC?	BACT Triggered for NH3?	BACT Triggered for PM10?
1	Freestall 16	milk cows	260	9.86	21.13	0.27	7.0	2,564	15.0	5,493	0.2	70	Yes	Yes	No
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
							7.0	2,564	15.0	5,493	0.2	70			

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

Post-Project Totals					
VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
112.7	41,117	241.6	88,104	8.2	2,942

Calculations:

Annual PE 2 for each pollutant (lb/yr) = Controlled EF (lb/hd-yr) x # of cows (hd)

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

BACT Applicability

Milking Parlor					
VOC Emissions					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	2.1	1.0	0.40	0.42	1.1
Total					1.1
NH3 Emissions					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	0.7	0.3	0.14	0.14	0.4
Total					0.4

Cow Housing
See detailed cow housing AIPE calculations on the BACT Calcs page.

Liquid Manure Handling					
VOC Emissions - Lagoon/Storage Pond(s)					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	3.6	3.0	0.70	1.23	1.9
Dry Cows	0.3	0.4	0.38	0.66	0.1
Support Stock (Heifers, Calves, and Bulls)	1.5	1.3	0.29	0.52	0.8
Large Heifers	0.0	0.0	0.29	0.52	0.0
Medium Heifers	0.0	0.0	0.20	0.35	0.0
Small Heifers	0.0	0.0	0.11	0.20	0.0
Calves	0.0	0.0	0.05	0.09	0.0
Bulls	0.0	0.0	0.18	0.32	0.0
Total					2.7

BACT triggered for VOC for Lagoon/Storage Ponds					
VOC Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	3.9	3.2	0.76	1.33	2.1
Dry Cows	0.3	0.4	0.41	0.72	0.1
Support Stock (Heifers, Calves, and Bulls)	1.6	1.4	0.32	0.56	0.8
Large Heifers	0.0	0.0	0.32	0.56	0.0
Medium Heifers	0.0	0.0	0.22	0.38	0.0
Small Heifers	0.0	0.0	0.12	0.21	0.0
Calves	0.0	0.0	0.06	0.10	0.0
Bulls	0.0	0.0	0.19	0.34	0.0
Total					3.0

BACT triggered for VOC for Liquid Manure Land Application					
NH3 Emissions - Lagoon/Storage Pond(s)					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	6.1	2.8	1.18	1.18	3.3
Dry Cows	0.5	0.4	0.60	0.60	0.1
Support Stock (Heifers, Calves, and Bulls)	1.6	0.8	0.32	0.32	0.8
Large Heifers	0.0	0.0	0.32	0.32	0.0
Medium Heifers	0.0	0.0	0.22	0.22	0.0
Small Heifers	0.0	0.0	0.17	0.17	0.0
Calves	0.0	0.0	0.05	0.05	0.0
Bulls	0.0	0.0	0.43	0.43	0.0
Total					4.2

BACT triggered for NH3 for Lagoon/Storage Ponds					
NH3 Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	19.3	15.4	3.72	6.41	10.4
Dry Cows	1.5	1.9	1.88	3.24	0.4
Support Stock (Heifers, Calves, and Bulls)	5.0	4.0	0.96	1.66	2.7
Large Heifers	0.0	0.0	0.96	1.66	0.0
Medium Heifers	0.0	0.0	0.71	1.22	0.0
Small Heifers	0.0	0.0	0.54	0.94	0.0
Calves	0.0	0.0	0.15	0.27	0.0
Bulls	0.0	0.0	1.35	2.33	0.0
Total					13.4

BACT triggered for NH3 for Liquid Manure Land Application					
H2S Emissions - Lagoon/Storage Pond(s)					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	0.6	0.6	0.12	0.12	0.0
Dry Cows	0.0	0.0	0.06	0.06	0.0
Support Stock (Heifers, Calves, and Bulls)	0.2	0.2	0.03	0.03	0.0
Large Heifers	0.0	0.0	0.03	0.03	0.0
Medium Heifers	0.0	0.0	0.02	0.02	0.0
Small Heifers	0.0	0.0	0.02	0.02	0.0
Calves	0.0	0.0	0.01	0.01	0.0
Bulls	0.0	0.0	0.04	0.04	0.0
Total					0.0

Solid Manure Handling					
VOC Emissions - Solid Manure Storage/Separated Solids Piles					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	1.0	0.5	0.18	0.20	0.5
Dry Cows	0.1	0.1	0.10	0.11	0.0
Support Stock (Heifers, Calves, and Bulls)	0.4	0.2	0.10	0.08	0.2
Large Heifers	0.0	0.0	0.08	0.08	0.0
Medium Heifers	0.0	0.0	0.05	0.06	0.0
Small Heifers	0.0	0.0	0.03	0.03	0.0
Calves	0.0	0.0	0.01	0.01	0.0
Bulls	0.0	0.0	0.05	0.05	0.0
Total					0.7

VOC Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	1.5	0.8	0.30	0.32	0.7
Dry Cows	0.1	0.1	0.16	0.17	0.0
Support Stock (Heifers, Calves, and Bulls)	0.6	0.3	0.12	0.13	0.3
Large Heifers	0.0	0.0	0.12	0.13	0.0
Medium Heifers	0.0	0.0	0.08	0.09	0.0
Small Heifers	0.0	0.0	0.05	0.05	0.0
Calves	0.0	0.0	0.02	0.02	0.0
Bulls	0.0	0.0	0.07	0.08	0.0
Total					1.1

NH3 Emissions - Solid Manure Storage/Separated Solids Piles					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	6.9	3.2	1.33	1.33	3.7
Dry Cows	0.6	0.4	0.67	0.67	0.2
Support Stock (Heifers, Calves, and Bulls)	1.8	0.8	0.35	0.35	1.0
Large Heifers	0.0	0.0	0.35	0.35	0.0
Medium Heifers	0.0	0.0	0.25	0.25	0.0
Small Heifers	0.0	0.0	0.18	0.18	0.0
Calves	0.0	0.0	0.06	0.06	0.0
Bulls	0.0	0.0	0.49	0.49	0.0
Total					4.9

BACT triggered for NH3 for Solid Manure Storage					
NH3 Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	7.8	3.6	1.50	1.50	4.2
Dry Cows	0.6	0.4	0.76	0.76	0.2
Support Stock (Heifers, Calves, and Bulls)	2.1	1.0	0.40	0.40	1.1
Large Heifers	0.0	0.0	0.40	0.40	0.0
Medium Heifers	0.0	0.0	0.28	0.28	0.0
Small Heifers	0.0	0.0	0.22	0.22	0.0
Calves	0.0	0.0	0.06	0.06	0.0
Bulls	0.0	0.0	0.55	0.55	0.0
Total					5.5

Feed Storage and Handling					
VOC Emissions - Silage					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Corn Silage	7.8	24.8	21,155	21,155	-17.0
Alfalfa Silage	2.0	2.4	10,649	10,649	-0.4
Wheat Silage	9.8	6.0	26,745	26,745	3.8
Total					-13.6
VOC Emissions - TMR					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
TMR	90.4	39.3	10,575	9,518	51.1
Total					51.1

BACT triggered for VOC for TMR

Post-Project Potential to Emit (PE2)

Post-Project Herd Size							
Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals		
Milk Cows	1,900	0	0	0	1,900		
Dry Cows	0	300	0	0	300		
Support Stock (Heifers, Calves, and Bulls)	1,090	810	0	0	1,900		
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		Total # of Calves
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	
Calves	0	0	0	0	0	0	0

Silage Information				
Feed Type	Maximum # Open Piles	Maximum Height (ft)	Maximum Width (ft)	Open Face Area (ft ²)
Corn	1	20	80	1,250
Alfalfa	1	20	80	1,250
Wheat	1	20	80	1,250

Milking Parlor				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Total	2.1	760	0.7	260

	Cow Housing					
	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Total	78.1	28,521	148	53,875	7	2,575

Cow	Liquid Manure Handling					
	VOC		NH3		H2S	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	7.6	2,774	25.5	9,310	0.6	224
Dry Cows	0.6	237	2.0	744	0	18
Support Stock (Heifers, Calves, and Bulls)	3.2	1,159	6.7	2,432	0.2	60
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	11.4	4,170	34.2	12,486	0.8	303

Cow	Solid Manure Handling			
	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	2.5	912	14.7	5,377
Dry Cows	0.2	78	1.2	429
Support Stock (Heifers, Calves, and Bulls)	1.0	380	3.9	1,425
Large Heifers	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0
Calves	0.0	0	0.0	0
Bulls	0.0	0	0.0	0
Total	3.7	1,370	19.8	7,231

	Feed Handling and Storage	
	Daily PE (lb-VOC/day)	Annual PE (lb-VOC/yr)
Corn Emissions	7.8	2,841
Alfalfa Emissions	2.0	715
Wheat Emissions	9.8	3,591
TMR	90.4	32,990
Total	110.0	40,137

Total Daily Post-Project Potential to Emit (lb/day)							
Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0.0	0.0	0.0	0.0	2.1	0.7	0.0
Cow Housing	0.0	0.0	7.2	0.0	78.1	147.6	0.0
Liquid Manure	0.0	0.0	0.0	0.0	11.4	34.2	0.8
Solid Manure	0.0	0.0	0.0	0.0	3.7	19.8	0.0
Feed Handling	0.0	0.0	0.0	0.0	110.0	0.0	0.0
Total	0.0	0.0	7.2	0.0	205.3	202.3	0.8

Total Annual Post-Project Potential to Emit (lb/yr)							
Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	760	260	0
Cow Housing	0	0	2,575	0	28,521	53,875	0
Liquid Manure	0	0	0	0	4,170	12,486	303
Solid Manure	0	0	0	0	1,370	7,231	0
Feed Handling	0	0	0	0	40,137	0	0
Total	0	0	2,575	0	74,958	73,852	303

Calculations for milking parlor:

$$\text{Annual PE} = (\# \text{ milk cows}) \times (\text{EF2 lb-pollutant/hd-yr})$$

$$\text{Daily PE} = (\text{Annual PE lb/yr}) \div (365 \text{ day/yr})$$

Calculations for cow housing:

See detailed calculations under Cow Housing Calculations worksheet.

Calculations for liquid manure and solid manure handling:

$$\text{Annual PE} = [(\# \text{ milk cows}) \times (\text{EF1 lb-pollutant/hd-yr}) + (\# \text{ dry cows}) \times (\text{EF2 lb-pollutant/hd-yr}) + (\# \text{ large heifers}) \times (\text{EF2 lb-pollutant/hd-yr}) + (\# \text{ medium heifers}) \times (\text{EF2 lb-pollutant/hd-yr}) + (\# \text{ small heifers}) \times (\text{EF2 lb-pollutant/hd-yr}) + (\# \text{ calves}) \times (\text{EF2 lb-pollutant/hd-yr}) + (\# \text{ bulls}) \times (\text{EF2 lb-pollutant/hd-yr})]$$

$$\text{Daily PE} = (\text{Annual PE lb/yr}) \div (365 \text{ day/yr})$$

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:

$$\text{Annual PE} = (\text{EF2}) \times (\text{area ft}^2) \times (0.0929 \text{ m}^2/\text{ft}^2) \times (8,760 \text{ hr/yr}) \times (60 \text{ min/hr}) \times 2.20\text{E-}9 \text{ lb}/\mu\text{g}$$

$$\text{Daily PE} = (\text{Annual PE lb/yr}) \div (365 \text{ day/yr})$$

Calculation for TMR emissions:

$$\text{Annual PE} = (\# \text{ cows}) \times (\text{EF2}) \times (0.658 \text{ m}^2) \times (525,600 \text{ min/yr}) \times (2.20\text{E-}9 \text{ lb}/\mu\text{g})$$

$$\text{Daily PE} = (\text{Annual PE lb/yr}) \div (365 \text{ day/yr})$$

Calves are not included in TMR calculation.

Major Source Emissions (lb/yr)						
Permit	NOx	SOx	PM10	CO	VOC	
Milk Parlor	0	0	0	0	0	0
Cow Housing	0	0	0	0	0	0
Liquid Manure	0	0	0	0	0	1,995
Solid Manure	0	0	0	0	0	0
Feed Handling	0	0	0	0	0	0
Total	0	0	0	0	0	1,995

Increase in Emissions

SSIPE (lb/yr)							
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	390	140	0
Cow Housing	0	0	-7,475	0	14,915	28,079	0
Liquid Manure	0	0	0	0	665	3,238	0
Solid Manure	0	0	0	0	666	3,769	0
Feed Handling	0	0	0	0	13,693	0	0
Total	0	0	-7,475	0	30,330	35,226	0

Total Daily Change in Emissions (lb/day)							
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0.0	0.0	0.0	0.0	1.1	0.4	0.0
Cow Housing	0.0	0.0	-20.3	0.0	40.9	76.9	0.0
Liquid Manure	0.0	0.0	0.0	0.0	1.8	8.8	0.0
Solid Manure	0.0	0.0	0.0	0.0	1.8	10.4	0.0
Feed Handling	0.0	0.0	0.0	0.0	37.5	0.0	0.0
Total	0.0	0.0	-20.3	0.0	83.1	96.5	0.0

Total Annual Change in Non-Fugitive Emissions (Major Source Emissions) (lb/yr)							
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	0	0	0
Cow Housing	0	0	0	0	0	0	0
Liquid Manure	0	0	0	0	311	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	311	0	0

Quarterly Net Emissions Change (QNEC)

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

QNEC = PE2 - PE1, where:

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

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

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

Milking Parlor						
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	0	0	760	260
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	2.1	0.7
Quarterly Net Emissions Change (lb/qtr)	1:	0.0	0.0	0.0	97.60	34.88
	2:	0.0	0.0	0.0	97.60	34.88
	3:	0.0	0.0	0.0	97.60	34.88
	4:	0.0	0.0	0.0	97.60	34.88

Cow Housing							
	NOx	SOx	PM10	CO	VOC	NH3	
Annual PE2 (lb/yr)	0	0	2,575	0	28,521	53,875	
Daily PE2 (lb/day)	0.0	0.0	7.2	0.0	78.1	147.6	
Quarterly Net Emissions Change (lb/qtr)	1:	0.0	-1,868.75	0.0	3,728.75	7,019.75	
	2:	0.0	0.0	-1,868.75	0.0	3,728.75	7,019.75
	3:	0.0	0.0	-1,868.75	0.0	3,728.75	7,019.75
	4:	0.0	0.0	-1,868.75	0.0	3,728.75	7,019.75

Liquid Manure Handling							
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Annual PE2 (lb/yr)	0	0	0	0	4,170	12,486	303
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	11.4	34.2	0.8
Quarterly Net Emissions Change (lb/qtr)	1:	0.0	0.0	0.0	166.18	809.44	0.0
	2:	0.0	0.0	0.0	166.18	809.44	0.0
	3:	0.0	0.0	0.0	166.18	809.44	0.0
	4:	0.0	0.0	0.0	166.18	809.44	0.0

Solid Manure Handling						
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	0	0	1,370	7,231
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	3.7	19.8
Quarterly Net Emissions Change (lb/qtr)	1:	0.0	0.0	0.0	166.58	942.35
	2:	0.0	0.0	0.0	166.58	942.35
	3:	0.0	0.0	0.0	166.58	942.35
	4:	0.0	0.0	0.0	166.58	942.35

Feed Storage and Handling						
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	0	0	40,137	0
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	110.0	0.0
Quarterly Net Emissions Change (lb/qtr)	1:	0.0	0.0	0.0	3,423.36	0.0
	2:	0.0	0.0	0.0	3,423.36	0.0
	3:	0.0	0.0	0.0	3,423.36	0.0
	4:	0.0	0.0	0.0	3,423.36	0.0

APPENDIX K
Anaerobic Lagoon Design Check

Lagoon Design Check in Accordance with NRCS Guideline #359

Proposed Lagoon Volume

$$\text{Volume of treatment lagoon} = (L \times W \times D) - (S \times D^2) \times (W + L) + (4 \times S^2 \times D^3 \div 3)$$

Primary Treatment Lagoon Dimensions

Length	396	ft
Width	285	ft
Depth	12	ft
Slope	2	ft

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

Primary Lagoon Volume **1,167,408 ft³**

Secondary Treatment Lagoon Dimensions

Length	385	ft
Width	92	ft
Depth	12	ft
Slope	2	ft

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

Secondary Lagoon Volume **296,880 ft³**

Combined Lagoon Volume **1,464,288 ft³**

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	1,900	x	17	x	71%	x	50%	=	11,467
Dry Cow	300	x	9.2	x	71%	x	50%	=	980
Heifer (15 to 24 months)	1,900	x	7.1	x	48%	x	50%	=	3,238
Heifer (7 to 14 months)		x	4.9	x	48%	x	50%	=	0
Heifer (3 to 6 months)		x	2.7	x	48%	x	50%	=	0
Calf (under 3 months)		x	1.0	x	100%	x	50%	=	0
Bulls		x	9.2	x	48%	x	50%	=	0
Total for Dairy									15,684

[1]The Volatile Solids (VS) excretion rates for Holstein cattle are based on Table 1.b – Section 3 of ASAE D384.2 (March 2005). VS excretion rates for milk cows, dry cows, & heifers 15-24 months were taken directly from the table. The VS excretion rate for heifers 3-6 months was estimated based on total solids excretion. The VS excretion rate for heifers 7-14 months was estimated as the average of heifers 15-24 months and heifers 3-6 months. The table did not give values for total solids or volatile solids excreted by baby calves. The VS excretion rate for baby calves was estimated based on an estimated dry matter intake (DMI) of 1.7% of body weight and the ratio of DMI to VS excretion for 150 kg calves. The VS excretion rate for mature bulls was assumed to be similar to dry cows.

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

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

Lagoon Design Check in Accordance with NRCS Guideline #359

Minimum Treatment Volume Calculation

$$MTV = TVS/VSLR$$

Where:

MTV = Minimum Treatment Volume (ft³)

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	Net VS Loading (lb/day)		VSLR (lb/ft ³ -day)[1]		MTV (ft ³)
Type of Cow					
Milk Cows	11,467	÷	0.011	=	1,042,409
Dry Cow	980	÷	0.011	=	89,073
Heifer (15 to 24 months)	3,238	÷	0.011	=	294,327
Heifer (7 to 14 months)	0	÷	0.011	=	0
Heifer (3 to 6 months)	0	÷	0.011	=	0
Calf (under 3 months)	0	÷	0.011	=	0
Bulls	0	÷	0.011	=	0
Total for Dairy					1,425,809

[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/1000 ft³-day

Lagoon Design Check in Accordance with NRCS Guideline #359

Sludge Accumulation Volume

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

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

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

$$\text{SAV} = \text{VPL} - \text{MTV}$$

Where:

SAV = Sludge Accumulation Volume (ft³)

VPL = total Volume of Primary Lagoon (ft³)

MTV = Minimum Treatment Volume (ft³)

$$\text{SAV} = \text{VPL} - \text{MTV}$$

$$\text{SAV} = 1,464,288 - 1,425,809 = 38,479 \text{ (ft}^3\text{)}$$

Lagoon Design Check in Accordance with NRCS Guideline #359

Hydraulic Retention Time (HRT) Calculation

The anaerobic treatment lagoon and covered lagoon anaerobic digester must be designed to provide sufficient Hydraulic Retention Time (HRT) to adequately treat the waste entering the lagoon and to allow environmentally safe utilization of this waste. The NRCS Technical Guide Code 365 – Anaerobic Digester – Ambient Temperature specifies a minimum HRT 38 days in the San Joaquin Valley.

The Hydraulic Retention Time (HRT) is calculated as follows:

$$\text{HRT} = \text{MTV}/\text{HFR}$$

where:

HFR = Hydraulic flow rate (1000ft³/day)

HRT = Hydraulic Retention Time (day)

The Hydraulic Flow Rate is Calculated below

Type	# of cows		Amount of Manure*		HFR
Milk Cows	1,900	x	2.40	ft ³ =	4,560 ft ³ /day
Dry Cows	300	x	1.30	ft ³ =	390 ft ³ /day
Heifers (15-24 mo)	1,900	x	0.78	ft ³ =	1,482 ft ³ /day
Heifers (7-14 mo)	0	x	0.78	ft ³ =	- ft ³ /day
Heifers (3-6 mo)	0	x	0.30	ft ³ =	- ft ³ /day
Calves	0	x	0.15	ft ³ =	- ft ³ /day
Bulls	0	x	1.30	ft ³ =	- ft ³ /day
Total	4,100				6,432 ft³/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.

