San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

March 9, 2021

John Toste
John F Toste Dairy
785 Santa Fe Greade
Newman, CA 95360

Re: Notice of Preliminary Decision - Authority to Construct
Facility Number: N-5591
Project Number: N-1193387

Dear Mr. Toste:

Enclosed for your review and comment is the District's analysis of John F Toste Dairy's application for an Authority to Construct for modification of the dairy to increase the number of milk and dry cows to 1,050 heads and support stock to 250 heads, replace freestall barns, install new freestall barns, remove pens, and add a new anaerobic treatment lagoon, at 609 Santa Fe Grade in Newman, CA.

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 Authority to Construct. Please submit your written comments on this project within the 30-day public comment period, as specified in the enclosed public notice.

Thank you for your cooperation in this matter. If you have any questions regarding this matter, please contact Mr. Kai Chan of Permit Services at (209) 557-6451.

Sincerely,

Brian Clements
Director of Permit Services

BC:kc

Enclosures

cc: Courtney Graham, CARB (w/ enclosure) via email

Samir Sheikh
Executive Director/Air Pollution Control Officer

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www.valleyair.org www.healthyairliving.com

San Joaquin Valley Air Pollution Control District

Authority to Construct Application Review

Dairy Expansion

Facility Name:	John F Toste Dairy	Date:	March 1, 2021
Mailing Address:	785 Santa Fe Grade Newman, CA 95360	Engineer:	Kai Chan
		Lead Engineer:	James Harader
Contact Person:	John Toste		
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E-Mail:	jramos@fragservices.com		
Application #(s):	N-5591-1-1, '-2-3, '-3-1, '-4-2, and '-5-2		
Project #:	N-1193387		
Deemed Complete:	November 14, 2019		

I. Proposal

John F Toste Dairy has requested Authority to Construct (ATC) permits to expand its existing dairy operation as follows:

- Modification of the 1,500 cow milking operation with one 36 stall parabone milking parlor (Permit Unit N-5591-1) due to a change in the herd profile as authorized by ATC permit N-5591-2-3 to increase the quantity of milking cows to 2,500 heads.

- Modification of the cow housing with 1,500 milk cows not to exceed a combined total of 1,950 mature cows (milk and dry), 2,700 support stock (heifers), and four freestalls with flush system (Permit Unit N-5591-2) to increase the maximum number of cows to 2,500 milk cows not to exceed a combined total of 3,000 mature cows (milk and dry) and 2,950 support stock (heifers), and replace the existing cow housing with four new freestall barns.

- Modification of the liquid manure handling system consisting of two storage ponds (Permit Unit N-5591-3) and mechanical separator(s) to install an anaerobic treatment lagoon (storage volume of 2,192,047 cu.ft.) for an increase in liquid manure due to a change in herd profile as authorized by ATC permit N-5591-2-3.

- Modification of the solid manure handling consisting of manure stock piles; manure transported to fields; solid manure application to land and hauled offsite (Permit Unit N-5591-4) for an increase in solid manure processing due to a change in herd profile as authorized by ATC permit N-5591-2-3.

- Modification of the feed storage and handling consisting of silage pile(s) (Permit Unit N-5591-5) due to a change in herd profile as authorized by ATC permit N-5591-2-3.

Disposition of Outstanding ATCs:

ATC permits N-5591-1-0, '-2-1, '-4-1, and '-5-1 have been implemented and serve as the base document. ATC permit N-5591-3-2 has not yet been implemented but will serve as the base document and will be required to be implemented prior to or at the same time ATC permit N-5591-3-1 under this project is implemented. Current Permits to Operate (PTOs) N-5591-1-0, '-2-1, '-4-1, and '-5-1, along with ATC permit N-5591-3-2 are included in Appendix B. A project site plan indicating the proposed modifications is included in Appendix C.

II. Applicable Rules

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	Conservative Management Practices (CMP) (8/19/04)
Rule 4570	Confined Animal Facilities (10/21/10)
CH&SC 41700	Health Risk Assessment
CH&SC 42301.6	School Notice

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

III. Project Location

The facility is located at 609 Santa Fe Grade in Newman, CA. The equipment is not located within 1,000 feet of the outer boundary of a K-12 school. Therefore, the public notification requirement of California Health and Safety Code 42301.6 is not applicable to this project.

IV. Process Description

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

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

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

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

Milking Operation (Permit Unit N-5591-1):

Milking is a dairy's primary income generating activity. The lactating cows at this facility are milked two times per day. The milk is chilled and temporarily stored in onsite tanks until it is collected by tanker truck for delivery to a creamery. A purpose-built structure known as the milking parlor is used for milking and the associated onsite milk handling activities. The milking parlor is located in proximity to, but separate from the lactating cow housing areas. It is designed to facilitate efficient in-and-out movement of groups of cows being milked; and also to allow workers access to individual cows during milking. The first part of the milking parlor, known as the holding area, is an open-sided roofed space where cows that are ready for milking are temporarily confined as they enter the milking parlor. The milking occurs in the milking parlor within the barn. There are several different parlor designs, including flat, parallel, herringbone, parabone, and rotary. John F Toste Dairy currently has a 36-stall parabone milking parlor.

With this project, the dairy will utilize the existing 36-stall parabone milking parlor and increase the number milk cows from 1,500 heads to 2,500 heads. The lactating cows will be milked two times per day. The milking parlor has 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 continuously in the milking parlor. The effluent from the milking parlor will be carried through pipes to the lagoon system.

Cow Housing (Permit Unit N-5591-2):

The facility currently utilizes four freestall barns (Freestall Barns 1 through 4) with flush lanes to house milk cows. In the freestalls, the cows are grouped in large pens with free access to feed bunks, water, and stalls for resting. A standard freestall barn design has a feed alley in the center of the barn separating two feed bunks on each side. The facility is proposing to utilize existing Freestall Barn 1 and replace Freestall Barns 2, 3, and 4 with two new freestall barns (Freestall Barns 2 and 3) to house 2,500 milk cows.

The facility currently utilizes fifteen open corrals to house dry cows and support stock (heifers). Open corrals are large loose dirt open areas where cows are confined. These corrals have paved feed lanes. Manure from the feed lanes will be removed by flushing or scraping, whereas manure from the unpaved surfaces of the corrals will be removed by scraping with a box-type scraper. Eleven of the existing open corrals (Dairy Pens 1 through 6 and Canal School Pens 11 through 15) will be removed and the displaced dry cows and support stock will be housed in two new freestall barns (Freestall Barns 4 and 5).

The facility currently also utilizes six shade barns to house dry cows and support stock (heifers). The shade barns or loafing barn are housing structure consisting of a large fenced confinement area with paved feed lanes and a roof-type shade structure over the entire area. Manure from the feed lanes is removed by flushing, whereas manure from the unpaved surfaces is removed by scraping with a box-type scraper. Five of the existing shade barns (Shade Barns 1 through 5) will continue to be used to house dry cows and support stock, while one of the existing shade barn (Shade Barn 6) will be removed. The displaced support stock will be housed in the new freestall barns (Freestall Barns 4 and 5).

Liquid Manure Handling System (Permit Unit N-5591-3):

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

The existing manure handling system consists of two storage ponds and mechanical separator(s). The mechical separator will be installed under ATC permit N-5591-3-2. The manure is land applied through furrow irrigation.

Storage Pond:

The facility has two storage ponds. The storage ponds are designed to have sufficient volume to hold all of the following: all manure and wastewater accumulated at the dairy for a period of 120 days; normal precipitation and any drainage to the lagoon system minus evaporation from the surface of the lagoon; and precipitation during a 25 year, 24 hour storm event. The liquid manure from the storage pond will be used to irrigate crops.

Solids Separation:

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

Land Application:

Liquid manure from the storage pond 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.

Anaerobic Treatment Lagoons:

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

1) Minimum treatment volume - the minimum design volume must account for all potential sludge, treatment, precipitation, and runoff volumes;
2) Minimum hydraulic retention time - the retention time of the material in the lagoon must be adequate to provide environmentally safe utilization of waste;
3) Maximum volatile solids (VS) loading rate - the VS loading rate shall be based on maximum daily loading considering all waste sources that will be treated by the lagoon. The suggested loading rate for the San Joaquin Valley is 6.5 - 11 lb-VS/1000 ft^3/day depending on the type of system and solids separation; and
4) Minimum operating depth of at least 12 feet - maximizing the depth of the lagoon has the following advantages: 1) The surface area in contact with the atmosphere is minimized, which will reduce volatilization of air pollutants; 2) The smaller surface area reduces the effects of the environment on the lagoon, which provides a more stable and favorable environment for anaerobic bacteria; 3) There is better mixing of lagoon due to rising gas bubbles; 4) and A deeper lagoon requires less land for the required treatment volume.

John F Toste Dairy has proposed to install and use a lagoons that meet the anaerobic treatment design requirements discussed above.

Solid Manure Handling (Permit Unit N-5591-4)

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

Feed Storage and Handling (Permit Unit N-5591-5):

The existing feed storage and handing operation consists of silage piles.

Silage Piles:

The feed consists primarily of silage, which is made from corn, oats, and alfalfa, or a variety of other feed crops. The silage is made by placing the harvested crops, chopped to desired pieces if necessary, into piles, which are then compacted with heavy equipment to remove air. The piles are then tightly covered to avoid reintroduction of air. This allows anaerobic microbes present in the crops to multiply, resulting in fermentation of the organic material in the feed. When the silage is ready, one end of the pile can be opened and the required amount of silage can be removed from that end on a daily basis.

Total Mixed Rations (TMR):

TMR refers to a blended mixture of silage and additives that is ready to be fed to the cattle. Most cattle facilities prepare their TMRs in small batches using a feed wagon equipped with a mixer. The silage and additives are placed in the feed wagon in the proportions prescribed by the dietary requirements of the group of cows to be fed. These ingredients are then thoroughly mixed in the wagon and delivered to the cow housing areas to spread the TMR along the feed lanes.

V. Equipment Listing

Pre-Project Equipment Description:

N-5591-1-0: 1,500 COW MILKING OPERATION WITH ONE 36 STALL PARABONE MILKING PARLOR.

N-5591-2-1: COW HOUSING – 1,500 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 1,950 MATURE COWS (MILK AND DRY); 2,700 SUPPORT STOCK (HEIFERS, CALVES AND BULLS); AND 4 FREESTALLS WITH FLUSH SYSTEM.

N-5591-3-2(2):LIQUID MANURE HANDLING SYSTEM CONSISTING OF TWO STORAGE PONDS AND MECHANICAL SEPARATOR(S).

N-5591-4-1: SOLID MANURE HANDLING CONSISTING OF TRANSPORTED TO FIELDS; SOLID MANURE APPLICATION TO LAND AND HAULED OFFSITE.

N-5591-5-1: FEED STORAGE AND HANDLING CONSISTING OF SILAGE PILE(S).

Proposed Modification:

The facility is proposing to install two new freestall barns (Freestall Barns 4 and 5), replace three existing freestall barns (Freestall Barns 1, 2, and 3) with two new freestall barns (Freestall Barns 2 and 3), which will be over five existing open corrals (Pens 1 through 6), remove one shade barn (Shade Barn 6), install an anaerobic treatment lagoon, and increase the number of milk and dry cows by 1,050 heads, and support stock by 250 heads.

[2] This is an ATC permit, which will be required to be implemented prior to or at the same time ATC permit N-5591-3-1 is implemented.

N-5591-1-1: MODIFICATION OF 1,500 COW MILKING OPERATION WITH ONE 36 STALL PARABONE MILKING PARLOR TO INCREASE THE NUMBER OF MILK COWS TO 2,500 HEADS DUE TO A CHANGE IN HERD PROFILE AS AUTHORIZED BY ATC PERMIT N-5591-2-3.

N-5591-2-3: MODIFICATION OF COW HOUSING – 1,500 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 1,950 MATURE COWS (MILK AND DRY); 2,700 SUPPORT STOCK (HEIFERS, CALVES AND BULLS); AND 4 FREESTALLS WITH FLUSH SYSTEM TO: INCREASE THE MAXIMUM NUMBER OF COWS TO 2,500 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 3,000 MATURE COWS (MILK AND DRY) AND 2,950 SUPPORT STOCK (HEIFERS, CALVES, AND BULLS); INSTALL TWO NEW FREESTALL BARNS (4 AND 5); REPLACE THREE EXISTING FREESTALL BARNS (2, 3, AND 4) WITH TWO NEW FREESTALL BARNS (2 AND 3), WHICH WILL BE OVER FIVE EXISTING OPEN CORRALS (PENS 1 THROUGH 6); REMOVE FIVE OPEN CORRALS (CANAL SCHOOL PENS 11 THROUGH 15) AND ONE SHADE BARN (SHADE BARN 6).

N-5591-3-1: MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF SETTLING BASIN(S), TWO STORAGE PONDS AND MECHANICAL SEPARATOR(S) TO INSTALL AN ANAEROBIC TREATMENT LAGOON (STORAGE VOLUME OF 2,192,047 CU.FT.) AND FOR AN INCREASE IN LIQUID MANURE PROCESSING DUE TO A CHANGE IN HERD PROFILE AS AUTHORIZED BY ATC PERMIT N-5591-2-3.

N-5591-4-2: MODIFICATION OF SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES, MANURE TRANSPORTED TO FIELDS; SOLID MANURE APPLICATION TO LAND AND HAULED OFFSITE FOR AN INCREASE IN SOLID MANURE PROCESSING DUE TO A CHANGE IN HERD PROFILE AS AUTHORIZED BY ATC PERMIT N-5591-2-3.

N-5591-5-2: MODIFICATION OF FEED STORAGE AND HANDLING CONSISTING OF SILAGE PILE(S) FOR AN INCREASE IN TOTAL MIXED RATIONS DUE TO A CHANGE IN HERD PROFILE AS AUTHORIZED BY ATC PERMIT N-5591-2-3.

Post-Project Equipment Description:

N-5591-1-1: 2,500 COW MILKING OPERATION WITH ONE 36 STALL PARABONE MILKING PARLOR.

N-5591-2-3: COW HOUSING – 2,500 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 3,000 MATURE COWS (MILK AND DRY); 2,950 SUPPORT STOCK (HEIFERS, CALVES AND BULLS); 5 FREESTALLS AND 5 SHADE BARNS WITH FLUSH/SCRAPE SYSTEM.

N-5591-3-2: LIQUID MANURE HANDLING SYSTEM CONSISTING OF SETTLING BASIN(S); TWO STORAGE PONDS; MECHANICAL SEPARATOR(S); ONE ANAEROBIC TREATMENT LAGOON (STORAGE VOLUME OF 2,192,047 CU.FT.); MANURE IS LAND APPLIED THROUGH FLOOD/FURROW IRRIGATION.

N-5591-4-1: SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; MANURE TRANSPORTED TO FIELDS; SOLID MANURE APPLICATION TO LAND AND HAULED OFFSITE.

N-5591-5-1: FEED STORAGE AND HANDLING CONSISTING OF SILAGE PILE(S).

VI. Emission Control Technology Evaluation

Particulate matter (PM_{10}), volatile organic compounds (VOC), hydrogen sulfide (H_2S) and ammonia (NH_3) are the major pollutants of concern from dairy operations. PM_{10} emissions are generated primarily from the mechanical 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. NH_3 and H_2S 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.[3]

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

Milking Parlor (Permit Unit N-5591-1):

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

Cow Housing (Permit Unit N-5591-2):

The milk cows at the facility will be housed in freestall barns, while the remaining dry cows and support stock will be housed in freestall barns, shade barns, and open corrals. Three of the practices that will be utilized to reduce emissions at the dairy are described below:

[3] 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.

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 manure lanes creates a moist environment, which further decreases particulate matter emissions.

The only time cows leave their housing is to go to the milking parlor to be milked (twice a day or more depending on the milking schedule). The distance from the freestall barns to the milking parlor is insignificant and usually involves walking through a wet process (concrete flush lanes). The only source of PM_{10} emissions from this type of housing would be generated from the cow bedding.

Shade Structures and Scraping of Corrals/Pens

Most of the support stock and dry cows will be housed in open corrals with concrete lanes and shade structures. Providing shade for the animals reduces movement and unnecessary activity during hot weather, which reduces PM_{10} emissions.

The surfaces of the freestall exercise pens and open corrals will be scraped in the morning hours on a biweekly basis, except during wet conditions. Frequent scraping of the freestall exercise pens and open corrals will reduce the amount of dry manure on the surfaces that may be pulverized by the cows' hooves and emitted as PM_{10}. This practice will also reduce the chance of anaerobic conditions developing in the manure pack of the freestall exercise pen and corral surface, potentially reducing VOC emissions.

Frequent Flushing

Manure, which is a source of emissions, will be removed from all of the freestall barn and open corral feed lanes and walkways by flushing. Because of ammonia's high affinity for and solubility in water, flushing the lanes and walkways will also reduce volatilization of ammonia from the manure deposited in the corral lanes. The feed lanes and walkways for all mature cows (milk and dry cows) in the freestall barn will be flushed at least three times per day and the feed lanes and walkways for all support stock in the freestall will be flushed at least once per day. Both manure and dissolved pollutants are subsequently carried by the flush water into the liquid manure handling system for further treatment.

Liquid Manure Handling (Permit Unit N-5591-3):

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.

Solids Separation (Mechanical Separator)

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.

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.

Anaerobic Treatment Lagoon System

The modified liquid manure handling system at this dairy will include one anaerobic treatment lagoon designed in accordance with the specifications set forth in NRCS practice standard 359. A properly designed and operated anaerobic treatment system will reduce VOC emissions because the organic compounds in the manure will be mostly converted into methane, carbon dioxide, and water rather than a significant amount of VOCs. An anaerobic treatment system also has an air pollution benefit over a system with only a storage pond. Odorous emissions are reduced with an anaerobic treatment storage system since the lagoon has a constant treatment volume, which promotes more efficient anaerobic digestion. Pursuant to the design check analysis shown in Appendix I, the proposed anaerobic treatment lagoon system is expected to meet the standard design requirements.

Solid Manure Handling (N-5591-4):

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

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

Feed Storage and Handling (N-5591-5):

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

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

District Rule 4570 Mitigation Measures

The facility currently complies with all applicable Phase II mitigation measure requirements of District Rule 4570, as previously processed under District project N-1104414. All mitigation measures result in VOC and ammonia emissions for each permit unit at the dairy. A complete list of the mitigation measures practiced at the facility, and the expected control efficiency for each, is included with the emission calculations shown in Appendix D.

VII. General Calculations

A. Assumptions

- Potential to emit calculations will be based on the permitted limits for the different age categories of cows in the proposed herd.
- Only non-fugitive emissions are considered when determining major source status. For this facility, the lagoon/storage pond (Permit Unit N-5591-3) and the gasoline dispensing operation (Permit Unit N-5591-6) are the only sources of non-fugitive emissions.
- All PM_{10} emissions will be allocated to the cow housing permit unit (Permit Unit N-5591-2).
- All H_2S emissions will be allocated to the liquid manure permit unit - lagoon/storage pond (Permit Unit N-5591-3); and will be assumed to be equivalent to 10% of the NH_3 emissions from the lagoon/storage pond.
- The PM_{10} control efficiency for shade structures is from a District document titled "Dairy/Feedlot PM_{10} Mitigation Practices and their Control Efficiencies."[5]
- The PM_{10} emission factors are from a District document titled "Dairy and Feedlot PM_{10} Emissions Factors,"[6] which compiled data from studies performed by Texas A&M and ASAE, and a USDA/UC Davis report, quantifying dairy and feedlot emissions.

[5] http://www.valleyair.org/busind/pto/dpag/Dairy_PM10_Control_Efficiencies.pdf
[6] http://www.valleyair.org/busind/pto/dpag/FYI_%20Dairy_Feedlot_PM10_Emission_Factor.pdf

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

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

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

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

- Current District practice to streamline calculations for $PM_{2.5}$ emissions is to assume $PM_{2.5}$ emissions to be equal to PM_{10} emissions. However, the District has been made aware of a number of scientific studies[9] that have established more representative $PM_{2.5}$-to-PM_{10} fractions from dairy operations. Data from a preliminary analysis of these studies indicate a range of percentages (from 8.6% to 26.7%) for the $PM_{2.5}$-to-PM_{10} fraction, but a final $PM_{2.5}$ fraction has not been determined. Since this additional evaluation is in progress and has not been finalized; for this specific project, the District will include an additional 20.0% margin of safety to the highest published value of 26.7%[10] and use a conservative $PM_{2.5}$ fraction of 32.0% $PM_{2.5}$-to-PM_{10}. Additional work must be completed to more closely analyze the results of these studies and determine a final $PM_{2.5}$-to-PM_{10} fraction for district-wide usage.

To streamline emission calculations, $PM_{2.5}$ emissions are assumed to be equal to PM_{10} emissions. Only if needed to determine if a project is a Federal major modification for $PM_{2.5}$ will specific $PM_{2.5}$ emission calculations be performed.

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

[8] http://www.arb.ca.gov/ei/areasrc/livestockemisfwp.pdf

[9] Including: (1) California Air Resources Board - Speciation Profiles Used in ARB Modeling (PMSIZE spreadsheet); (2) Winkel, A. et al (2015). Emissions of particulate matter from animal houses in the Netherlands. Atmospheric Environment, 111, pp.202-212.; (3) Joo, H.S., et al (2013). Particulate matter dynamics in naturally ventilated freestall dairy barns. Atmospheric Environment, 69, pp.182-190.; and (4) Marchant, C. C.; et al, (2011) "Estimation of Dairy Particulate Matter Emission Rates by LIDAR and Inverse Modeling". *Space Dynamics Lab Publications.* Paper 85.

[10] The 26.7% fraction was derived from the Joo, H.S., et. al. (2013) study and the study was conducted in the State of Washington in the Pacific Northwest region of the U.S. While utilizing the highest published fraction may seem conservative, the study also states, "a comparison of PM emissions across different geographical and climate regions is, however, complicated because of the differences in environmental conditions, animal feed, feed and manure management, bedding material, amongst others."

B. Emission Factors

Detailed emission factors (EFs) are listed in the emissions calculation spreadsheet in Appendix D of the sheet titled "EFs".

C. Calculations

1. Pre-Project Potential to Emit (PE1)

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

Emission calculations for this project are included in the dairy emissions calculation spreadsheet in Appendix D. PE1 for each dairy permit modified under this project are shown in the table below.

Daily Pre-Project Potential to Emit (PE1) (lb/day)							
Permit Number	NO_X	SO_X	PM_{10}	CO	VOC	NH_3	H_2S
N-5591-1-0	0.0	0.0	0.0	0.0	1.6	0.6	0.0
N-5591-2-1	0.0	0.0	73.5	0.0	79.1	140.9	0.0
N-5591-3-2	0.0	0.0	0.0	0.0	13.3	39.1	1.2
N-5591-4-1	0.0	0.0	0.0	0.0	3.7	18.9	0.0
N-5591-5-1	0.0	0.0	0.0	0.0	130.4	0.0	0.0
Annual Pre-Project Potential to Emit (PE1) (lb/year)							
Permit Number	NO_X	SO_X	PM_{10}	CO	VOC	NH_3	H_2S
N-5591-1-0	0	0	0	0	600	205	0
N-5591-2-1	0	0	26,783	0	28,827	51,458	0
N-5591-3-2	0	0	0	0	4,856	14,295	419
N-5591-4-1	0	0	0	0	1,358	6,914	0
N-5591-5-1	0	0	0	0	47,578	0	0

2. Post-Project Potential to Emit (PE2)

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

Daily Post-Project Potential to Emit (PE2) (lb/day)							
Permit Number	NO_X	SO_X	PM_{10}	CO	VOC	NH_3	H_2S
N-5591-1-1	0.0	0.0	0.0	0.0	2.7	0.9	0.0
N-5591-2-3	0.0	0.0	31.0	0.0	106.9	211.0	0.0
N-5591-3-1	0.0	0.0	0.0	0.0	21.5	73.2	1.2
N-5591-4-2	0.0	0.0	0.0	0.0	5.1	27.5	0.0
N-5591-5-2	0.0	0.0	0.0	0.0	145.9	0.0	0.0
Annual Post-Project Potential to Emit (PE2) (lb/year)							
Permit Number	NO_X	SO_X	PM_{10}	CO	VOC	NH_3	H_2S
N-5591-1-1	0	0	0	0	1,000	342	0
N-5591-2-3	0	0	11,196	0	39,014	77,110	0
N-5591-3-1	0	0	0	0	5,845	17,266	419
N-5591-4-2	0	0	0	0	1,890	10,003	0
N-5591-5-2	0	0	0	0	53,250	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.

Pre-Project Stationary Source Potential to Emit (SSPE1) (lb/year)							
Permit Number	NO_X	SO_X	PM_{10}	CO	VOC	NH_3	H_2S
N-5591-1-0	0	0	0	0	600	205	0
N-5591-2-1	0	0	26,783	0	28,827	51,458	0
N-5591-3-2	0	0	0	0	4,856	14,295	419
N-5591-4-1	0	0	0	0	1,358	6,914	0
N-5591-5-1	0	0	0	0	47,578	0	0
N-5591-6-0[11]	0	0	0	0	35	0	0
SSPE1	**0**	**0**	**26,783**	**0**	**83,254**	**72,872**	**419**

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.

[11] Annual PE1 for this permit unit for a gasoline dispensing operation was obtained from project #N-1104414.

Post-Project Stationary Source Potential to Emit (SSPE2) (lb/year)							
Permit Number	NO_X	SO_X	PM_{10}	CO	VOC	NH_3	H_2S
N-5591-1-1	0	0	0	0	1,000	342	0
N-5591-2-1	0	0	11,196	0	39,014	77,110	0
N-5591-3-1	0	0	0	0	5,845	17,266	419
N-5591-4-2	0	0	0	0	1,890	10,003	0
N-5591-5-2	0	0	0	0	53,250	0	0
N-5591-6-0	0	0	0	0	35	0	0
SSPE2	**0**	**0**	**11,196**	**0**	**101,034**	**104,721**	**419**

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 nonroad 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

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

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

Milking Parlor

The mechanical ventilation system could arguably be utilized to capture emissions from the milking parlor. In order achieve and maintain the negative pressure required for this purpose, the adjoining holding area would also need to be completely

enclosed. However, enclosing the holding area is not practical due to the continuous movement of cows in and out of the barn throughout the day. In addition, the capital outlay required to enclose this large area would be prohibitive. The District therefore determines that emissions from the milking parlor cannot reasonably be captured, and are to be considered fugitive.

Cow Housing

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

Manure Storage Areas

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

Land Application

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

Feed Storage and Handling

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

Silage is stored in silage piles. Only two piles will be actively used at any given time and the remainder of the piles will remain covered. One end/face of the silage pile that is actively being used to prepare feed rations must remain open to allow extraction of the silage. A front-end loader is used to extract silage from the open face of the pile throughout the day as the feed rations for the various groups or categories of cows

are prepared. A significant proportion of silage pile emissions are associated with this open face, which is exposed to the atmosphere and frequently disturbed during silage extraction. Due to the need to access the pile's open face throughout the day, it is not practical to enclose it or equip it with any kind of device or system that could be used to capture of emissions.

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

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

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

Non-Fugitive SSPE1 (lb/year)					
Permit Number	**NO_X**	**SO_X**	**PM_{10}**	**CO**	**VOC**
N-5591-3-2 (Lagoons and Storage Ponds only)	0	0	0	0	2,337[12]
N-5591-6-0 (Gasoline Dispensing Operation)	0	0	0	0	35
Non-Fugitive SSPE1	**0**	**0**	**0**	**0**	**2,372**

Non-Fugitive SSPE2 (lb/year)					
Permit Number	**NO_X**	**SO_X**	**PM_{10}**	**CO**	**VOC**
N-5591-3-1 (Lagoons and Storage Ponds only)	0	0	0	0	2,796[13]
N-5591-6-0 (Gasoline Dispensing Operation)	0	0	0	0	35
Non-Fugitive SSPE2	**0**	**0**	**0**	**0**	**2,831**

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

[12] From Appendix D – In sheet titled "PE1" (Pre-Project Potential to Emit) for Major Source Emissions.
[13] From Appendix D - 'In sheet titled "PE2" (Post-Project Potential to Emit) for Major Source Emissions.

Rule 2201 Major Source Determination (lb/year)						
	NO_X	**SO_X**	**PM_{10}**	**$PM_{2.5}$**	**CO**	**VOC**
SSPE1	0	0	0	0	0	2,372
SSPE2	0	0	0	0	0	2,831
Major Source Threshold	20,000	140,000	140,000	140,000	200,000	20,000
Major Source?	No	No	No	No	No	No

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

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

Rule 2410 Major Source Determination:

The facility or the equipment evaluated under this project is not listed as one of the categories specified in 40 CFR 52.21 (b)(1)(iii). Therefore the PSD Major Source threshold is 250 tpy for any regulated NSR pollutant.

Fugitive emissions at dairies are excluded in determining if a source is a major source for PSD. For this dairy, only emissions from the lagoon and gasoline dispensing operation are non-fugitive emissions. Emissions from all other sources are considered fugitive and are excluded from PSD calculations.

PSD Major Source Determination (tons/year)						
	NO_2	**VOC**	**SO_2**	**CO**	**PM**	**PM_{10}**
Estimated Facility PE before Project Increase	0.0	1.19	0.0	0.0	0.0	0.0
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 pollutant-by-pollutant for each unit within the project to calculate the QNEC, and if applicable, to determine the amount of offsets required.

Pursuant to District Rule 2201, BE = PE1 for:

- Any unit located at a non-Major Source,
- Any Highly-Utilized Emissions Unit, located at a Major Source,
- Any Fully-Offset Emissions Unit, located at a Major Source, or
- Any Clean Emissions Unit, located at a Major Source.

otherwise,

BE = Historic Actual Emissions (HAE), calculated pursuant to District Rule 2201.

As shown in Section VII.C.5 above, the facility is not a Major Source for any pollutant.

Therefore BE = PE1.

Baseline Emissions (BE) (lb/year)							
Permit Number	NO_X	SO_X	$PM_{10\ \&\ 2.5}$	CO	VOC	NH_3	H_2S
N-5591-1-0	0	0	0	0	600	205	0
N-5591-2-1	0	0	26,783	0	28,827	51,458	0
N-5591-3-2	0	0	0	0	4,856	14,295	419
N-5591-4-1	0	0	0	0	1,358	6,914	0
N-5591-5-1	0	0	0	0	47,578	0	0

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

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.

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
- PM_{10}
- Hydrogen sulfide (H2S)
- Total reduced sulfur (including H2S)

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). The PSD Major Source threshold is 250 tpy for any regulated NSR pollutant.

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

PSD Major Source Determination: Potential to Emit (tons/year)					
Category	**VOC**	**PM**	**PM_{10}**	**H_2S**	**S**
Total PE from new and modified units	1.40	0	0	0.21	0.21
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 I.

VIII. Compliance Determination

Rule 1070 Inspections

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

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

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

Rule 2010 Permits Required

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

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

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

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 applicant is proposing to expand the herd size and add two new freestall barns. As shown in the calculations in Appendix E, the PE for the new barns exceeds 2 lb/day for PM_{10}, VOC, and NH_3. BACT for new emissions units with PE > 2 lb/day is therefore triggered, as summarized below:

N-5591-2-3 (Cow Housing):
Freestall Barns 4 and 5: VOC, NH_3, and PM_{10}

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

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

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

AIPE = PE2 – HAPE

Where, AIPE = Adjusted Increase in Permitted Emissions (lb/day)
PE2 = The emissions units post project potential to emit (lb/day)
HAPE = The emissions units Historically Adjusted Potential to Emit (lb/day)

HAPE = PE1 × (EF2 / EF1)

Where, PE1 = The emission unit's Potential to Emit prior to modification.
EF2 = The emission unit's permitted emission factor for the pollutant after modification. If EF2 is greater than EF1 then EF2/EF1 shall be set equal to 1.
EF1 = The emission unit's permitted emission factor for the pollutant before the modification.

AIPE = PE2 – (PE1 × (EF2 / EF1))

The applicant is proposing to expand the herd size and install two freestall barns over existing freestall barns 2, 3, and 4, and over open corrals. Detailed AIPE calculations for each emissions unit are shown in Appendix E. The AIPE is greater than 2 lb/day, and therefore BACT is triggered, for the emission units and each respective pollutants summarized below:

N-5591-2-3 (Cow Housing):
Freestall Barns 2 and 3: VOC, NH_3, and PM_{10}

N-5591-3-1 (Liquid Manure Handling):
Lagoon/Storage Ponds: VOC and NH_3
Liquid Manure Land Application: VOC and NH_3

N-5591-4-2 (Solid Manure Handling):
Solid Manure Storage: NH_3
Solid Manure Land Application: NH_3

N-5591-5-2 (Feed Storage and Handling):
Total Mixed Ration (TMR): 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 applies to the dairy emission units triggering BACT as stated above:

- District BACT Guideline 5.8.2 (Cow Housing – Freestall and Saudi-Style Barns)
- District BACT Guideline 5.8.6 (Liquid Manure Handling – Lagoon/Storage Ponds)
- District BACT Guideline 5.8.7 (Liquid Manure Handling – Liquid/Slurry Land Application)
- District BACT Guideline 5.8.8 (Solid Manure Handling – Storage/Separated Solid Piles)
- District BACT Guideline 5.8.9 (Solid Manure Handling – Land Application)
- District BACT Guideline 5.8.11 (Feed Storage and Handling – Feed/TMR)

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 in Appendix G of this document, BACT has been satisfied with the following:

N-5591-2-3 (Cow Housing):

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

NH_3 (Freestall Barns 2, 3, 4, and 5):
(1). Concrete feed lanes and walkways;
(2). Flushing the feed lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing feed lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, scraping feed lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning feed 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 corrals (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing corrals to maintain a dry surface; and
(5). Scraping corrals and exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions.

PM_{10} (Freestall Barns 2, 3, 4, and 5):
(1). Concrete feed lanes and walkways; and
(2). Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions;

N-5591-3-1 (Liquid Manure Handling):

VOC (Lagoon/Storage Ponds):
(1). Use of an anaerobic treatment lagoon designed according to Natural Resources Conservation Services (NRCS) Guideline, and solids removal/separation system (mechanical separator(s) or settling basin(s)/weeping wall(s)).

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

NH_3 (Lagoon/Storage Ponds and Land Application):
(1). All animals fed in accordance with Natural Resources Conservation Services (NRCS) or other District-approved guidelines.

N-5591-4-2 (Solid Manure Handling):

NH_3 (Solid Manure Storage):
(1). All animals fed in accordance with Natural Resources Conservation Services (NRCS) or other District-approved guidelines.

NH_3 (Solid Manure Land Application):
(1). Rapid incorporation of solid manure into the soil after land application, and all animals fed in accordance with Natural Resources Conservation Services (NRCS) or other District-approved guidelines.

N-5591-5-2 (Feed Storage and Handling):

VOC (Total Mixed Rations):
(1). District Rule 4570 mitigation 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	0	0	11,196	0	101,034
Offset Thresholds	20,000	54,750	29,200	200,000	20,000
Offsets triggered?	No	No	No	No	Yes

2. Quantity of Offsets Required

As seen above, the SSPE2 is greater than the offset thresholds only for VOC emissions. However, per Section 4.6.9 of Rule 2201, offsets are not required for agricultural sources unless they are a major source. As determined in Section VII.C.5 above, this facility is not a major source for any pollutant; therefore, offset calculations are not necessary and offsets will not be required for this project.

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

Applications which include a new emissions unit with a PE greater than 100 pounds during any one day for any pollutant will trigger public noticing requirements. The facility is proposing to construct two new freestall barns and replace three freestall barns with two new freestall barns. As shown in the cow housing calculations in Appendix D, the new emission units do not have a Potential to Emit greater than 100 lb/day for any pollutant; therefore, public noticing for PE > 100 lb/day purposes is not required.

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	0	180	20,000 lb/year	No
SO_X	0	0	54,750 lb/year	No
PM_{10}	26,783	11,196	29,200 lb/year	No
CO	0	0	200,000 lb/year	No
VOC	83,254	101,034	20,000 lb/year	No

As demonstrated above, the SSPE1 is above the offset threshold for VOC prior to this project. 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	0	0	0	20,000 lb/year	No
SO_x	0	0	0	20,000 lb/year	No
PM_{10}	11,196	26,783	-15,587	20,000 lb/year	No
CO	0	0	0	20,000 lb/year	No
VOC	101,034	83,254	17,780	20,000 lb/year	No
NH_3	104,721	72,872	31,849	20,000 lb/year	Yes
H_2S	419	419	0	20,000 lb/year	No

As demonstrated above, the SSIPEs for NH_2 is 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 for SSIPE in excess of 20,000 lb/day for NH_3. 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 permits for the associated operations.

D. Daily Emission Limits (DELs)

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

For dairies, the DEL is satisfied based on the number and types of cows at the dairy, and any proposed mitigation measures. The number and types of cows are listed in the permit equipment description for the cow housing permit (N-5591-2-3).

The following District Rule 2201 conditions will be included in the ATC permits to ensure compliance with applicable BACT requirements and/or control efficiencies attributed to mitigation measures implemented at the facility. Some of the following conditions may reference District Rule 4570, as these are mitigation measures the facility has selected to comply with that rule.

Proposed Rule 2201 (DEL) Conditions:

N-5591-1-1 (Cow Milking Operation):

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

N-5591-2-3 (Cow Housing):

- *{Modified 4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201, 4102, and 4570]*
- *{Modified 4486} Permittee shall pave feed lanes for a width of at least 8 feet along the corral side of the feed lane fence for milk and dry cows and at least 6 feet along the corral side of the feed lane fence for support stock. [District Rules 2201, 4102, and 4570]*
- *{Modified 4487} Permittee shall flush, scrape, or vacuum freestall lanes immediately prior to, immediately after or during each milking. [District Rules 2201, 4102, and 4570]*
- *{Modified 4492} Permittee shall remove manure that is not dry from individual cow freestall beds or shall rake, harrow, scrape, or grade freestall bedding at least once every seven (7) days. [District Rules 2201 and 4570]*
- *{Modified 4499} Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rules 2201 and 4570]*
- *{Modified 4501} Permittee shall clean manure from corrals at least four (4) times per year with at least sixty (60) days between cleanings; or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]*
- *{Modified 4509} Permittee shall clean concreted lanes such that the depth of manure does not exceed twelve (12) inches at any point or time. [District Rule 2201, 4102, and 4570]*
- *{Modified 4518} Permittee shall manage corrals such that the 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 corrals becoming accessible. [District Rules 2201 and 4570]*

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

- *For Freestall Barns 2, 3, 4, and 5, the feedlanes and walkways shall be constructed of concrete. [District Rules 2201, 4102, and 4570]*

- *For Freestall Barns 2, 3, 4, and 5, the permittee shall flush the feed lanes and walkways for the mature cows (milk and dry cows) at least four times per day and for the support stock (heifers) at least once per day or scrape feed lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and for support stock at least once per day. [District Rules 2201, 4102, and 4570]*

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

- *{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, 4102 and 4570]*

N-5591-3-1 (Liquid Manure Handling):

- *{Modified 4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4102]*

- *{4538} Permittee shall remove solids with a solids separation system prior to the manure entering the lagoon. [District Rule 4570]*

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

- *All liquid manure shall be treated in an anaerobic treatment lagoon system that is designed and operated according to the Natural Resources Conservative Service (NRCS) Field Office Technical Guide No. 359. [District Rules 2201, 4102, and 4570]*

- *Any liquid manure applied to land shall have been treated in an anaerobic treatment lagoon system that is designed and operated according to the NRCS Field Office Technical Guide No. 359. [District Rules 2201, 4102, and 4570]*

N-5591-4-2 (Solid Manure Handling):

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

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

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

N-5591-5-2 (Feed Storage and Handling):

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

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

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

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

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

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

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

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

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

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

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

E. Compliance Assurance

1. Source Testing

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

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. In general, recordkeeping for the Milking Parlor (N-5591-1-1), the Liquid Manure Handling System (N-5591-3-1), and the Solid Manure Handling System (N-5591-4-2) and the Feed Storage and Handling System (N-5591-5-2) is satisfied with the records that must be kept to demonstrate compliance with the numbers and types of cows listed in the permit equipment description for the Cow Housing (N-5591-2-3). Conditions that will be placed on the ATC permits are listed below.

N-5591-1-1 (Cow Milking Operation):

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

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

N-8441-2-1 (Cow Housing):

- *{Modified 4455} Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201, 4102, 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, 4102, and 4570]*

- *{Modified 4493} 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 4510} Permittee shall measure and document the depth of manure on concrete lanes at least once every ninety (90) days. [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 4521} Permittee shall measure and document the depth of manure at the fence line at least once every ninety (90) days. [District Rules 2201 and 4570]*

- *{Modified 4490} For Freestall Barns 2, 3, 4, and 5, the permittee shall maintain records or maintain an operating plan that requires feed lanes and walkways for mature cows to be flushed or scraped at least four (4) times per day and the feed lanes and walkways for support stock to be flushed or scraped at least once per day. [District Rules 2201, 4102, and 4570]*

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

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

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

N-5591-3-1 (Liquid Manure Handling):

- *{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 4102]*

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

- *Permittee shall maintain design specifications and calculations, including minimum treatment volume (MTV) and hydraulic retention time (HRT) calculations, demonstrating that the anaerobic treatment lagoon system meets the requirements listed in the NRCS Field Office Technical Guide No. 359. [District Rules 2201, 4102, and 4570]*

- *Permittee shall maintain records to demonstrate that only liquid manure that has been treated in the anaerobic treatment lagoon system is applied to the fields. [District Rules 2201, 4102, and 4570]*

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

N-5591-4-2 (Solid Manure Handling):

- *{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]*

- *{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]*

- *{4531} Permittee shall maintain records, such as manufacturer warranties or other documentation, demonstrating that the weatherproof covering over separated solids are installed, used, and maintained in accordance with manufacturer recommendations and applicable standards listed in NRCS Field Office Technical Guide Code 313 or 367, or any other applicable standard approved by the APCO, ARB, and EPA. [District Rules 2201 and 4570]*

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

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

N-5591-5-2 (Feed Storage and Handling):

- *{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 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]*

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

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

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

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

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

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

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

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

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

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

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

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 H 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 PM_{10} 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 PM_{10} 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.

Newly constructed facilities or reconstructed units or sources at existing facilities are subject to preconstruction review requirements if they have the potential to emit hazardous air pollutants (air toxics) in "major" amounts (10 tons or more of an individual pollutant or 25 tons or more of a combination of pollutants) and the new units are not already subject to a standard promulgated under Section 112(d), 112(j), or 112(h) of the Clean Air Act." Facilities or sources subject to Rule 2550 would be subject to stringent air pollution control requirements, referred to as Maximum Achievable Control Technology (MACT).

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

Hazardous Air Pollutant Emissions from Dairies		
HAP	**Emission Rate lb/milk cow-year**	**Source**
Methanol	1.35	UC Davis - *VOC Emission from Dairy Cows and their Excreta,* 2005
Carbon disulfide	0.027	Dr. Schmidt - *Dairy Emissions using Flux Chambers (Phase I & II)*, 2005
Ethylbenzene	0.003	
o-Xylene	0.005	
1,2-Dibromo-3chloropropane	0.011	
1,2,4-Trichlorobenzene	0.025	
Naphthalene	0.012	
Hexachlorobutadiene	0.012	
Formaldehyde	0.005	
Acetaldehyde	0.029	

Chloroform	0.017	California State University Fresno (CSUF) - *Monitoring and Modeling of ROG at California Dairies*, 2005
Styrene	0.01	
Vinyl acetate[14]	0.08	Dr. Schmidt - *Dairy Emissions using Flux Chambers (Phase I & II)* & California State University Fresno (CSUF) - *Monitoring and Modeling of ROG at California Dairies*, 2005
Toluene[15]	0.162	
Cadmium	0.009	Air Resources Board's Profile No. 423, Livestock Operations Dust
Hexavalent Chromium	0.004	
Nickel	0.026	
Arsenic	0.005	
Cobalt	0.003	
Lead	0.033	
Total	**1.828**	

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

HAPs Emissions Calculations						
Category	**Number of cows**		**Emission Rate lb/cow-year[16]**		**Emissions**	
					lb/year	**tons/year**
Milking Cows	2,500	x	1.828	=	4,570	2.29
Dry Cows	500	x	1.123	=	562	0.28
Support Stock	2,950	x	0.786	=	2,319	1.16
Calves (0 - 3 mon)	0	x	0.584	=	0	0.00
				Total =	**7,451**	**3.73**

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

Rule 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.

[14] 0.01 + 0.07 = 0.08 lbs/hd-year.
[15] 0.012 + 0.15 = 0.162 lbs/hd-year.
[16] The emission rate total has been adjusted for each cow category using ratios based on manure production rates.

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 facility operations.

Rule 4101 Visible Emissions

Rule 4101 states that no air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity.

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

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

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

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

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

Rule 4102 Nuisance

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

California Health & Safety Code 41700 (Health Risk Assessment)

District Policy APR 1905 – *Risk Management Policy for Permitting New and Modified Sources* specifies that for an increase in emissions associated with a proposed new source or modification, the District perform an analysis to determine the possible impact to the nearest resident or worksite.
An HRA is not required for a project with a total facility prioritization score of less than one. According to the Technical Services Memo for this project (Appendix H), the total facility prioritization score including this project was greater than one. Therefore, an HRA was required to determine the short-term acute and long-term chronic exposure from this project.

The cancer risk for this project is shown below:

Permit Units	Prioritization Score	Acute Hazard Index	Chronic Hazard Index	Maximum Individual Cancer Risk	T-BACT Required	Special Permit Requirements
N-5591-1-1	0.90	0.00	0.00	2.90E-08	No	No
N-5591-2-3	42.64	0.28	0.11	7.86E-06	Yes[3]	No
N-5591-3-1	51.62	0.02	0.02	6.13E-06	Yes	No
N-5591-4-2	0.00	0.01	0.00	N/A[1]	No	No
N-5591-5-2	N/A[2]	N/A[2]	N/A[2]	N/A[2]	No	No
Project Totals	95.16	0.31	0.13	1.40E-05		
Facility Totals	>1	0.31	0.13	1.40E-05		

Notes:
1. Maximum Individual Cancer Risk was not calculated for unit 4 since there are no risk factor or the risk factor is so low thtat it has been determined to be insignificant for this type of unit.
2. 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.
3. T-BACT is determined on a corral by corral basis.

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 emissions from the new cow housing for the new freestall barns 4 and 5 (ATC permit N-5591-2-3), and the liquid manure handling operation (ATC permit N-5591-3-1). T-BACT is satisfied with BACT for VOC (refer to Appendix G for the BACT analysis for the applicable toxic emissions control); therefore, compliance with the District's Risk Management Policy is expected.

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

Rule 4550 Conservative Management Practices (CMP)

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

Pursuant to Section 4.2, dairies with at least 500 mature cows or cattle facilities with at least 190 cattle are subject to the provisions of this rule. Therefore, this facility is currently subject to the provisions of this rule as a dairy, and will continue to be subject to the provisions of this rule as a dairy.

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 initial dairy CMP plan on March 17, 2005 and a modified CMP plan on April 13, 2020. This proposed project does not involve any changes or modifications to the current CMP plan. Continued compliance with the requirements of this rule is therefore expected.

Rule 4570 Confined Animal Facilites (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) through the implementation of various mitigation measures for each emissions unit.

The facility was issued ATC permits to implement the requirements of this rule under projects N-1104414 and N-1193387. The existing Rule 4570 mitigation measures will be used in the current evaluation, except where the applicant has proposed a specific change. Modifications to specific measures will be made, as necessary, to accommodate New Source Review requirements from the current project. The following are a list of the permit conditions to be included in the ATC permits for compliance with this rule:

<u>General Condition on all ATC Permits</u>

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

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

<u>N-5591-1-1 (Cow Milking Operation):</u>

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

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

N-5591-2-3 (Cow Housing):

- *{Modified 4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201, 4102, 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, 4102, and 4570]*

- *{Modified 4486} Permittee shall pave feed lanes for a width of at least 8 feet along the corral side of the feed lane fence for milk and dry cows and at least 6 feet along the corral side of the feed lane fence for support stock. [District Rules 2201, 4102, and 4570]*

- *{Modified 4487} Permittee shall flush, scrape, or vacuum freestall lanes immediately prior to, immediately after or during each milking. [District Rules 2201, 4102, 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, 4102, 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 4493} 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 cleanings; or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]*

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

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

- *{Modified 4510} Permittee shall measure and document the depth of manure on concrete lanes at least once every ninety (90) days. [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, 4102 and 4570]*

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

- *{Modified 4517} 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 the 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 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 corrals 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]*

The following conditions were added for the proposed additional mitigation measures for compliance with this rule due to this proposed project under the cow housing permit:

- *{Modified 4520} Permittee shall knockdown fence line manure build-up prior to it exceeding a height of twelve (12) inches at any time or point. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rules 2201, 4102, and 4570]*

- *{Modified 4521} Permittee shall measure and document the depth of manure at the fence line at least once every ninety (90) days. [District Rules 2201, 4102, and 4570]*

- *For Freestall Barns 2, 3, 4, and 5, the feedlanes and walkways shall be constructed of concrete. [District Rules 2201, 4102, and 4570]*

- *For Freestall Barns 2, 3, 4, and 5, the permittee shall flush the feed lanes and walkways for the mature cows (milk and dry cows) at least four times per day and for the support stock (heifers) at least once per day or scrape feed lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and for support stock at least once per day. [District Rules 2201, 4102, and 4570]*

- *{Modified 4490} For Freestall Barns 2, 3, 4, and 5, the permittee shall maintain records or maintain an operating plan that requires feed lanes and walkways for mature cows to be flushed or scraped at least four (4) times per day and the feed lanes and walkways for support stock to be flushed or scraped at least once per day. [District Rules 2201, 4102, and 4570]*

N-5591-3-1 (Liquid Manure Handling):

- *{4538} Permittee shall remove solids with a solids separation system prior to the manure entering the lagoon. [District Rule 4570]*

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

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

The following conditions were added for the proposed additional mitigation measures for compliance with this rule due to this proposed project under the liquid manure handling permit:

- *{Modified 4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4102]*

- *{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 4102]*

- *All liquid manure shall be treated in an anaerobic treatment lagoon system that is designed and operated according to the Natural Resources Conservation Service (NRCS) Field Office Technical Guide No. 359. [District Rules 2201, 4102, and 4570]*

- *Any liquid manure applied to land shall have been treated in an anaerobic treatment lagoon system that is designed and operated according to the NRCS Field Office Technical Guide No. 359. [District Rules 2201, 4102, and 4570]*

- *Permittee shall maintain design specifications and calculations, including minimum treatment volume (MTV) and hydraulic retention time (HRT) calculations, demonstrating that the anaerobic treatment lagoon system meets the requirements listed in the NRCS Field Office Technical Guide No. 359. [District Rules 2201, 4102, and 4570]*

- *Permittee shall maintain records to demonstrate that only liquid manure that has been treated in the anaerobic treatment lagoon system is applied to land. [District Rules 2201, 4102, and 4570]*

N-5591-4-1 (Solid Manure Handling):

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

- *{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]*

- *{4531} Permittee shall maintain records, such as manufacturer warranties or other documentation, demonstrating that the weatherproof covering over separated solids are installed, used, and maintained in accordance with manufacturer recommendations and applicable standards listed in NRCS Field Office Technical Guide Code 313 or 367, or any other applicable standard approved by the APCO, ARB, and EPA. [District Rules 2201 and 4570]*

The following conditions were added for the proposed additional mitigation measures for compliance with this rule due to this proposed project under the solid manure handling permit:

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

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

N-5591-5-2 (Feed Storage and Handling):

- *{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 the feed lane fences within two hours of putting out the feed, or use feed troughs or other feeding structures designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]*

- *{Modified 4457} Permittee shall maintain an operating plan or 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 manufacturer's instructions for application of the additive. [District Rules 2201 and 4570]*

According to the District's inspection records, this facility has been operating in compliance with Rule 4570 requirements. Since the proposed modifications do not fundamentally alter the nature of the facility's operations, continued compliance with the requirements of this rule is expected.

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

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

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

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. Pending a successful NSR Public Noticing period, issue ATC permits N-5591-1-1, '-2-3, '-3-1, '-4-2, and '-5-2 subject to the permit conditions on the attached draft ATC permits in Appendix A.

X. Billing Information

Annual Permit Fees			
Permit Number	**Fee Schedule**	**Fee Description**	**Annual Fee**
N-5591-1-1	3020-06	Cow Milking Operation	$128
N-5591-2-3	3020-06	Cow Housing	$128
N-5591-3-1	3020-06	Liquid Manure Handling	$128
N-5591-4-2	3020-06	Solid Manure Handling	$128
N-5591-5-2	3020-06	Feed Storage and Handling	$128

IX. Appendixes

Appendix A: Draft Authority to Construct (ATC) Permits N-5591-1-1, '-2-3, '-3-1, '-4-2, and '-5-2
Appendix B: Current Permits to Operate (PTOs) N-5591-1-0, '-2-1, '-4-1, and '-5-1; and ATC Permit N-5591-3-2
Appendix C: Project Site Plan
Appendix D: Dairy Emissions Calculations
Appendix E: BACT Calculations
Appendix F: BACT Guidelines
Appendix G: Top-Down BACT Analysis
Appendix H: RMR and AAQA Summary
Appendix I: Anaerobic Treatment Lagoon Design Check Analysis
Appendix J: Quarterly Net Emissions Change (QNEC)

APPENDIX A

Draft Authority to Construct (ATC) Permits N-5591-1-1, '-2-3, '-3-1, '-4-2, and '-5-2

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: N-5591-1-1 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: JOHN F TOSTE DAIRY
MAILING ADDRESS: 785 SANTA FE GRADE
NEWMAN, CA 95360

LOCATION: 609 SANTA FE GRADE
NEWMAN, CA 95360

EQUIPMENT DESCRIPTION:
MODIFICATION OF 1,500 COW MILKING OPERATION WITH ONE 36 STALL PARABONE MILKING PARLOR TO INCREASE THE NUMBER OF MILK COWS TO 2,500 HEADS DUE TO A CHANGE IN HERD PROFILE AS AUTHORIZED BY ATC PERMIT N-5591-2-3

CONDITIONS

1. This Authority to Construct (ATC) permit shall be implemented concurrently with ATC permit N-5591-2-3. [District Rule 2201]
2. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
3. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
4. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

CONDITIONS CONTINUE ON NEXT PAGE

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

Samir Sheikh, Executive Director / APCO

Brian Clements, Director of Permit Services

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

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

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: N-5591-2-3 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: JOHN F TOSTE DAIRY
MAILING ADDRESS: 785 SANTA FE GRADE
NEWMAN, CA 95360

LOCATION: 609 SANTA FE GRADE
NEWMAN, CA 95360

EQUIPMENT DESCRIPTION:
MODIFICATION OF COW HOUSING - 1,500 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 1,950 MATURE COWS (MILK AND DRY); 2,700 SUPPORT STOCK (HEIFERS, CALVES, AND BULLS); AND FOUR FREESTALLS WITH FLUSH SYSTEM TO: INCREASE THE MAXIMUM NUMBER OF COWS TO 2,500 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 3,000 MATURE COWS (MILK AND DRY) AND 2,950 SUPPORT STOCK (HEIFERS, CALVES, AND BULLS); INSTALL TWO NEW FREESTALL BARNS (4 AND 5); REPLACE THREE EXISTING FREESTALL BARNS (2, 3, AND 4) WITH TWO NEW FREESTALL BARNS (2 AND 3), WHICH WILL BE OVER FIVE EXISTING OPEN CORRALS (PENS 1 THROUGH 6); REMOVE FIVE OPEN CORRALS (CANAL SCHOOL PENS 11 THROUGH 15) AND ONE SHADE BARN (SHADE BARN 6).

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

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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, 4102, 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, 4102, and 4570]
7. For Freestall Barns 2, 3, 4, and 5, the feedlanes and walkways shall be constructed of concrete. [District Rules 2201, 4102, and 4570]
8. Permittee shall flush, scrape or vacuum freestall lanes immediately prior to, immediately after or during each milking. [District Rules 2201, 4102, and 4570]
9. 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, 4102, and 4570]
10. For Freestall Barns 2, 3, 4, and 5, the permittee shall flush the feed lanes and walkways for the mature cows (milk and dry cows) at least four times per day and for the support stock (heifers) at least once per day, or scrape feed lanes and walkways for the mature cows with an automatic scraper (or equivalent) four times per day and for the support stock at least once per day. [District Rules 2201, 4102, and 4570]
11. For Freestall Barns 2, 3, 4, and 5, the permittee shall keep records or maintain an operating plan that requires the feed lanes and walkways for mature cows to be flushed or scraped at least four times per day and for support stock to be flushed or scraped at least once per day. [District Rules 2201, 4102, and 4570]
12. Permittee shall scrape exercise pen and corral surfaces every two weeks using a pull-type scraper during morning hours, except when prevented by wet conditions. [District Rules 2201 and 4102]
13. Permittee shall pave feedlanes for a width of at least 8 feet along the housing side of the feedlane fence for mature cows and at least 6 feet along the housing side of the feedlane fence for heifers. [District Rules 2201, 4102, and 4570]
14. 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]
15. 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]
16. Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rules 2201 and 4570]
17. Permittee shall maintain records demonstrating that water pipes and troughs are inspected and leaks are repaired at least once every seven (7) days. [District Rules 2201 and 4570]
18. Permittee shall clean manure from corrals at least four (4) times per year with at least sixty (60) days between each cleaning, or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]
19. Permittee shall demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning or demonstrate that corrals are cleaned at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]
20. Permittee shall clean concreted lanes such that the depth of manure does not exceed twelve (12) inches at any point or time. [District Rules 2201 and 4570]

CONDITIONS CONTINUE ON NEXT PAGE

21. 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]

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. 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]

25. 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]

26. 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]

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

28. Permittee shall knockdown fence line manure build-up prior to it exceeding a height of twelve (12) inches at any time or point. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rules 2201, 4102, and 4570]

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

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: N-5591-3-1 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: JOHN F TOSTE DAIRY
MAILING ADDRESS: 785 SANTA FE GRADE
NEWMAN, CA 95360

LOCATION: 609 SANTA FE GRADE
NEWMAN, CA 95360

EQUIPMENT DESCRIPTION:
MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF TWO STORAGE PONDS AND MECHANICAL SEPARATOR(S) TO INSTALL AN ANAEROBIC TREATMENT LAGOON (STORAGE VOLUME OF 2,192,047 CU.FT.) AND FOR AN INCREASE IN LIQUID MANURE PROCESSING DUE TO A CHANGE IN HERD PROFILE AS AUTHORIZED BY ATC PERMIT N-5591-2-3.

CONDITIONS

1. Authority to Construct (ATC) permit N-5591-3-2 shall be implemented prior to or concurrently with this ATC permit. [District Rule 2201]
2. This Authority to Construct (ATC) permit shall be implemented concurrently with ATC permit N-5591-2-3. [District Rule 2201]
3. {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]
4. {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]
5. {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

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6. {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]
7. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4102]
8. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4102]
9. {4538} Permittee shall remove solids with a solid separator system, prior to the manure entering the lagoon. [District Rule 4570]
10. All liquid manure shall be treated in an anaerobic treatment lagoon system that is designed and operated according to the Natural Resources Conservative Service (NRCS) Field Office Technical Guide No. 359. [District Rules 2201, 4102, and 4570]
11. Any liquid manure applied to land shall have been treated in an anaerobic treatment lagoon system that is designed and operated according to the NRCS Field Office Technical Guide No. 359. [District Rules 2201, 4102, and 4570]
12. Permittee shall maintain design specifications and calculations, including minimum treatment volume (MTV) and hydraulic retention time (HRT) calculations, demonstrating that the anaerobic treatment lagoon system meets the requirements listed in the NRCS Field Office Technical Guide No. 359. [District Rules 2201, 4102, and 4570]
13. Permittee shall maintain records to demonstrate that liquid manure applied to land has been treated in the anaerobic treatment lagoon system. [District Rules 2201, 4102, and 4570]
14. {4550} Permittee shall not allow liquid manure to stand in the fields for more than twenty-four (24) hours after irrigation. [District Rule 4570]
15. {4551} Permittee shall maintain records to demonstrate liquid manure did not stand in the fields for more than twenty-four (24) hours after irrigation. [District Rule 4570]
16. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201, 4102 and 4570]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: N-5591-4-2 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: JOHN F TOSTE DAIRY
MAILING ADDRESS: 785 SANTA FE GRADE
NEWMAN, CA 95360

LOCATION: 609 SANTA FE GRADE
NEWMAN, CA 95360

EQUIPMENT DESCRIPTION:
MODIFICATION OF SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES, MANURE TRANSPORTED TO FIELDS; SOLID MANURE APPLICATION TO LAND AND HAULED OFFSITE FOR AN INCREASE IN SOLID MANURE PROCESSING DUE TO A CHANGE IN HERD PROFILE AS AUTHORIZED BY ATC PERMIT N-5591-2-3.

CONDITIONS

1. This Authority to Construct (ATC) permit shall be implemented concurrently with ATC permit N-5591-2-3. [District Rule 2201]
2. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
3. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
4. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

CONDITIONS CONTINUE ON NEXT PAGE

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

Samir Sheikh, Executive Director / APCO

Brian Clements, Director of Permit Services

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

5. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
6. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
7. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
8. {4529} Within seventy two (72) hours of removal of separated solids from the drying process, permittee shall either 1) remove separated solids from the facility, or 2) cover separated solids outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed twenty-four (24) hours per event. [District Rule 4570]
9. {4530} Permittee shall keep records of dates when separated solids are removed from the facility or permittee shall maintain records to demonstrate that separated solids piles outside the pens are covered with a weatherproof covering from October through May. [District Rule 4570]
10. {4531} Permittee shall maintain records, such as manufacturer warranties or other documentation, demonstrating that the weatherproof covering over separated solids are installed, used, and maintained in accordance with manufacturer recommendations and applicable standards listed in NRCS Field Office Technical Guide Code 313 or 367, or any other applicable standard approved by the APCO, ARB, and EPA. [District Rule 4570]
11. Solid manure shall be incorporated into the soil within two hours of land application. [District Rules 2201 and 4570]
12. Permittee shall maintain records to demonstrate that solid manure has been incorporated into the soil within two hours of land application. [District Rules 2201 and 4570]
13. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: N-5591-5-2 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: JOHN F TOSTE DAIRY
MAILING ADDRESS: 785 SANTA FE GRADE
NEWMAN, CA 95360

LOCATION: 609 SANTA FE GRADE
NEWMAN, CA 95360

EQUIPMENT DESCRIPTION:
MODIFICATION OF FEED STORAGE AND HANDLING CONSISTING OF SILAGE PILE(S) FOR AN INCREASE IN TOTAL MIXED RATIONS DUE TO A CHANGE IN HERD PROFILE AS AUTHORIZED BY ATC PERMIT N-5591-2-3.

CONDITIONS

1. This Authority to Construct (ATC) permit shall be implemented concurrently with ATC permit N-5591-2-3. [District Rule 2201]
2. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
3. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
4. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

CONDITIONS CONTINUE ON NEXT PAGE

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

Samir Sheikh, Executive Director / APCO

Brian Clements, Director of Permit Services
N-5591-5-2 : Feb 17 2021 10:44AM -- CHANK : 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 feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
7. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
8. Permittee shall push feed so that it is within three feet of feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]
9. Permittee shall maintain an operating plan or record that requires feed to be pushed within three feet of feedlane fence within two hours of putting out the feed, or use of a feed trough or other structure designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]
10. Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
11. Permittee shall maintain an operating plan or record of when feeding of total mixed rations began within two hours of grinding and mixing rations. [Districts Rule 2201 and 4570]
12. Permittee shall store grain in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]
13. Permittee shall maintain records demonstrating grain is/was stored in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]
14. Permittee shall 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]
15. 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]
16. For bagged silage/feedstuff, permittee shall utilize a sealed feed storage system (e.g., ag bag). [District Rules 2201 and 4570]
17. Permittee shall cover all silage piles, except for the area where feed is being removed from the pile, with a plastic tarp that is at least five (5) mils (0.005 inches) thick, multiple plastic tarps with a cumulative thickness of at least 5 mils (0.005 inches), or an oxygen barrier film covered with a UV resistant material. Silage piles shall be covered within seventy-two (72) hours of last delivery of material to the pile. Sheets of material used to cover silage shall overlap so that silage is not exposed where the sheets meet. [District Rules 2201 and 4570]
18. Permittee shall maintain records of the thickness and type of cover used to cover each silage pile. Permittee shall also maintain records of the date of the last delivery of material to each silage pile and the date each pile is covered. [District Rules 2201 and 4570]

CONDITIONS CONTINUE ON NEXT PAGE

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

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

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

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

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

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

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

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

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

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

CONDITIONS CONTINUE ON NEXT PAGE

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

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

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

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

APPENDIX B

Current Permits to Operate (PTOs) N-5591-1-0, '-2-1, '-4-1, and '-5-1; and ATC Permit N-5591-3-2

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: N-5591-1-0 **EXPIRATION DATE:** 12/31/2022

EQUIPMENT DESCRIPTION:
1,500 COW MILKING OPERATION WITH ONE 36 STALL PARABONE MILKING PARLOR

PERMIT UNIT REQUIREMENTS

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

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: N-5591-2-2 **EXPIRATION DATE:** 12/31/2022

EQUIPMENT DESCRIPTION:
COW HOUSING - 1,500 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 1,950 MATURE COWS (MILK AND DRY); 2,700 SUPPORT STOCK (HEIFERS, CALVES, AND BULLS); AND FREESTALLS 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, scrape or vacuum freestall lanes immediately prior to, immediately after or during each milking. [District Rule 4570]
7. Permittee shall maintain records sufficient to demonstrate that freestall lanes are flushed, scraped or vacuumed immediately prior to, immediately after or during each milking. [District Rule 4570]
8. Permittee shall 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 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

13. Permittee shall demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning or demonstrate that corrals are cleaned at least once between April and July and at least once between September and December. [District Rule 4570]
14. Permittee shall implement at least one of the following corral mitigation measures: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 square feet or less and shall slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 square feet per animal; 2) maintain corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface except during periods of rainy weather. [District Rule 4570]
15. Permittee shall either 1) maintain sufficient records to demonstrate that corrals are maintained to ensure proper drainage preventing water from standing for more than forty-eight hours or 2) maintain records of dates pens are groomed (i.e., harrowed, raked, or scraped, etc.). [District Rule 4570]
16. Permittee shall clean concreted lanes such that the depth of manure does not exceed twelve (12) inches at any point or time. [District Rule 4570]
17. Permittee shall measure and document the depth of manure on the concrete lanes at least once every ninety (90) days. [District Rule 4570]
18. Shade structures shall be installed in any of the following ways: 1) constructed with a light permeable roofing material; 2) uphill of any slope in the corral; 3) installed so that the structure has a North/South orientation. OR Permittee shall clean manure from under corral shades at least once every fourteen (14) days, when weather permits access into the corral. [District Rule 4570]
19. If permittee has selected to comply using shades constructed with a light permeable roofing material, then permittee shall maintain records, such as design specifications, demonstrating that the shade structures are equipped with such roofing material or if Permittee has selected to comply by cleaning the manure from under the corral shades, then Permittee shall maintain records demonstrating that manure is cleaned from under the shades at least once every fourteen (14) days, as long as weather permits access to corrals. [District Rule 4570]
20. Permittee shall 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. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: N-5591-3-0 **EXPIRATION DATE:** 12/31/2022

EQUIPMENT DESCRIPTION:
LIQUID MANURE HANDLING SYSTEM CONSISTING OF TWO STORAGE PONDS

PERMIT UNIT REQUIREMENTS

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

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: N-5591-4-1 **EXPIRATION DATE:** 12/31/2022

EQUIPMENT DESCRIPTION:
SOLID MANURE HANDLING CONSISTING OF TRANSPORTED TO FIELDS; SOLID MANURE APPLICATION TO LAND AND HAULED OFFSITE

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]
4. If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
5. Within seventy two (72) hours of removal of separated solids from the drying process, permittee shall either 1) remove separated solids from the facility, or 2) cover separated solids outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed twenty-four (24) hours per event. [District Rule 4570]
6. Permittee shall keep records of dates when separated solids are removed from the facility or permittee shall maintain records to demonstrate that separated solids piles outside the pens are covered with a weatherproof covering from October through May. [District Rule 4570]
7. Permittee shall maintain records, such as manufacturer warranties or other documentation, demonstrating that the weatherproof covering over separated solids are installed, used, and maintained in accordance with manufacturer recommendations and applicable standards listed in NRCS Field Office Technical Guide Code 313 or 367, or any other applicable standard approved by the APCO, ARB, and EPA. [District Rule 4570]
8. Permittee shall incorporate all solid manure within seventy-two (72) hours of land application. [District Rule 4570]
9. Permittee shall maintain records to demonstrate that all solid manure has been incorporated within seventy-two (72) hours of land application. [District Rule 4570]
10. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: N-5591-5-1 **EXPIRATION DATE:** 12/31/2022

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

PERMIT UNIT REQUIREMENTS

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

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

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

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

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

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

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

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

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

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

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING

AUTHORITY TO CONSTRUCT

PERMIT NO: N-5591-3-2

ISSUANCE DATE: 03/20/2020

LEGAL OWNER OR OPERATOR: JOHN F TOSTE DAIRY
MAILING ADDRESS: 785 SANTA FE GRADE
NEWMAN, CA 95360

LOCATION: 609 SANTA FE GRADE
NEWMAN, CA 95360

EQUIPMENT DESCRIPTION:
MODIFICATION TO INSTALL A MECHANICAL SEPARATOR(S). POST PROJECT DESCRIPTION: LIQUID MANURE HANDLING SYSTEM CONSISTING OF TWO STORAGE PONDS AND MECHANICAL SEPARATOR(S)

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. 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]

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.

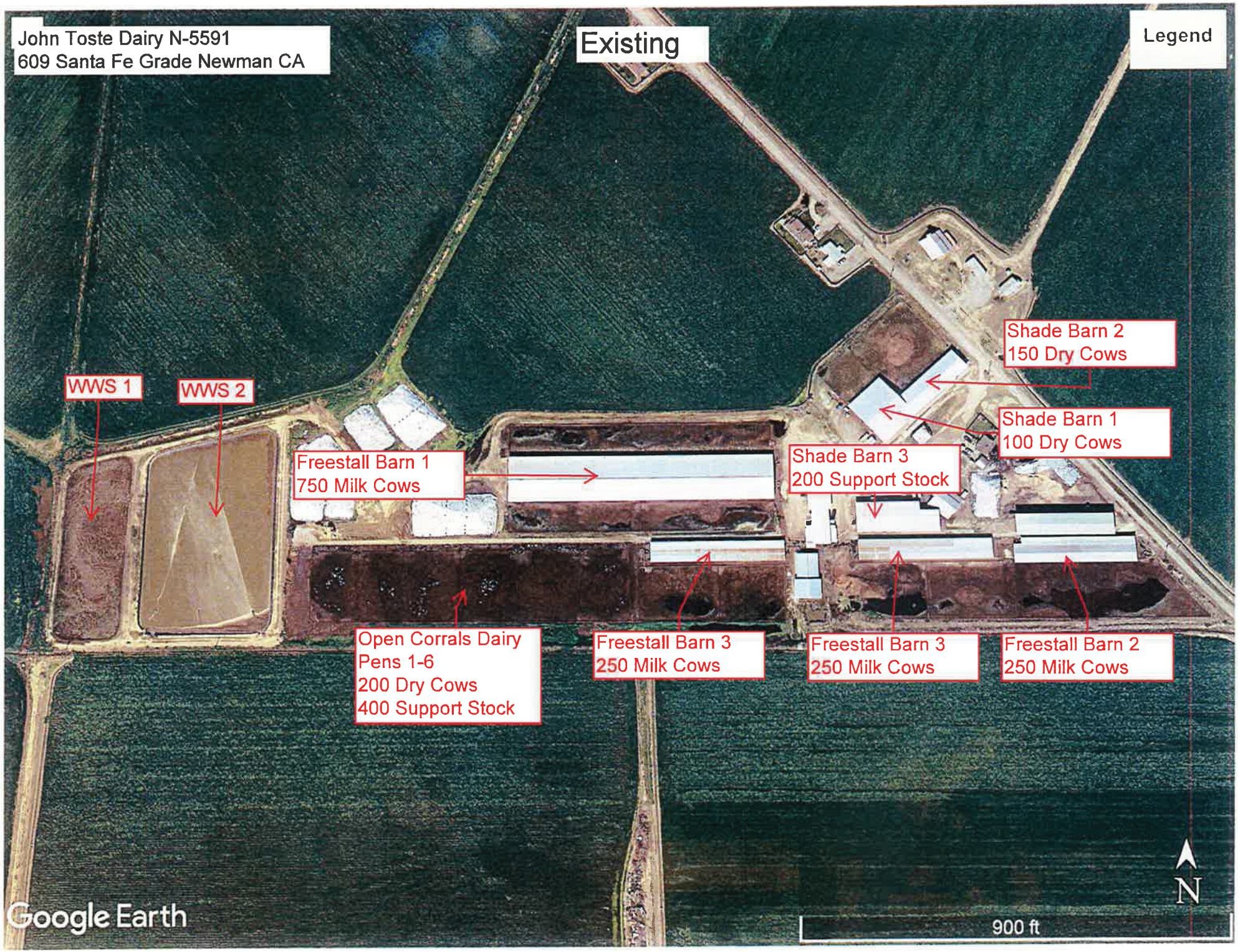
Samir Sheikh, Executive Director / APCO

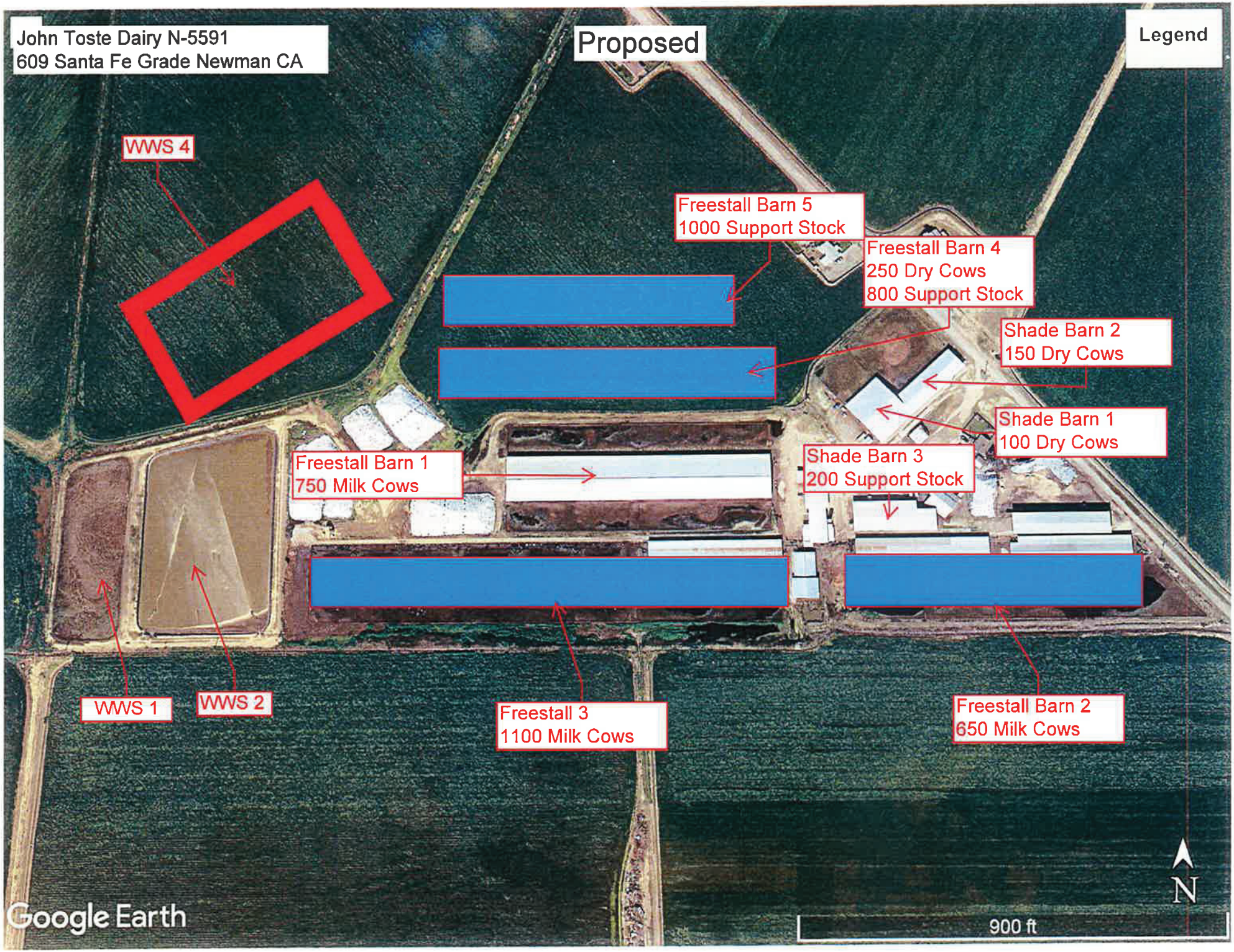
Arnaud Marjollet, Director of Permit Services

N-5591-3-2 Mar 20 2020 10:21AM – CRUZF Joint Inspection NOT Required

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]

APPENDIX C
Project Site Plan


John Toste Dairy N-5591
609 Santa Fe Grade Newman CA
Existing
Legend
WWS 1
WWS 2
Freestall Barn 1
750 Milk Cows
Shade Barn 2
150 Dry Cows
Shade Barn 1
100 Dry Cows
Shade Barn 3
200 Support Stock
Open Corrals Dairy
Pens 1-6
200 Dry Cows
400 Support Stock
Freestall Barn 3
250 Milk Cows
Freestall Barn 3
250 Milk Cows
Freestall Barn 2
250 Milk Cows
N
900 ft
Google Earth


John Toste Dairy N-5591
609 Santa Fe Grade Newman CA
Proposed
Legend
WWS 4
Freestall Barn 5
1000 Support Stock
Freestall Barn 4
250 Dry Cows
800 Support Stock
Shade Barn 2
150 Dry Cows
Shade Barn 1
100 Dry Cows
Shade Barn 3
200 Support Stock
Freestall Barn 1
750 Milk Cows
WWS 1
WWS 2
Freestall 3
1100 Milk Cows
Freestall Barn 2
650 Milk Cows
N
900 ft
Google Earth

APPENDIX D
Dairy Emissions Calculations

Rev. January 6, 2020

Pre-Project Facility Information

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

Pre-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals
Milk Cows	1,500				1,500
Dry Cows			450		450
Support Stock (Heifers, Calves, and Bulls)			600	2,100	2,700
Large Heifers					0
Medium Heifers					0
Small Heifers					0
Bulls					0

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

Total Herd Summary	
Total Milk Cows	1,500
Total Mature Cows	1,950
Support Stock (Heifers, Calves, and Bulls)	2,700
Total Calves	0
Total Dairy Head	4,650

Pre-Project Silage Information

Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	1	24	100
Alfalfa	1	12	60
Wheat	1	20	135

Post-Project Facility Information

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

Post-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals
Milk Cows	2,500				2,500
Dry Cows	250		250		500
Support Stock (Heifers, Calves, and Bulls)	1,800		200	950	2,950
Large Heifers					0
Medium Heifers					0
Small Heifers					0
Bulls					0

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

Total Herd Summary	
Total Milk Cows	2,500
Total Mature Cows	3,000
Support Stock (Heifers, Calves, and Bulls)	2,950
Total Calves	0
Total Dairy Head	5,950

Post-Project Silage Information

Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	1	24	100
Alfalfa	1	12	60
Wheat	1	20	135

VOC Mitigation Measures and Control Efficiencies

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

Cow Housing				
Measure Proposed?		**Mitigation Measure(s) per Emissions Point**	**VOC Control Efficiency (%)**	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Enteric Emissions Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%
		Total Control Efficiency	10%	10%
		Corrals/Pens Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%
☑	☑	Inspect water pipes and troughs and repair leaks at least once every seven days. Note: If selected for dairies > 999 milk cows, CE is already included in EF.	0%	0%
☑	☑	**Dairies:** Clean manure from corrals at least four times per year with at least 60 days between cleaning, or clean corrals at least once between April and July and at least once between September and December. Note: If selected for dairies > 999 milk cows, CE is already included in EF. Note: No additional control given for increased cleaning frequency (e.g. BACT requirement). **Heifer/Calf Ranches:** Scrape corrals twice a year with at least 90 days between cleanings, excluding in-corral mounds. Note: No additional control given for increased cleaning frequency (e.g. BACT requirement).	0%	0%
☑	☑	Scrape, vacuum, or flush concrete lanes in corrals at least once every day for mature cows and every seven days for support stock, or clean concrete lanes such that the depth of manure does not exceed 12 inches at any point or time. Note: No additional control given for increased cleaning frequency (e.g. BACT requirement).	10%	10%
☑	☑	Implement one of the following: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 sq ft or less and slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 sq ft; 2) maintain corrals to ensure proper drainage preventing water from standing more than 48 hrs; 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface. Note: If selected for dairies > 999 milk cows, CE already included in EF.	0%	0%
☐	☐	Install shade structures such that they are constructed with a light permeable roofing material. Note: If selected for dairies > 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.	5%	5%
☑	☑	Install all shade structures uphill of any slope in the corral. Note: If selected for dairies > 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.		
☐	☐	Clean manure from under corral shades at least once every 14 days, when weather permits access into corral. Note: If selected for dairies > 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.		
☐	☐	Install shade structure so that the structure has a North/South orientation. Note: If selected for dairies > 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.		
☑	☑	Manage corrals such that the manure depth in the corral does not exceed 12 inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. The manure facility must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF.	0%	0%
☐	☑	Knockdown fence line manure build-up prior to it exceeding a height of 12 inches at any time or point. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. The facility must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible.	0%	10%
☐	☐	Use lime or a similar absorbent material in the corral according to the manufacturer's recommendation to minimize moisture in the corrals.	0%	0%
☐	☐	Apply thymol to the corral soil in accordance with the manufacturer's recommendation.	0%	0%
		Total Control Efficiency	23.05%	30.75%
		Bedding Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%

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

Liquid Manure Handling				
Measure Proposed?		**Mitigation Measure(s) per Emissions Point**	**VOC Control Efficiency (%)**	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Lagoons/Storage Ponds Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%
☐	☐	Use phototropic lagoon	0%	0%
☐	☑	Use an anaerobic treatment lagoon designed according to NRCS Guideline No. 359, or aerobic treatment lagoon, or mechanically aerated lagoon, or covered lagoon digester vented to a control device with minimum 95% control	0%	40%
☑	☑	Remove solids from the waste system with a solid separator system, prior to the waste entering the lagoon. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF.	0%	0%
☐	☐	Maintain lagoon pH between 6.5 and 7.5	0%	0%
		Total Control Efficiency	10.00%	46.00%
		Liquid Manure Land Application Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%
☐	☑	Only apply liquid manure that has been treated with an anaerobic or aerobic treatment lagoon, aerobic lagoon, or digester system	0%	40%
☐	☐	Allow liquid manure to stand in the fields for no more than 24 hours after irrigation. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF.	0%	0%
☐	☐	Apply liquid/slurry manure via injection with drag hose or similar apparatus	0%	0%
		Total Control Efficiency	10.00%	46.00%

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

Silage and TMR				
Measure Proposed?		**Mitigation Measure(s) per Emissions Point**	**VOC Control Efficiency (%)**	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Corn/Alfalfa/Wheat Silage Mitigations		
		1. Utilize a sealed feed storage system (e.g. Ag-Bag) for bagged silage, or		

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

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

		TMR Mitigations		
☑	☑	**(D)** Push feed so that it is within 3 feet of feedlane fence within 2 hrs of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the cows.	10%	10%
☑	☑	**(D)** Begin feeding total mixed rations within 2 hrs of grinding and mixing rations. Note: If selected for dairies > 999 milk cows, control efficiency already included in EF.	0%	0%
☑	☑	Feed steam-flaked, dry rolled, cracked or ground corn or other ground cereal grains.	10%	10%
☐	☑	Remove uneaten wet feed from feed bunks within 24 hrs after then end of a rain event.	0%	10%
☐	☐	**(D)** For total mixed rations that contain at least 30% by weight of silage, feed animals total mixed rations that contain at least 45% moisture.	0%	0%
☑	☑	Feed according to NRC guidelines. Note: If selected for dairies, control efficiency already included in EF.	0%	0%
		Total Control Efficiency	19.00%	27.10%

Ammonia Mitigation Measures and Control Efficiencies

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

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

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

Solid Manure Handling				
Measure Proposed?		**Mitigation Measure(s) per Emissions Point**	**NH3 Control Efficiency (%)**	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Solid Manure Land Application Mitigations		
☑	☑	Feed according to NRC guidelines	28%	28%
☐	☐	Incorporate all solid manure within 72 hours of land application. **AND** Only apply solid manure that has been treated with an anaerobic treatment lagoon, aerobic lagoon or digester system. **AND** Apply no solid manure with a moisture content of more than 50%	0%	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	0.37	0.37	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
		Milking Parlor Floor	0.04	0.03	0.03	0.03	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
		Total	**0.47**	**0.44**	**0.40**	**0.40**	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
	NH3	**Total**	**0.19**	**0.19**	**0.14**	**0.14**	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
Cow Housing	**VOC**	Enteric Emissions in Cow Housing	3.89	3.69	3.32	3.32	2.33	2.23	2.01	2.01	1.81	1.71	1.54	1.54	1.23	1.17	1.05	1.05	0.69	0.65	0.58	0.58	0.32	0.31	0.28	0.28	1.10	1.04	0.94	0.94
		Corrals/Pens	10.00	6.60	5.08	4.57	5.40	3.59	2.76	2.49	4.20	2.76	2.12	1.91	2.85	1.88	1.45	1.30	1.60	1.04	0.80	0.72	0.75	0.50	0.39	0.35	2.55	1.67	1.29	1.16
		Bedding	1.05	1.00	0.81	0.81	0.57	0.54	0.44	0.44	0.44	0.42	0.34	0.34	0.30	0.28	0.23	0.23	0.17	0.16	0.13	0.13	0.08	0.08	0.06	0.06	0.27	0.25	0.20	0.20
		Lanes	0.84	0.80	0.65	0.65	0.45	0.44	0.35	0.35	0.35	0.33	0.27	0.27	0.24	0.23	0.18	0.18	0.13	0.13	0.10	0.10	0.06	0.06	0.05	0.05	0.21	0.20	0.16	0.16
		Total	**15.78**	**12.09**	**9.86**	**9.35**	**8.75**	**6.80**	**5.57**	**5.29**	**6.81**	**5.22**	**4.27**	**4.06**	**4.62**	**3.56**	**2.91**	**2.77**	**2.59**	**1.98**	**1.62**	**1.54**	**1.22**	**0.95**	**0.78**	**0.74**	**4.13**	**3.16**	**2.59**	**2.46**
	NH3	Enteric Emissions in Cow Housing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Corrals/Pens	41.90	41.90	15.08	15.08	21.20	21.20	7.63	7.63	11.00	11.00	3.96	3.96	7.90	7.90	2.84	2.84	6.00	6.00	2.16	2.16	1.80	1.80	0.65	0.65	15.30	15.30	5.51	5.51
		Bedding	6.30	6.30	2.37	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
		Lanes	5.10	5.10	3.67	3.67	2.60	2.60	1.87	1.87	1.30	1.30	0.94	0.94	1.00	1.00	0.72	0.72	0.70	0.70	0.50	0.50	0.20	0.20	0.14	0.14	1.90	1.90	1.37	1.37
		Total	**53.30**	**53.30**	**21.13**	**21.13**	**27.00**	**27.00**	**10.71**	**10.71**	**14.00**	**14.00**	**5.54**	**5.54**	**10.10**	**10.10**	**4.02**	**4.02**	**7.60**	**7.60**	**3.00**	**3.00**	**2.30**	**2.30**	**0.90**	**0.90**	**19.50**	**19.50**	**7.74**	**7.74**
Liquid Manure Handling	**VOC**	Lagoons/Storage Ponds	1.52	1.30	1.17	0.70	0.82	0.71	0.64	0.38	0.64	0.54	0.49	0.29	0.43	0.37	0.33	0.20	0.24	0.21	0.19	0.11	0.11	0.10	0.09	0.05	0.40	0.33	0.30	0.18
		Liquid Manure Land Application	1.64	1.40	1.26	0.76	0.89	0.76	0.69	0.41	0.69	0.58	0.53	0.32	0.47	0.40	0.36	0.22	0.26	0.22	0.20	0.12	0.12	0.11	0.10	0.06	0.42	0.35	0.32	0.19
		Total	**3.16**	**2.70**	**2.43**	**1.46**	**1.71**	**1.47**	**1.33**	**0.79**	**1.33**	**1.13**	**1.02**	**0.61**	**0.90**	**0.77**	**0.69**	**0.42**	**0.51**	**0.43**	**0.38**	**0.23**	**0.24**	**0.21**	**0.18**	**0.11**	**0.82**	**0.68**	**0.61**	**0.37**
	NH3	Lagoons/Storage Ponds	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
		Liquid Manure Land Application	8.90	8.90	6.41	3.72	4.50	4.50	3.24	1.88	2.30	2.30	1.66	0.96	1.70	1.70	1.22	0.71	1.30	1.30	0.94	0.54	0.37	0.37	0.27	0.15	3.23	3.23	2.33	1.35
		Total	**17.10**	**17.10**	**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**	**0.32**	**0.20**	**6.23**	**6.23**	**2.76**	**1.78**
Solid Manure Handling	**VOC**	Solid Manure Storage	0.16	0.15	0.12	0.12	0.09	0.08	0.07	0.07	0.07	0.06	0.05	0.05	0.05	0.04	0.03	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.04	0.04	0.03	0.03
		Separated Solids Piles	0.06	0.06	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02
		Solid Manure Land Application	0.39	0.33	0.30	0.30	0.21	0.18	0.16	0.16	0.16	0.14	0.12	0.12	0.11	0.09	0.08	0.08	0.06	0.05	0.05	0.05	0.03	0.03	0.02	0.02	0.10	0.08	0.07	0.07
		Total	**0.61**	**0.54**	**0.47**	**0.47**	**0.33**	**0.29**	**0.25**	**0.25**	**0.26**	**0.23**	**0.20**	**0.20**	**0.17**	**0.15**	**0.13**	**0.13**	**0.10**	**0.09**	**0.07**	**0.07**	**0.05**	**0.04**	**0.04**	**0.04**	**0.16**	**0.14**	**0.12**	**0.12**
	NH3	Solid Manure Storage	0.95	0.95	0.95	0.95	0.48	0.48	0.48	0.48	0.25	0.25	0.25	0.25	0.18	0.18	0.18	0.18	0.13	0.13	0.13	0.13	0.04	0.04	0.04	0.04	0.35	0.35	0.35	0.35
		Separated Solids Piles	0.38	0.38	0.38	0.38	0.19	0.19	0.19	0.19	0.10	0.10	0.10	0.10	0.07	0.07	0.07	0.07	0.05	0.05	0.05	0.05	0.02	0.02	0.02	0.02	0.14	0.14	0.14	0.14
		Solid Manure Land Application	2.09	2.09	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/m^2-min)					
		Silage Type	Uncontrolled	EF1	EF2
Feed Storage and Handling	VOC	Corn Silage	34,681	21,155	21,155
		Alfalfa Silage	17,458	10,649	10,649
		Wheat Silage	43,844	26,745	26,745
		TMR	13,056	10,575	9,518

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.

Dairy Emission Factors

lb/hd-yr Dairy Emissions Factors for Jersey Cows

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

			Milk Cows				Dry Cows				Large Heifers (15 to 24 months)				Medium Heifers (7 to 14 months)				Small Heifers (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	0.31	0.29	0.26	0.26	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
		Milking Parlor Floor	0.03	0.02	0.02	0.02	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
		Total	**0.34**	**0.31**	**0.28**	**0.28**	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
	NH3	**Total**	**0.13**	**0.13**	**0.10**	**0.10**	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
Cow Housing	**VOC**	Enteric Emissions in Cow Housing	2.76	2.62	2.36	2.36	1.66	1.58	1.43	1.43	1.29	1.22	1.09	1.09	0.87	0.83	0.75	0.75	0.49	0.46	0.41	0.41	0.23	0.22	0.20	0.20	0.78	0.74	0.66	0.66
		Corrals/Pens	7.10	4.69	3.61	3.25	3.83	2.55	1.96	1.77	2.98	1.96	1.51	1.36	2.02	1.33	1.03	0.92	1.14	0.74	0.57	0.51	0.53	0.36	0.27	0.25	1.81	1.19	0.91	0.82
		Bedding	0.75	0.71	0.58	0.58	0.40	0.39	0.31	0.31	0.31	0.30	0.24	0.24	0.21	0.20	0.16	0.16	0.12	0.11	0.09	0.09	0.06	0.05	0.04	0.04	0.19	0.18	0.14	0.14
		Lanes	0.60	0.57	0.46	0.46	0.32	0.31	0.25	0.25	0.25	0.24	0.19	0.19	0.17	0.16	0.13	0.13	0.10	0.09	0.07	0.07	0.04	0.04	0.03	0.03	0.15	0.14	0.12	0.12
		Total	**11.20**	**8.58**	**7.00**	**6.64**	**6.21**	**4.83**	**3.95**	**3.76**	**4.83**	**3.71**	**3.03**	**2.88**	**3.28**	**2.53**	**2.07**	**1.97**	**1.84**	**1.40**	**1.15**	**1.09**	**0.86**	**0.67**	**0.55**	**0.52**	**2.93**	**2.24**	**1.84**	**1.74**
	NH3	Enteric Emissions in Cow Housing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Corrals/Pens	29.75	29.75	10.71	10.71	15.05	15.05	5.42	5.42	7.81	7.81	2.81	2.81	5.61	5.61	2.02	2.02	4.26	4.26	1.53	1.53	1.28	1.28	0.46	0.46	10.86	10.86	3.91	3.91
		Bedding	4.47	4.47	1.68	1.68	2.27	2.27	0.86	0.86	1.21	1.21	0.45	0.45	0.85	0.85	0.32	0.32	0.64	0.64	0.24	0.24	0.21	0.21	0.08	0.08	1.63	1.63	0.61	0.61
		Lanes	3.62	3.62	2.61	2.61	1.85	1.85	1.33	1.33	0.92	0.92	0.66	0.66	0.71	0.71	0.51	0.51	0.50	0.50	0.36	0.36	0.14	0.14	0.10	0.10	1.35	1.35	0.97	0.97
		Total	**37.84**	**37.84**	**15.00**	**15.00**	**19.17**	**19.17**	**7.60**	**7.60**	**9.94**	**9.94**	**3.93**	**3.93**	**7.17**	**7.17**	**2.85**	**2.85**	**5.40**	**5.40**	**2.13**	**2.13**	**1.63**	**1.63**	**0.64**	**0.64**	**13.85**	**13.85**	**5.50**	**5.50**
Liquid Manure Handling	**VOC**	Lagoons/Storage Ponds	1.08	0.92	0.83	0.50	0.58	0.50	0.45	0.27	0.45	0.39	0.35	0.21	0.31	0.26	0.24	0.14	0.17	0.15	0.13	0.08	0.08	0.07	0.06	0.04	0.28	0.23	0.21	0.13
		Liquid Manure Land Application	1.16	0.99	0.89	0.54	0.63	0.54	0.49	0.29	0.49	0.42	0.37	0.22	0.33	0.28	0.25	0.15	0.19	0.16	0.14	0.08	0.09	0.08	0.07	0.04	0.30	0.25	0.22	0.13
		Total	**2.24**	**1.92**	**1.72**	**1.04**	**1.21**	**1.04**	**0.94**	**0.56**	**0.94**	**0.80**	**0.72**	**0.43**	**0.64**	**0.55**	**0.49**	**0.29**	**0.36**	**0.30**	**0.27**	**0.16**	**0.17**	**0.15**	**0.13**	**0.08**	**0.58**	**0.48**	**0.43**	**0.26**
	NH3	Lagoons/Storage Ponds	5.82	5.82	0.84	0.84	2.98	2.98	0.43	0.43	1.56	1.56	0.22	0.22	1.07	1.07	0.15	0.15	0.85	0.85	0.12	0.12	0.25	0.25	0.04	0.04	2.13	2.13	0.31	0.31
		Liquid Manure Land Application	6.32	6.32	4.55	2.64	3.20	3.20	2.30	1.33	1.63	1.63	1.18	0.68	1.21	1.21	0.87	0.50	0.92	0.92	0.66	0.39	0.26	0.26	0.19	0.11	2.29	2.29	1.65	0.96
		Total	**12.14**	**12.14**	**5.39**	**3.48**	**6.18**	**6.18**	**2.73**	**1.76**	**3.20**	**3.20**	**1.40**	**0.91**	**2.27**	**2.27**	**1.02**	**0.66**	**1.78**	**1.78**	**0.79**	**0.51**	**0.51**	**0.51**	**0.22**	**0.15**	**4.42**	**4.42**	**1.96**	**1.26**
Solid Manure Handling	**VOC**	Solid Manure Storage	0.11	0.11	0.09	0.09	0.06	0.06	0.05	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.02	0.02
		Separated Solids Piles	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
		Solid Manure Land Application	0.28	0.23	0.21	0.21	0.15	0.13	0.11	0.11	0.12	0.10	0.09	0.09	0.08	0.07	0.06	0.06	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.07	0.06	0.05	0.05
		Total	**0.43**	**0.38**	**0.33**	**0.33**	**0.23**	**0.21**	**0.18**	**0.18**	**0.18**	**0.16**	**0.14**	**0.14**	**0.12**	**0.11**	**0.09**	**0.09**	**0.07**	**0.06**	**0.05**	**0.05**	**0.03**	**0.03**	**0.03**	**0.03**	**0.11**	**0.10**	**0.09**	**0.09**
	NH3	Solid Manure Storage	0.67	0.67	0.67	0.67	0.34	0.34	0.34	0.34	0.18	0.18	0.18	0.18	0.13	0.13	0.13	0.13	0.09	0.09	0.09	0.09	0.03	0.03	0.03	0.03	0.25	0.25	0.25	0.25
		Separated Solids Piles	0.27	0.27	0.27	0.27	0.13	0.13	0.13	0.13	0.07	0.07	0.07	0.07	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.10	0.10	0.10	0.10
		Solid Manure Land Application	1.48	1.48	1.07	1.07	0.75	0.75	0.54	0.54	0.39	0.39	0.28	0.28	0.28	0.28	0.20	0.20	0.21	0.21	0.15	0.15	0.06	0.06	0.05	0.05	0.54	0.54	0.39	0.39
		Total	**2.43**	**2.43**	**2.01**	**2.01**	**1.23**	**1.23**	**1.02**	**1.02**	**0.64**	**0.64**	**0.53**	**0.53**	**0.45**	**0.45**	**0.38**	**0.38**	**0.34**	**0.34**	**0.28**	**0.28**	**0.11**	**0.11**	**0.09**	**0.09**	**0.89**	**0.89**	**0.74**	**0.74**

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

		Silage Type	Uncontrolled	EF1	EF2
Feed Storage and Handling	**VOC**	Corn Silage	34,681	21,155	21,155
		Alfalfa Silage	17,458	10,649	10,649
		Wheat Silage	43,844	26,745	26,745
		TMR	13,056	10,575	9,518

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.

PM10 Mitigation Measures and Control Efficiencies

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

Pre-Project PM10 Mitigation Measures

Pre-Project PM10 Mitigation Measures

	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows in Each Housing Structure(s)	Maximum Design Capacity of Each Structure	# of Combined Housing Structures in row	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk
1	Freestall Barn 1	freestall	milk cows	750	750	1	☐	☑	☐	☑	☑	☐	☑	☐	☐
2	Freestall Barn 2 & 3	freestall	milk cows	250	250	2	☐	☑	☑	☐	☐	☑	☑	☐	☑
3	Freestall Barn 4	freestall	milk cows	250	250	1	☐	☐	☐	☐	☐	☐	☐	☐	☐
4	Preston Pens 7-10	open corral	support stock	700	700	1	☐	☐	☑	☑	☑	☑	☑	☑	☑
5	Dairy Shade Barn 1	saudi style barn	dry cows	100	100	1	☐	☐	☐	☐	☐	☑	☐	☑	☐
6	Dairy Shade Barn 2	saudi style barn	dry cows	150	150	1	☐	☐	☐	☐	☐	☐	☐	☐	☐
7	Dairy Shade Barn 3	saudi style barn	support stock	200	200	1	☐	☐	☐	☐	☐	☑	☐	☐	☐
8	Preston Shade Barn 4	saudi style barn	support stock	50	50	1	☐	☐	☑	☐	☐	☐	☐	☐	☑
9	Preston Shade Barn 5	loafing barn	support stock	200	200	1	☑	☑	☐	☐	☐	☑	☑	☐	☐
10	Dairy Pens 1-2	open corral	dry cows	200	200	1	☐	☐	☐	☑	☑	☐	☐	☑	☐
11	Dairy Pens 3-6	open corral	support stock	400	400	1	☐	☐	☑	☐	☑	☑	☑	☐	☐
12	Canal School Pens 11-15	open corral	support stock	800	800	1	☑	☐	☐	☐	☐	☐	☐	☐	☐
13	Canal School Shade Barn 6	loafing barn	support stock	350	350	1	☐	☐	☐	☐	☐	☑	☑	☐	☑
			Pre-Project Total # of Cows	4,650											

	Pre-Project PM10 Control Efficiencies and Emission Factors															
	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows in Each Housing Structure(s)	Maximum Design Capacity of Each Structure	Uncontrolled EF (lb/hd-yr)	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk	Controlled EF (lb/hd-yr)
1	Freestall Barn 1	freestall	milk cows	750	750	1.370										1.37
2	Freestall Barn 2 & 3	freestall	milk cows	250	250	1.370										1.37
3	Freestall Barn 4	freestall	milk cows	250	250	1.370										1.37
4	Preston Pens 7-10	open corral	support stock	700	700	10.550										10.55
5	Dairy Shade Barn 1	saudi style barn	dry cows	100	100	1.370										1.37
6	Dairy Shade Barn 2	saudi style barn	dry cows	150	150	1.370										1.37
7	Dairy Shade Barn 3	saudi style barn	support stock	200	200	1.370										1.37
8	Preston Shade Barn 4	saudi style barn	support stock	50	50	1.370										1.37
9	Preston Shade Barn 5	loafing barn	support stock	200	200	5.280										5.28
10	Dairy Pens 1-2	open corral	dry cows	200	200	5.460										5.46
11	Dairy Pens 3-6	open corral	support stock	400	400	10.550										10.55
12	Canal School Pens 11-15	open corral	support stock	800	800	10.550										10.55
13	Canal School Shade Barn 6	loafing barn	support stock	350	350	5.280										5.28
			Pre-Project Total # of Cows	4,650												

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 Barn 1	freestall	milk cows	750	750	1	☐	☐	☐	☐	☐	☐	☐	☐	☐
2	Freestall Barn 2	freestall	milk cows	650	650	1	☐	☐	☐	☐	☑	☐	☐	☐	☐
3	Freestall Barn 3	freestall	milk cows	1,100	1,100	1	☐	☐	☐	☐	☑	☐	☐	☐	☐
4	Preston Pens 7-10	open corral	support stock	700	700	1	☐	☐	☐	☐	☐	☐	☐	☐	☐
5	Dairy Shade Barn 1	saudi style barn	dry cows	100	100	1	☐	☐	☐	☐	☐	☐	☐	☐	☐
6	Dairy Shade Barn 2	saudi style barn	dry cows	150	150	1	☐	☐	☐	☐	☐	☐	☐	☐	☐
7	Dairy Shade Barn 3	saudi style barn	support stock	200	200	1	☐	☐	☐	☐	☐	☐	☐	☐	☐
8	Preston Shade Barn 4	saudi style barn	support stock	50	50	1	☐	☐	☐	☐	☐	☐	☐	☐	☐
9	Preston Shade Barn 5	loafing barn	support stock	200	200	1	☐	☐	☐	☐	☐	☐	☐	☐	☐

Post-Project PM10 Mitigation Measures for New Housing Units at an Expandihg 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 Barn 4A	freestall	milk cows	250	250	1	☐	☐	☐	☐	☑	☐	☐	☐	☐
2	Freestall Barn 4B	freestall	support stock	800	800	1	☐	☐	☐	☐	☑	☐	☐	☐	☐
3	Freestall Barn 5	freestall	support stock	1,000	1,000	1	☐	☐	☐	☐	☑	☐	☐	☐	☐
		Post-Project Total # of Cows		5,950	(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 Barn 1	freestall	milk cows	750	750	1.370										1.37
2	Freestall Barn 2	freestall	milk cows	650	650	1.370					80%					0.27
3	Freestall Barn 3	freestall	milk cows	1,100	1,100	1.370					80%					0.27
4	Preston Pens 7-10	open corral	support stock	700	700	10.550										10.55
5	Dairy Shade Barn 1	saudi style barn	dry cows	100	100	1.370										1.37
6	Dairy Shade Barn 2	saudi style barn	dry cows	150	150	1.370										1.37
7	Dairy Shade Barn 3	saudi style barn	support stock	200	200	1.370										1.37
8	Preston Shade Barn 4	saudi style barn	support stock	50	50	1.370										1.37
9	Preston Shade Barn 5	loafing barn	support stock	200	200	5.280										5.28

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 Barn 4A	freestall	milk cows	250	250	1.370					80%					0.27
2	Freestall Barn 4B	freestall	support stock	800	800	1.370					80%					0.27
3	Freestall Barn 5	freestall	support stock	1000	1000	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 Barn 1	milk cows	750	9.86	21.13	1.37	20.3	7,395	43.4	15,846	2.8	1,028
2	Freestall Barn 2 & 3	milk cows	500	9.86	21.13	1.37	13.5	4,930	28.9	10,564	1.9	685
3	Freestall Barn 4	milk cows	250	9.86	21.13	1.37	6.8	2,465	14.5	5,282	0.9	343
4	Preston Pens 7-10	support stock	700	4.27	5.54	10.55	8.2	2,989	10.6	3,875	20.2	7,385
5	Dairy Shade Barn 1	dry cows	100	5.57	10.71	1.37	1.5	557	2.9	1,071	0.4	137
6	Dairy Shade Barn 2	dry cows	150	5.57	10.71	1.37	2.3	836	4.4	1,606	0.6	206
7	Dairy Shade Barn 3	support stock	200	4.27	5.54	1.37	2.3	854	3.0	1,107	0.8	274
8	Preston Shade Barn 4	support stock	50	4.27	5.54	1.37	0.6	214	0.8	277	0.2	69
9	Preston Shade Barn 5	support stock	200	4.27	5.54	5.28	2.3	854	3.0	1,107	2.9	1,056
10	Dairy Pens 1-2	dry cows	200	5.57	10.71	5.46	3.1	1,114	5.9	2,142	3.0	1,092
11	Dairy Pens 3-6	support stock	400	4.27	5.54	10.55	4.7	1,708	6.1	2,214	11.6	4,220
12	Canal School Pens 11-15	support stock	800	4.27	5.54	10.55	9.4	3,416	12.1	4,429	23.1	8,440
13	anal School Shade Barn	support stock	350	4.27	5.54	5.28	4.1	1,495	5.3	1,938	5.1	1,848
	Pre-Project Total # of Cows		**4,650**				**79.1**	**28,827**	**140.9**	**51,458**	**73.5**	**26,783**

*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)
4,650	79.1	28,827	140.9	51,458	73.5	26,783

Calculations:

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

Post-Project Potential to Emit - Cow Housing

	Post-Project Potential to Emit - Cow Housing											
	Housing Name(s) or #(s)	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
1	Freestall Barn 1	milk cows	750	9.35	21.13	1.37	19.2	7,013	43.4	15,846	2.8	1,028
2	Freestall Barn 2	milk cows	650	9.35	21.13	0.27	16.7	6,078	37.6	13,733	0.5	178
3	Freestall Barn 3	milk cows	1,100	9.35	21.13	0.27	28.2	10,285	63.7	23,241	0.8	301
4	Preston Pens 7-10	support stock	700	4.06	5.54	10.55	7.8	2,842	10.6	3,875	20.2	7,385
5	Dairy Shade Barn 1	dry cows	100	5.29	10.71	1.37	1.4	529	2.9	1,071	0.4	137
6	Dairy Shade Barn 2	dry cows	150	5.29	10.71	1.37	2.2	794	4.4	1,606	0.6	206
7	Dairy Shade Barn 3	support stock	200	4.06	5.54	1.37	2.2	812	3.0	1,107	0.8	274
8	Preston Shade Barn 4	support stock	50	4.06	5.54	1.37	0.6	203	0.8	277	0.2	69
9	Preston Shade Barn 5	support stock	200	4.06	5.54	5.28	2.2	812	3.0	1,107	2.9	1,056
	Post-Project # of Cows (non-expansion)		**3,900**				**80.5**	**29,368**	**169.4**	**61,863**	**29.2**	**10,634**

*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 Barn 4A	milk cows	250	9.35	21.13	0.27	6.4	2,338	14.5	5,282	0.2	69
2	Freestall Barn 4B	support stock	800	4.06	5.54	0.27	8.9	3,248	12.1	4,429	0.6	219
3	Freestall Barn 5	support stock	1000	4.06	5.54	0.27	11.1	4,060	15.2	5,536	0.8	274
	Total # of Cows From Expansion		**2,050**				**26.4**	**9,646**	**41.8**	**15,247**	**1.6**	**562**

*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)**
5,950	**106.9**	**39,014**	**211.2**	**77,110**	**30.8**	**11,196**

Calculations:

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

Pre-Project Potential to Emit (PE1)

Pre-Project Herd Size					
Herd	**Flushed Freestalls**	**Scraped Freestalls**	**Flushed Corrals**	**Scraped Corrals**	**Total # of Animals**
Milk Cows	1,500	0	0	0	1,500
Dry Cows	0	0	450	0	450
Support Stock (Heifers, Calves and Bulls)	0	0	600	2,100	2,700
Large Heifers	0	0	0	0	0
Medium Heifers	0	0	0	0	0
Small Heifers	0	0	0	0	0
Bulls	0	0	0	0	0

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

Silage Information				
Feed Type	Maximum # Open Piles	Maximum Height (ft)	Maximum Width (ft)	Open Face Area (ft^2)
Corn	1	24	100	1,865
Alfalfa	1	12	60	545
Wheat	1	20	135	1,954

Milking Parlor				
Cow	VOC		NH3	
Milk Cows	lb/day	lb/yr	lb/day	lb/yr
	1.6	**600**	**0.6**	**205**

Cow Housing						
Cow	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Total	**79.1**	**28,827**	**140.9**	**51,458**	**73.5**	**26,783**

Liquid Manure Handling						
Cow	VOC		NH3		H2S*	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	10.0	3,645	31.2	11,385	0.8	295
Dry Cows	1.6	599	4.7	1,728	0.1	30
Support Stock (Heifers, Calves and Bulls)	1.7	612	3.2	1,182	0.3	93
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	**13.3**	**4,856**	**39.1**	**14,295**	**1.2**	**419**

Solid Manure Handling				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	1.9	705	11.6	4,245
Dry Cows	0.3	113	1.8	644
Support Stock (Heifers, Calves and Bulls)	1.5	540	5.5	2,025
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**	**1,358**	**18.9**	**6,914**

Feed Handling and Storage		
	Daily PE (lb-VOC/day)	Annual PE (lb-VOC/yr)
Corn Emissions	11.6	4,237
Alfalfa Emissions	0.9	312
Wheat Emissions	15.4	5,613
TMR	102.5	37,416
Total	**130.4**	**47,578**

Calculations for milking parlor:

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

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

Calculations for cow housing:

See detailed calculations under Cow Housing Calculations worksheet.

Calculations for liquid manure and solid manure handling:

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

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

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

Calculations for silage emissions:

Annual PE = (EF1) x (area ft^2) x (0.0929 m^2/ft^2) x (8,760 hr/yr) x (60 min/hr) x 2.20E-9 lb/µg

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

Calculation for TMR emissions:

Annual PE = (# cows) x (EF1) x (0.658 m^2) x (525,600 min/yr) x (2.20E-9 lb/µg)

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

Notes

Calves are not included in TMR calculation.

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

Total Daily Pre-Project Potential to Emit (lb/day)							
Permit	**NOx**	**SOx**	**PM10**	**CO**	**VOC**	**NH3**	**H2S**
Milking Parlor	0.0	0.0	0.0	0.0	1.6	0.6	0.0
Cow Housing	0.0	0.0	73.5	0.0	79.1	140.9	0.0
Liquid Manure	0.0	0.0	0.0	0.0	13.3	39.1	1.2
Solid Manure	0.0	0.0	0.0	0.0	3.7	18.9	0.0
Feed Handling	0.0	0.0	0.0	0.0	130.4	0.0	0.0
Total	**0.0**	**0.0**	**73.5**	**0.0**	**228.1**	**199.5**	**1.2**

Major Source Emissions (lb/yr)					
Permit	**NOx**	**SOx**	**PM10**	**CO**	**VOC**
Milk Parlor	0	0	0	0	0
Cow Housing	0	0	0	0	0
Liquid Manure	0	0	0	0	2,337
Solid Manure	0	0	0	0	0
Feed Handling	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**2,337**

Total Annual Pre-Project Potential to Emit (lb/yr)							
Permit	**NOx**	**SOx**	**PM10**	**CO**	**VOC**	**NH3**	**H2S**
Milking Parlor	0	0	0	0	600	205	0
Cow Housing	0	0	26,783	0	28,827	51,458	0
Liquid Manure	0	0	0	0	4,856	14,295	419
Solid Manure	0	0	0	0	1,358	6,914	0
Feed Handling	0	0	0	0	47,578	0	0
Total	**0**	**0**	**26,783**	**0**	**83,218**	**72,872**	**419**

Post-Project Potential to Emit (PE2)

Post-Project Herd Size					
Herd	**Flushed Freestalls**	**Scraped Freestalls**	**Flushed Corrals**	**Scraped Corrals**	**Total # of Animals**
Milk Cows	2,500	0	0	0	2,500
Dry Cows	250	0	250	0	500
Support Stock (Heifers, Calves, and Bulls)	1,800	0	200	950	2,950
Large Heifers	0	0	0	0	0
Medium Heifers	0	0	0	0	0
Small Heifers	0	0	0	0	0
Bulls	0	0	0	0	0

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

Silage Information				
Feed Type	Maximum # Open Piles	Maximum Height (ft)	Maximum Width (ft)	Open Face Area (ft^2)
Corn	1	24	100	1,865
Alfalfa	1	12	60	545
Wheat	1	20	135	1,954

Milking Parlor				
Cow	VOC		NH3	
Milk Cows	lb/day	lb/yr	lb/day	lb/yr
Total	**2.7**	**1,000**	**0.9**	**342**

Cow Housing						
	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Total	**106.9**	**39,014**	**211**	**77,110**	**31**	**11,196**

Liquid Manure Handling						
Cow	VOC		NH3		H2S	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	10.0	3,650	33.6	12,250	0.8	295
Dry Cows	1.1	395	3.4	1,240	0.1	30
Support Stock (Heifers, Calves, and Bulls)	4.9	1,800	10.3	3,776	0.3	93
Large Heifers	0.0	0	0.0	0	0	0
Medium Heifers	0.0	0	0.0	0	0	0
Small Heifers	0.0	0	0.0	0	0	0
Calves	0.0	0	0.0	0	0	0
Bulls	0.0	0	0.0	0	0	0
Total	**16.0**	**5,845**	**47.3**	**17,266**	**1.2**	**419**

Solid Manure Handling				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	3.2	1,175	19.4	7,075
Dry Cows	0.3	125	2.0	715
Support Stock (Heifers, Calves, and Bulls)	1.6	590	6.1	2,213
Large Heifers	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0
Calves	0.0	0	0.0	0
Bulls	0.0	0	0.0	0
Total	**5.1**	**1,890**	**27.5**	**10,003**

Feed Handling and Storage		
	Daily PE (lb-VOC/day)	Annual PE (lb-VOC/yr)
Corn Emissions	11.6	4,237
Alfalfa Emissions	0.9	312
Wheat Emissions	15.4	5,613
TMR	118.0	43,088
Total	**145.9**	**53,250**

Calculations for milking parlor:

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

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

Calculations for cow housing:

See detailed calculations under Cow Housing Calculations worksheet.

Calculations for liquid manure and solid manure handling:

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

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

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

Calculations for silage emissions:

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

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

Calculation for TMR emissions:

Annual PE = (# cows) x (EF2) x (0.658 m^2) x (525,600 min/yr) x (2.20E-9 lb/µg)

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

Calves are not included in TMR calculation.

Total Daily Post-Project Potential to Emit (lb/day)							
Permit	**NOx**	**SOx**	**PM10**	**CO**	**VOC**	**NH3**	**H2S**
Milking Parlor	0.0	0.0	0.0	0.0	2.7	0.9	0.0
Cow Housing	0.0	0.0	30.8	0.0	106.9	211.2	0.0
Liquid Manure	0.0	0.0	0.0	0.0	16.0	47.3	1.2
Solid Manure	0.0	0.0	0.0	0.0	5.1	27.5	0.0
Feed Handling	0.0	0.0	0.0	0.0	145.9	0.0	0.0
Total	**0.0**	**0.0**	**30.8**	**0.0**	**276.6**	**286.9**	**1.2**

Major Source Emissions (lb/yr)					
Permit	**NOx**	**SOx**	**PM10**	**CO**	**VOC**
Milk Parlor	0	0	0	0	0
Cow Housing	0	0	0	0	0
Liquid Manure	0	0	0	0	2,796
Solid Manure	0	0	0	0	0
Feed Handling	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**2,796**

Total Annual Post-Project Potential to Emit (lb/yr)							
Permit	**NOx**	**SOx**	**PM10**	**CO**	**VOC**	**NH3**	**H2S**
Milking Parlor	0	0	0	0	1,000	342	0
Cow Housing	0	0	11,196	0	39,014	77,110	0
Liquid Manure	0	0	0	0	5,845	17,266	419
Solid Manure	0	0	0	0	1,890	10,003	0
Feed Handling	0	0	0	0	53,250	0	0
Total	**0**	**0**	**11,196**	**0**	**100,999**	**104,721**	**419**

APPENDIX E
BACT Calculations

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 Barn 1	milk cows	750	9.86	21.13	10.55	20.3	7,395	43.4	15,846	21.7	7,913
2	Freestall Barn 2 & 3	milk cows	250	9.86	21.13	10.55	6.8	2,465	14.5	5,282	7.2	2,638
3	Freestall Barn 4	milk cows	250	9.86	21.13	10.55	6.8	2,465	14.5	5,282	7.2	2,638
4	Preston Pens 7-10	support stock	700	9.86	21.13	10.55	18.9	6,902	40.5	14,790	20.2	7,385
5	Dairy Shade Barn 1	dry cows	100	9.86	21.13	10.55	2.7	986	5.8	2,113	2.9	1,055
6	Dairy Shade Barn 2	dry cows	150	9.86	21.13	10.55	4.1	1,479	8.7	3,169	4.3	1,583
7	Dairy Shade Barn 3	support stock	200	9.86	21.13	10.55	5.4	1,972	11.6	4,226	5.8	2,110
8	Preston Shade Barn 4	support stock	50	9.86	21.13	10.55	1.4	493	2.9	1,056	1.4	528
9	Preston Shade Barn 5	support stock	200	9.86	21.13	10.55	5.4	1,972	11.6	4,226	5.8	2,110
10	Dairy Pens 1-2	dry cows	200	9.86	21.13	10.55	5.4	1,972	11.6	4,226	5.8	2,110
11	Dairy Pens 3-6	support stock	400	9.86	21.13	10.55	10.8	3,944	23.2	8,451	11.6	4,220
12	Canal School Pens 11-15	support stock	800	9.86	21.13	10.55	21.6	7,888	46.3	16,903	23.1	8,440
13	anal School Shade Barn	support stock	350	9.86	21.13	10.55	9.5	3,451	20.3	7,395	10.1	3,693
							119.1	**43,384**	**254.9**	**92,965**	**127.1**	**46,423**

*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)
119.1	**43,384**	**254.9**	**92,965**	**127.1**	**46,423**

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 Barn 1	milk cows	750	9.35	21.13	10.55	19.2	7,013	43.4	15,846	21.7	7,913	-0.1	0.0	0.0	No	No	No
2	Freestall Barn 2	milk cows	650	9.35	21.13	2.11	16.7	6,078	37.6	13,733	3.8	1,372	10.3	23.1	2.4	Yes	Yes	Yes
3	Freestall Barn 3	milk cows	1,100	9.35	21.13	2.11	28.2	10,285	63.7	23,241	6.4	2,321	21.8	49.2	5.0	Yes	Yes	Yes
4	Preston Pens 7-10	support stock	700	9.35	21.13	10.55	17.9	6,545	40.5	14,790	20.2	7,385	0.0	0.0	0.0	No	No	No
5	Dairy Shade Barn 1	dry cows	100	9.35	21.13	10.55	2.6	935	5.8	2,113	2.9	1,055	0.0	0.0	0.0	No	No	No
6	Dairy Shade Barn 2	dry cows	150	9.35	21.13	10.55	3.8	1,403	8.7	3,169	4.3	1,583	-0.1	0.0	0.0	No	No	No
7	Dairy Shade Barn 3	support stock	200	9.35	21.13	10.55	5.1	1,870	11.6	4,226	5.8	2,110	0.0	0.0	0.0	No	No	No
8	Preston Shade Barn 4	support stock	50	9.35	21.13	10.55	1.3	468	2.9	1,056	1.4	528	0.0	0.0	0.0	No	No	No
9	Preston Shade Barn 5	support stock	200	9.35	21.13	10.55	5.1	1,870	11.6	4,226	5.8	2,110	0.0	0.0	0.0	No	No	No
							99.9	**36,467**	**225.8**	**82,400**	**72.3**	**26,377**						

*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 Barn 4A	milk cows	250	9.35	21.13	2.11	6.4	2,338	14.5	5,282	1.4	528	Yes	Yes	No
2	Freestall Barn 4B	support stock	800	9.35	21.13	2.11	20.5	7,480	46.3	16,903	4.6	1,688	Yes	Yes	Yes
3	Freestall Barn 5	support stock	1000	9.35	21.13	2.11	25.6	9,350	57.9	21,128	5.8	2,110	Yes	Yes	Yes
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
							52.5	**19,168**	**118.7**	**43,313**	**11.8**	**4,326**			

*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)**
152.4	**55,635**	**344.5**	**125,713**	**84.1**	**30,703**

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	2.7	1.6	0.40	0.40	1.1
				Total	**1.1**

NH3 Emissions

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	0.9	0.6	0.14	0.14	0.3
				Total	**0.3**

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	4.8	4.8	0.70	1.17	1.9
Dry Cows	0.5	0.8	0.38	0.64	0.0
Support Stock (Heifers, Calves, and Bulls)	2.3	0.8	0.29	0.49	1.8
Large Heifers	0.0	0.0	0.29	0.49	0.0
Medium Hefiers	0.0	0.0	0.20	0.33	0.0
Small Heifers	0.0	0.0	0.11	0.19	0.0
Calves	0.0	0.0	0.05	0.09	0.0
Bulls	0.0	0.0	0.18	0.30	0.0
BACT triggered for VOC for Lagoon/Storage Ponds				**Total**	**3.8**

VOC Emissions - Land Application

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	5.2	5.2	0.76	1.26	2.1
Dry Cows	0.6	0.8	0.41	0.69	0.1
Support Stock (Heifers, Calves, and Bulls)	2.6	0.9	0.32	0.53	2.1
Large Heifers	0.0	0.0	0.32	0.53	0.0
Medium Hefiers	0.0	0.0	0.22	0.36	0.0
Small Heifers	0.0	0.0	0.12	0.20	0.0
Calves	0.0	0.0	0.06	0.10	0.0
Bulls	0.0	0.0	0.19	0.32	0.0
BACT triggered for VOC for Liquid Manure Land Application				**Total**	**4.3**

NH3 Emissions - Lagoon/Storage Pond(s)

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	8.1	4.9	1.18	1.18	3.2
Dry Cows	0.8	0.7	0.60	0.60	0.1
Support Stock (Heifers, Calves, and Bulls)	2.6	0.5	0.32	0.32	2.1
Large Heifers	0.0	0.0	0.32	0.32	0.0
Medium Hefiers	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
BACT triggered for NH3 for Lagoon/Storage Ponds				**Total**	**5.4**

NH3 Emissions - Land Application

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	25.5	26.3	3.72	6.41	10.2
Dry Cows	2.6	4.0	1.88	3.24	0.3
Support Stock (Heifers, Calves, and Bulls)	7.8	2.7	0.96	1.66	6.2
Large Heifers	0.0	0.0	0.96	1.66	0.0
Medium Hefiers	0.0	0.0	0.71	1.22	0.0
Small Heifers	0.0	0.0	0.54	0.94	0.0
Calves	0.0	0.0	0.15	0.27	0.0
Bulls	0.0	0.0	1.35	2.33	0.0
BACT triggered for NH3 for Liquid Manure Land Application				**Total**	**16.8**

H2S Emissions - Lagoon/Storage Pond(s)

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	0.8	0.8	0.12	0.12	0.0
Dry Cows	0.1	0.1	0.06	0.06	0.0
Support Stock (Heifers, Calves, and Bulls)	0.3	0.3	0.03	0.03	0.0
Large Heifers	0.0	0.0	0.03	0.03	0.0
Medium Hefiers	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	1.2	0.7	0.17	0.17	0.5
Dry Cows	0.1	0.1	0.09	0.09	0.0
Support Stock (Heifers, Calves, and Bulls)	0.6	0.5	0.10	0.07	0.1
Large Heifers	0.0	0.0	0.07	0.07	0.0
Medium Hefiers	0.0	0.0	0.05	0.05	0.0
Small Heifers	0.0	0.0	0.03	0.03	0.0
Calves	0.0	0.0	0.01	0.01	0.0
Bulls	0.0	0.0	0.05	0.05	0.0
				Total	**0.6**

VOC Emissions - Land Application

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	2.0	1.2	0.30	0.30	0.8
Dry Cows	0.2	0.2	0.16	0.16	0.0
Support Stock (Heifers, Calves, and Bulls)	1.0	0.9	0.12	0.12	0.1
Large Heifers	0.0	0.0	0.12	0.12	0.0
Medium Hefiers	0.0	0.0	0.08	0.08	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	0.07	0.0
				Total	**0.9**

NH3 Emissions - Solid Manure Storage/Separated Solids Piles

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	9.1	5.5	1.33	1.33	3.6
Dry Cows	0.9	0.8	0.67	0.67	0.1
Support Stock (Heifers, Calves, and Bulls)	2.8	2.6	0.35	0.35	0.2
Large Heifers	0.0	0.0	0.35	0.35	0.0
Medium Hefiers	0.0	0.0	0.25	0.25	0.0
Small Heifers	0.0	0.0	0.18	0.18	0.0
Calves	0.0	0.0	0.06	0.06	0.0
Bulls	0.0	0.0	0.49	0.49	0.0
BACT triggered for NH3 for Solid Manure Storage				**Total**	**3.9**

NH3 Emissions - Land Application

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	10.3	6.2	1.50	1.50	4.1
Dry Cows	1.0	0.9	0.76	0.76	0.1
Support Stock (Heifers, Calves, and Bulls)	3.2	2.9	0.40	0.40	0.3
Large Heifers	0.0	0.0	0.40	0.40	0.0
Medium Hefiers	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
BACT triggered for NH3 for Solid Manure Land Application				**Total**	**4.5**

Feed Storage and Handling

VOC Emissions - Silage

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Corn Silage	11.6	11.6	21,155	21,155	0.0
Alfalfa Silage	0.9	0.9	10,649	10,649	0.0
Wheat Silage	15.4	15.4	26,745	26,745	0.0
				Total	0.0

VOC Emissions - TMR

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
TMR	118.0	102.5	9,518	10,575	25.8
		BACT triggered for VOC for TMR		**Total**	**25.8**

APPENDIX F
BACT Guidelines

San Joaquin Valley
Unified Air Pollution Control District

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 contained in the SIP	Technologically Feasible	Alternate Basic Equipment
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		
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		

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;

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**

San Joaquin Valley
Unified Air Pollution Control District

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 contained 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**

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.8.9*

Last Update: 12/18/2013

Solid Manure Handling - Land Application

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC	Rapid incorporation of solid manure into the soil after land application	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	
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.

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

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.8.11*

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.

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APPENDIX G
Top-Down BACT Analysis

I. Top-Down BACT and T-BACT Analysis for Cow Housing (ATC Permit N-5591-2-3):

BACT Guideline 5.8.2 (Cow Housing – Freestall and Saudi-Style Barns) applies to the proposed cow housing freestall barns. In accordance with the District BACT policy, information from these guidelines will be utilized without further analysis.

1. BACT and T-BACT Analysis for VOC Emissions from Freestall Barns 2, 3, 4, and 5

Step 1 - Identify all control technologies

Achieved-In-Practice

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

Technologically Feasible:
None

Alternate Basic Equipment:
None

Description of Control Technologies:

Concrete feed lanes and walkways

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

Increased flushing of feed lanes and walkways

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

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

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

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

Nutritional management of dairy feed is routinely practiced to improve milk production and herd health. The potential for VOC emissions can be reduced by reducing the quantity of undigested nutrients in the manure. Many of the VOCs emitted from Confined Animal Facilities, including dairies, originate from the decomposition of undigested protein in animal waste.[17] This undigested protein also produces ammonia emissions. The level of microbial action in the manure corresponds to the level of organic nitrogen content in the manure; the lower the level of nitrogen the lower the level of microbial action and the lower the production of ammonia and VOCs.

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

Based on very limited data (Klaunser, 1998, *J Prod Agric),* diet manipulation decreased nitrogen excretion by 34% while improving milk production. Up to 70% of excess nitrogen is lost off of the farm through volatilization, denitrification and leaching. Because of limited research, feeding cows in accordance with National Research Council (NRC) or other District-approved guidelines will be conservatively assumed to have a control efficiency of only 5-10% for both enteric[18] and manure VOC emissions.

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

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

Properly sloping exercise pens/corrals

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

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

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

Step 2 – Eliminate Technologically Infeasible Options

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

Step 3 - Rank Remaining Control Technologies by Control Effectiveness

The only control technology that is identified above is the use of the above listed achieved-in-practice control methods, therefore ranking is not required.

Step 4 - Cost Effectiveness Analysis

The above listed control technology is achieved-in-practice; therefore a cost analysis is not required.

Step 5 - Select BACT

The most effective VOC control technology not eliminated in Steps 2 and 4 above is the following listed achieved-in-practice VOC control methods:

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

- District Rule 4570 Mitigation Measures.

The applicant is proposing the use of the achieved-in-practice VOC control methods. Therefore, BACT for VOC is being proposed.

2. BACT Analysis for NH_3 Emissions from Freestall Barns 2, 3, 4, and 5

Step 1 - Identify all control technologies

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

Technologically Feasible:
None

Alternate Basic Equipment:
None

Description of Control Technologies

Concrete feed lanes and walkways

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

Increased Flushing for feed lanes and walkways

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

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

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

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

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

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

Properly sloping exercise pens/corrals

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

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

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

Step 2 – Eliminate Technologically Infeasible Options

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

Step 3 - Rank Remaining Control Technologies by Control Effectiveness

The only control technology that is identified above is the use of the above listed achieved-in-practice control methods, therefore ranking is not required.

Step 4 - Cost Effectiveness Analysis

The above listed control technology is achieved-in-practice; therefore a cost analysis is not required.

Step 5 - Select BACT

The most effective NH_3 control technology not eliminated in Steps 2 and 4 above is the following listed achieved-in-practice NH_3 control methods:

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

The applicant is proposing the use of the achieved-in-practice NH_3 control methods. Therefore, BACT for NH_3 is being proposed.

3. BACT Analysis for PM Emissions from Freestall Barns 2, 3, 4, and 5

Step 1 - Identify all control technologies

Achieved-In-Practice
- Concrete feed lanes and walkways;
- Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions;

Technologically Feasible:
None

Alternate Basic Equipment:
None

Description of Control Technologies

Concrete Feed Lanes and Walkways

Constructing the feed lanes and walkways of concrete causes the dairy animals to spend an increase amount of time on a paved surface rather than dry dirt, thus reducing PM_{10} emissions. Additionally, the manure that is deposited in the lanes and walkways will be flushed, which will prevent PM_{10} emissions from drying manure.

Scraping of exercise pens with a pull-type scraper

Other than the paved feed lanes and walkways, exercise pen surfaces are composed of earth and deposited manure, both of which have the potential for particulate matter emissions due to wind or animal activities. Frequent scraping of these surfaces will reduce the amount of dry manure that may be pulverized by the cow's hooves and subsequently emitted as PM_{10}.

Step 2 – Eliminate Technologically Infeasible Options

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

Step 3 - Rank Remaining Control Technologies by Control Effectiveness

The only control technology that is identified above is the use of the above listed achieved-in-practice control methods, therefore ranking is not required.

Step 4 - Cost Effectiveness Analysis

The above listed control technology is achieved-in-practice; therefore a cost analysis is not required.

Step 5 - Select BACT

The most effective VOC control technology not eliminated in Steps 2 and 4 above is the following listed achieved-in-practice PM_{10} control methods:

- Concrete feed lanes and walkways;
- Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions.

The applicant is proposing the use of the achieved-in-practice PM_{10} control methods. Therefore, BACT for PM_{10} is being proposed.

II. Top-Down BACT and T-BACT Analysis for Liquid Manure Handling (ATC Permit N-5591-3-1):

BACT Guideline 5.8.6 applies to the proposed modified liquid manure handling for lagoon/storage ponds and BACT Guideline 5.8.7 applies to the proposed modified liquid manure handling for liquid/slurry land application. In accordance with the District BACT policy, information from these guidelines will be utilized without further analysis.

1. BACT and T-BACT Analysis for VOC Emissions from Lagoon/Storage Ponds

Step 1 - Identify all control technologies

Achieved-In-Practice

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

Technologically Feasible:

- Aerobic treatment lagoon or mechanically aerated lagoon.
- Covered lagoon digester vented to a control device with minimum 95% control.

Alternate Basic Equipment:
None

Description of Control Technologies

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.

Covered Lagoon Digester

Covered treatment lagoons are one type of anaerobic digester. An anaerobic digester is an enclosed basin or tank that is designed to facilitate the decomposition of wastewater by microbes in the absence of oxygen. The process of anaerobic decomposition results in the preferential conversion of organic compounds in the wastewater into methane

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

As stated above, the gas generated in the covered lagoon anaerobic digester can be captured and then sent to a suitable combustion device. During combustion, gaseous hydrocarbons are oxidized to form CO_2 and water. The VOC emitted from the liquid manure in the covered lagoon can be reduced by 95% with the use of an appropriate combustion device. Therefore, installation of the digester will lower the total VOC emitted from the liquid manure handling system. Although the control efficiency of the gas captured from the primary lagoon is expected to be 95% or more, the overall control efficiency is expected to be less, since some VOC will also be emitted from the storage pond and as fugitive emissions. For this analysis, the overall control efficiency is assumed to be 80% of the emissions that would have been emitted from the lagoon system.

Anaerobic Treatment Lagoon and Solids Removal/Separation System

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

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

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

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

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

Step 2 – Eliminate Technologically Infeasible Options

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

Step 3 - Rank Remaining Control Technologies by Control Effectiveness

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

1) Aerobic treatment lagoon or mechanically aerated lagoon (95% control efficiency).
2) Covered lagoon digester vented to a control device (80% control efficiency).
3) Anaerobic treatment lagoon designed to meet Natural Resources Conservation Service (NRCS) standards and solids removal/separation system (40% control efficiency).

Step 4 - Cost Effectiveness Analysis

(1). Aerobic Treatment Lagoon or Mechanical Aerated Lagoon

The following analysis is based on the treatment of manure from 2,500 milk cows in naturally aerobic lagoons and mechanically aerated lagoons.

Space Requirements for a Naturally Aerobic Lagoon Treating Manure from 2,500 Milk Cows

NRCS Practice Standard Code 359 requires that naturally aerobic lagoons be designed to have a minimum treatment surface area as determined on the basis of daily BOD_5 loading per unit of lagoon surface. The standard specifies that the maximum loading rate of naturally aerobic lagoons shall not exceed the loading rate indicated by the NRCS Agricultural Waste Management Field Handbook (AWMFH) or the maximum loading rate according to state regulatory requirements, whichever is more stringent. According to Figure 10-30 (August 2009) of the latest version of the AWMFH, the maximum aerobic lagoon loading rate for the San Joaquin Valley is 45 - 55 lb-BOD_5/acre-day. According to Table 4-5 (March 2008) of the NRCS AWMFH, the total daily manure produced by a milk cow will have 2.9 lb-BOD_5/day. Assuming that at least 40% of the manure will be flushed to the lagoon system, the minimum lagoon surface area required for a naturally aerobic lagoon treating manure from 2,500 milk cows in the San Joaquin Valley can be calculated as follows:

BOD_5 loading (lb/day) = 2,500 milk cows × 2.9 lb-BOD_5/cow-day × 0.40
= 2,900 lb-BOD_5/day

Minimum Surface Area (acres) in San Joaquin Valley with a maximum loading rate of 55 lb-BOD_5/acre-day is the following:

2,900 lb-BOD_5/day ÷ 55 lb-BOD_5/acre-day = 52.7 acres

Minimum Surface Area (acres) in San Joaquin Valley with a maximum loading rate of 45 lb-BOD_5/acre-day is the following:

2,900 lb-BOD_5/day ÷ 45 lb-BOD_5/acre-day = 64.4 acres

As shown above, the minimum surface area required for a naturally aerobic lagoon to treat manure from 2,500 milk cows in the San Joaquin Valley would range from approximately 52.7 to 64.4 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.

Analysis for a Mechanically Aerated Lagoon Treating Manure from 1,630 Milk Cows:

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

Biological Oxygen Demand (BOD_5)

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

The proposed rule specifies that an aerobic lagoon be designed and operated in accordance with NRCS Practice Standard Code 359. NRCS Practice Standard Code 359 requires that mechanically aerated lagoons use aeration equipment that provides a minimum of one pound of oxygen for each pound of daily BOD_5 loading. As discussed above, the total daily manure produced by a milk cow will have a BOD_5 of 2.9 lb/day and a lagoon handling flushed manure from 1,630 milk cows will have a loading rate of approximately 2,900 lb-BOD_5/day (1,315 kg-BOD_5/day).

Energy Requirement

Based on the data gathered in a UC Davis study on aerator performance for wastewater lagoons, aeration efficiencies for mechanical aerators ranged from 0.10 to 0.68 kg of oxygen provided per kW-hr of energy utilized. The most efficient aerator tested that had been installed in dairy lagoons had an aeration efficiency of 0.49 kg-O_2/kW-hr. These efficiency tests were performed in clean water and lower aeration efficiencies are expected in liquid manure because of the significant amount of solids that it contains. The yearly energy requirement for a mechanically aerated lagoon system treating flushed manure from 2,500 milk cows is calculated as follows:

(1,315 kg-BOD_5/day ÷ 0.68 kg-O_2/kW-hr) × (365 day/year) = 705,846 kW-hr/year

Cost of Electricity

The cost of electricity will be based upon the average price for industrial electricity in California as of November 2020, as taken from the Energy Information Administration (EIA) website:[19]

Average cost of electricity = $0.1455/kW-hr

The electricity cost for complete aeration is calculated as follows:

705,846 kW-hr/year × $0.1455/kW-hr = $102,701/year

VOC Emissions Reductions

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

The annual VOC emissions reductions for mechanically aerated lagoon(s) treating the manure from 2,500 milk cows are calculated as follows:

VOC Reductions = [Number of cows] × [Lagoon/Storage Pond VOC EF (lb/cow-year)] × [Aeration Control Efficiency for Lagoon/Storage Pond]
= 2,500 cows × 1.3 lb-VOC/cow-year × 90% control
= 2,925 lb-VOC/year

Cost of VOC Emission Reductions

Cost of Reductions = ($102,701/year) ÷ [(2,925 lb-VOC/year) × (1 ton/2000 lb)]
= $70,223/ton

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

(2). Covered Lagoon Digester vented to a Control Device

Capital Cost for Installation

The capital cost estimates for installation of a covered lagoon digester are based on information from the United States EPA AgSTAR publication "Anaerobic Digestion Capital Costs for Dairy Farms" (May 2010)[20] and the California Energy Commission (CEC) Public Interest Energy Research (PIER) Program Dairy Methane Digester System Program

[19] http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_06_b
[20] "Anaerobic Digestion Capital Costs for Dairy Farms" (May 2010), EPA AgSTAR http://www.epa.gov/agstar/pdf/digester_cost_fs.pdf

Evaluation Report (Feb 2009).[21] The formula in the AgSTAR publication results in a capital cost of $1,032 per cow. This estimate excludes costs of solids separation after digestion, hydrogen sulfide removal, and utility charges including line upgrades and interconnection costs and fees. Based on information from installations in California, the CEC PIER Dairy Methane Digester Program Evaluation Report gives an average cost of $585 per cow for installation of covered lagoon anaerobic digesters (see Table 9 - Total Project Costs and Cost per Cow and per kW).

For the purposes of this analysis, an average of these cost values of $766.35/cow[(22)] will be used. Thus, the installation capital cost for the proposed herd of 2,500 milk cows is at least $1,915,875 ($766.35/cow × 2,500 cows).

Pursuant to the District's BACT policy, the annualized capital investment is calculated as follows:

Annualized Capital Investment = Total Capital Cost × Amortization Factor

Amortization Factor = $\left[\frac{0.1(1.1)^{10}}{(1.1)^{10}-1}\right]$ = 0.163, amortizing over 10 years at 10%

Therefore,

Annualized Capital Investment = $1,915,875 x 0.163 = $312,288

Potential Production of Electricity

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

The potential quantity of electricity produced is calculated as follows:

Electrical Produced = 670.3 kW-hour/milk cow-year × 2,500 milk cows
= 1,675,750 kW-hour/year

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

[22] Adjusted from 2010 dollars to 2020 dollars using the following: Inflation Multiplier (IM) = $(1+i)^n$, where i is the inflation rate of 2.75% and n is the number of years of 10, IM = $(1+0.0275)^{10}$ = 1.31; therefore, Cost Values = $585.00/cow × 1.31 = $766.35/cow

Potential Cost Savings from Production of Electricity

The value of electricity generated will be calculated using the previously cited EIA rate of $0.1455/kW-hr.

Potential Cost Savings = 1,675,750 kW-hour/year × $0.1455/kW-hour
= $243,822/year

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

Total Annualized Capital Investment = $312,288/year - $243,822/year
= $68,466/year

VOC Emissions Reductions

The annual VOC emission reductions is calculated as follows:

VOC Reductions = [Number of cows] × [Lagoon/Storage Pond VOC EF (lb/cow-year)]
× [Covered Lagoon Digester Efficiency for Lagoon/Storage Pond]
= 2,500 cows × 1.3 lb-VOC/cow-year × 80% control
= 2,600 lb-VOC/year

Cost of VOC Reductions

Cost of Reductions = ($68,466/year) ÷ [(2,600 lb-VOC/year) × (1 ton/2000 lb)]
= $52,666/ton

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

(3). Anaerobic Treatment Lagoon and Solids Removal/Separation System

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

Step 5 - Select BACT and T-BACT

The most effective VOC control technology not eliminated in Steps 2 and 4 above is the following listed achieved-in-practice VOC control method:

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

The applicant is proposing the use of the achieved-in-practice VOC control methods (using a mechanical separator). Therefore, T-BACT for VOC is being proposed.

2. BACT Analysis for NH_3 Emissions from Lagoon/Storage Ponds

Step 1 - Identify all control technologies

Achieved-In-Practice

- All animals fed in accordance with Natural Resources Conservation Services (NRCS) or other District-approved guidelines.

Technologically Feasible:
None

Alternate Basic Equipment:
None

Description of Control Technologies

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

Nutritional management of dairy feed is routinely practiced to improve milk production and herd health. The potential for ammonia emissions can be reduced by reducing the amount of undigested nitrogen compounds in the manure. The level of microbial action in the manure corresponds to the level of organic nitrogen present, hence the lower the level of nitrogen the lower the level of microbial action and the lower the production of ammonia 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 VOC and ammonia. The latest National Research Council (NRC) guidelines for the selection of an optimal bovine diet should be followed to the maximum extent possible. The diet recommendations made in this publication seek to achieve the maximum uptake of protein by the animal and the minimum carryover of nitrogen into the manure, which will reduce ammonia emissions from liquid manure in the lagoon and storage pond.

Step 2 – Eliminate Technologically Infeasible Options

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

Step 3 - Rank Remaining Control Technologies by Control Effectiveness

The only control technology that is identified above is the use of the above listed achieved-in-practice control method, therefore ranking is not required.

Step 4 - Cost Effectiveness Analysis

The above listed control technology is achieved-in-practice; therefore a cost analysis is not required.

Step 5 - Select BACT

The most effective NH_3 control technology not eliminated in Steps 2 and 4 above is the following listed achieved-in-practice NH_3 control method:

- All animals fed in accordance with Natural Resources Conservation Services (NRCS) or other District-approved guidelines.

The applicant is proposing the use of the achieved-in-practice NH_3 control method. Therefore, BACT for NH_3 is being proposed.

3. BACT and T-BACT Analysis for VOC Emissions from Liquid/Slurry Land Application

Step 1 - Identify all control technologies

Achieved-In-Practice

- Irrigation of crops using liquid/slurry manure from the secondary lagoon/holding/ storage pond preceded by an uncovered anaerobic treatment lagoon designed to meet NRCS standards.

Technologically Feasible:

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

Alternate Basic Equipment:
None

Description of Control Technologies

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

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

In completely aerated lagoons, sufficient oxygen must be provided to sustain the aerobic microorganisms. NRCS Practice Standard Code 359 specifies that naturally aerobic lagoons have a minimum surface area determined by regional climate and daily Biological Oxygen Demand (BOD_5) and requires naturally aerobic lagoons to have a maximum depth no greater than five feet. For mechanically aerated lagoons, NRCS Practice Standard Code 359 specifies that the aeration equipment shall provide a minimum of 1 pound of oxygen for each pound of daily BOD_5 loading. The mechanical aerators that

provide the required oxygen may float on the lagoon surface or be submerged in the lagoon. Aeration can also be performed by injection of tiny air bubbles into the lagoon water, mixing of the lagoon water, or spraying of the water into the air. According to Dr. Ruihong Zhang, a researcher at the University of California, Davis, at least 95% VOC control can be achieved if the dissolved oxygen (DO) concentration of the liquid manure is 2.0 mg/L or more. However, the DO concentrations achieved in mechanically aerated lagoons treating manure are typically much less than this and the control efficiencies will therefore be lower.

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

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

Assumptions:

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

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

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

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

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

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

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

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

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

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

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

Step 2 – Eliminate Technologically Infeasible Options

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

Step 3 - Rank Remaining Control Technologies by Control Effectiveness

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

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).
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 NRCS standards (40% VOC control efficiency).

Step 4 - Cost Effectiveness Analysis

<u>(1). Irrigation of crops using liquid/slurry from an aerobic treatment lagoon or mechanically aerated lagoon</u>

The following analysis is based on the treatment of manure from 2,500 milk cows in naturally aerobic lagoons and mechanically aerated lagoons. Because the liquid/slurry manure applied to land will come from an aerobic treatment lagoon or mechanically aerated lagoon, it will be assumed the reduction in VOC emissions from the lagoon will result in similar VOC reductions to land application.

<u>Space Requirements for a Naturally Aerobic Lagoon Treating Manure from 2,500 Milk Cows</u>

The cost effectiveness analysis performed in the previous section (BACT and T-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 and no further analysis is needed.

<u>Analysis for a Mechanically Aerated Lagoon Treating Manure from 1,630 Milk Cows:</u>

Based on the cost effectiveness analysis performed in the previous section (BACT and T-BACT analysis for VOC emissions from the lagoons/storage ponds) the estimated electrical cost for use of this control option is the following:

Estimated Electrical Cost = $102,701/year

The annual VOC emissions reductions for mechanically aerated lagoon(s) treating the manure from 2,500 milk cows are calculated as follows:

VOC Reductions = [Number of cows] × [Land Application VOC EF (lb/cow-year)]
× [Aeration Control Efficiency for Lagoon/Storage Pond]
= 2,500 cows × 1.4 lb-VOC/cow-year × 90% control
= 3,150 lb-VOC/year

Cost of Reductions = ($102,701/year) ÷ [(3,150 lb-VOC/year) × (1 ton/2,000 lb)]
= $65,207/ton

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

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

The following analysis is based on the treatment of manure from 1,630 milk cows in a covered lagoon digester vented to a control device. Because the liquid/slurry manure applied to land will come from a covered lagoon digester, it will be assumed the reduction in VOC emissions from the lagoon will result in similar VOC reductions to land application.

The annualized cost estimate performed in the previous section (BACT and T-BACT analysis for VOC emissions from the lagoons/storage ponds) will be the same as the estimated annualized cost (less the potential savings from electricity produced) for this control option. Therefore:

Total Annualized Capital Investment = $68,466/yearr

The annual VOC emissions reductions for a covered lagoon digester treating the manure from 2,500 milk cows is calculated as follows:

VOC Reductions = [Number of cows] × [Land Application VOC EF (lb/cow-year)]
× [Covered Lagoon Digester Efficiency for Lagoon/Storage Pond]
= 2,500 cows × 1.4 lb-VOC/cow-year × 80% control
= 2,800 lb-VOC/year

Cost of Reductions = ($68,466/year) ÷ [(2,800 lb-VOC/year) × (1 ton/2,000 lb)]
= $48,904/ton

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

(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 NRCS standards

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

Step 5 - Select T-BACT

The most effective VOC control technology not eliminated in Steps 2 and 4 above is the following listed achieved-in-practice VOC control method:

- Irrigation of crops using liquid/slurry manure from the secondary lagoon/holding/ storage pond preceded by an uncovered anaerobic treatment lagoon designed to meet NRCS standards.

The applicant is proposing the use of the achieved-in-practice VOC control method. Therefore, BACT and T-BACT for VOC is being proposed.

4. BACT Analysis for NH_3 Emissions from Liquid/Slurry Land Application

Step 1 - Identify all control technologies

Achieved-In-Practice

- All animals fed in accordance with Natural Resources Conservation Services (NRCS) or other District-approved guidelines.

Technologically Feasible:
None

Alternate Basic Equipment:
None

Description of Control Technologies

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

Nutritional management of dairy feed is routinely practiced to improve milk production and herd health. The potential for ammonia emissions can be reduced by reducing the amount of undigested nitrogen compounds in the manure. The level of microbial action in the manure corresponds to the level of organic nitrogen present, hence the lower the level of nitrogen the lower the level of microbial action and the lower the production of ammonia 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 VOC and ammonia. The latest National Research Council (NRC) guidelines for the selection of an optimal bovine diet should be followed to the maximum extent possible. The diet recommendations made in this publication seek to achieve the maximum uptake of

protein by the animal and the minimum carryover of nitrogen into the manure, which will reduce ammonia emissions from liquid manure applied to cropland.

Step 2 – Eliminate Technologically Infeasible Options

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

Step 3 - Rank Remaining Control Technologies by Control Effectiveness

The only control technology that is identified above is the use of the above listed achieved-in-practice control method, therefore ranking is not required.

Step 4 - Cost Effectiveness Analysis

The above listed control technology is achieved-in-practice; therefore a cost analysis is not required.

Step 5 - Select BACT

The most effective NH_3 control technology not eliminated in Steps 2 and 4 above is the following listed achieved-in-practice NH_3 control method:

- All animals fed in accordance with Natural Resources Conservation Services (NRCS) or other District-approved guidelines.

The applicant is proposing the use of the achieved-in-practice NH_3 control method. Therefore, BACT for NH_3 is being proposed.

III. Top-Down BACT Analysis for Solid Manure Handling (ATC Permit N-5591-4-2):

BACT Guideline 5.8.8 applies to the proposed modified solid manure handling for storage/separated solids piles and BACT Guideline 5.8.9 applies to the proposed modified solid manure handling for land application. In accordance with the District BACT policy, information from these guidelines will be utilized without further analysis.

1. BACT Analysis for NH_3 Emissions from Storage/Separated Solids Piles

Step 1 - Identify all control technologies

Achieved-In-Practice

- All animals fed in accordance with Natural Resources Conservation Services (NRCS) or other District-approved guidelines.

Technologically Feasible:
None

Alternate Basic Equipment:
None

Description of Control Technologies

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

Nutritional management of dairy feed is routinely practiced to improve milk production and herd health. The potential for ammonia emissions can be reduced by reducing the amount of undigested nitrogen compounds in the manure. The level of microbial action in the manure corresponds to the level of organic nitrogen present, hence the lower the level of nitrogen the lower the level of microbial action and the lower the production of ammonia 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 VOC and ammonia. The latest National Research Council (NRC) guidelines for the selection of an optimal bovine diet should be followed to the maximum extent possible. The diet recommendations made in this publication seek to achieve the maximum uptake of protein by the animal and the minimum carryover of nitrogen into the manure, which will reduce ammonia emissions from solid manure.

Step 2 – Eliminate Technologically Infeasible Options

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

Step 3 - Rank Remaining Control Technologies by Control Effectiveness

The only control technology that is identified above is the use of the above listed achieved-in-practice control method, therefore ranking is not required.

Step 4 - Cost Effectiveness Analysis

The above listed control technology is achieved-in-practice; therefore a cost analysis is not required.

Step 5 - Select BACT

The most effective NH_3 control technology not eliminated in Steps 2 and 4 above is the following listed achieved-in-practice NH_3 control method:

- All animals fed in accordance with Natural Resources Conservation Services (NRCS) or other District-approved guidelines.

The applicant is proposing the use of the achieved-in-practice NH_3 control method. Therefore, BACT for NH_3 is being proposed.

2. BACT Analysis for NH_3 Emissions from Land Application

Step 1 - Identify all control technologies

Achieved-In-Practice

- Rapid incorporation of solid manure into the soil after land application, and all animals fed in accordance with Natural Resources Conservation Services (NRCS) or other District-approved guidelines.

Technologically Feasible:
None

Alternate Basic Equipment:
None

Description of Control Technologies

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%.[23]

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

Nutritional management of dairy feed is routinely practiced to improve milk production and herd health. The potential for ammonia emissions can be reduced by reducing the amount of undigested nitrogen compounds in the manure. The level of microbial action in the manure corresponds to the level of organic nitrogen present, hence the lower the level of nitrogen the lower the level of microbial action and the lower the production of ammonia 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 VOC and ammonia. The latest National Research Council (NRC) guidelines for the selection of an optimal bovine diet should be followed to the maximum extent possible. The diet recommendations made in this publication seek to achieve the maximum uptake of protein by the animal and the minimum carryover of nitrogen into the manure, which will reduce ammonia emissions from solid manure.

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

Step 2 – Eliminate Technologically Infeasible Options

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

Step 3 - Rank Remaining Control Technologies by Control Effectiveness

The only control technology that is identified above is the use of the above listed achieved-in-practice control method, therefore ranking is not required.

Step 4 - Cost Effectiveness Analysis

The above listed control technology is achieved-in-practice; therefore a cost analysis is not required.

Step 5 - Select BACT

The most effective NH_3 control technology not eliminated in Steps 2 and 4 above is the following listed achieved-in-practice NH_3 control method:

- Rapid incorporation of solid manure into the soil after land application, and all animals fed in accordance with Natural Resources Conservation Services (NRCS) or other District-approved guidelines.

The applicant is proposing the use of the achieved-in-practice NH_3 control method. Therefore, BACT for NH_3 is being proposed.

IV. Top-Down BACT Analysis for Feed Storage and Handling (ATC Permit N-5591-5-2):

BACT Guideline 5.8.11 applies to the proposed modified feed storage and handling for feed/total mixed ration (TMR). In accordance with the District BACT policy, information from this guideline will be utilized without further analysis.

1. BACT Analysis for VOC Emissions from Feed/TMR

Step 1 - Identify all control technologies

Achieved-In-Practice

- District Rule 4570 Mitigation Measures for feed/TMR.

Technologically Feasible:
None

Alternate Basic Equipment:
None

Description of Control Technology

District Rule 4570 measures

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

Step 2 – Eliminate Technologically Infeasible Options

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

Step 3 - Rank Remaining Control Technologies by Control Effectiveness

The only control technology that is identified above is the use of the above listed achieved-in-practice control method, therefore ranking is not required.

Step 4 - Cost Effectiveness Analysis

The above listed control technology is achieved-in-practice; therefore a cost analysis is not required.

Step 5 - Select BACT

The most effective VOC control technology not eliminated in Steps 2 and 4 above is the following listed achieved-in-practice VOC control method:

- District Rule 4570 Mitigation Measures for feed/TMR.

The applicant is proposing the use of the achieved-in-practice VOC control methods. Therefore, BACT for VOC is being proposed.

APPENDIX H
RMR and AAQA Summary

San Joaquin Valley Air Pollution Control District
Risk Management Review and Ambient Air Quality Analysis

To:	Kai Chan – Permit Services
From:	Diana Walker – Technical Services
Date:	October 13, 2020
Facility Name:	JOHN F TOSTE DAIRY
Location:	609 SANTA FE GRADE, NEWMAN
Application #(s):	N-5591-1-1, -2-3, -3-1, -4-2, -5-2
Project #:	N-1193387

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	0.90	0.00	0.00	2.90E-08	No	No
2	42.64	0.28	0.11	7.86E-06	Yes[3]	No
3	51.62	0.02	0.02	6.13E-06	Yes	No
4	0.00	0.01	0.00	N/A[1]	No	No
5	N/A[2]	N/A[2]	N/A[2]	N/A[2]	No	No
Project Totals	95.16	0.31	0.13	1.40E-05		
Facility Totals	>1	0.31	0.13	1.40E-05		

Notes:
1. 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.
2. 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.
3. T-BACT is determined on a corral by corral basis.

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:
1. Only emissions from PM 10 and PM 2.5 were calculated and used to compare to State and Federal Air Quality Standards.
2. Modeled PM10 concentrations were below the District SIL for fugitive sources of 10.4 µg/m^3 for the 24-hour average concentration and 2.08 µg/m^3 for the annual concentration.
3. Modeled PM2.5 concentrations were below the District SIL for fugitive sources of 2.5 µg/m^3 for the 24-hour average concentration and 0.63 µg/m^3 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 # 1-1, 2-3, 3-1, 4-2, 5-2

1. No special requirements.

T-BACT is required for Unit 3 because of the emissions from Naphthalene and Acrylonitrile, which are VOCs.

T-BACT is required for Freestalls 4 and 5 because of the emissions from 1,2-Dibromo-3-chloropropane (DBCP) which is a VOC.

2. Project Description

Technical Services received a request on December 31, 2019 to perform a Risk Management Review (RMR) and Ambient Air Quality Analysis (AAQA) for the following:

- Unit -1-1: MODIFICATION OF 1,500 COW MILKING OPERATION WITH ONE 36 STALL PARABONE MILKING PARLOR TO INCREASE THE NUMBER OF MILK COWS TO 2,500 HEADS DUE TO A CHANGE IN HERD PROFILE AS AUTHORIZED BY ATC PERMIT N-5591-2-3
- Unit -2-3: MODIFICATION OF COW HOUSING - 1,500 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 1,950 MATURE COWS (MILK AND DRY); 2,700 SUPPORT STOCK (HEIFERS, CALVES, AND BULLS); AND FOUR FREESTALLS WITH FLUSH SYSTEM TO: INCREASE THE MAXIMUM NUMBER OF COWS TO 2,500 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 3,000 MATURE COWS (MILK AND DRY) AND 2,950 SUPPORT STOCK (HEIFERS, CALVES, AND BULLS); INSTALL TWO NEW FREESTALL BARNS (5 AND 6); REPLACE THREE EXISTING FREESTALL BARNS (2, 3, AND 4) WITH TWO NEW FREESTALL BARNS (2 AND 3), WHICH WILL BE OVER FIVE EXISTING OPEN CORRALS (PENS 1 THROUGH 6); REMOVE FIVE OPEN CORRALS (CANAL SCHOOL PENS 11 THROUGH 15) AND ONE SHADE BARN (SHADE BARN 6).
- Unit -3-1: MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF TWO STORAGE PONDS AND MECHANICAL SEPARATOR(S) TO INSTALL AN ANAEROBIC TREATMENT LAGOON (615'L X 300'W X 13'D) AND FOR AN INCREASE IN LIQUID MANURE PROCESSING DUE TO A CHANGE IN HERD PROFILE AS AUTHORIZED BY ATC PERMIT N-5591-2-3.
- Unit -4-2: MODIFICATION OF SOLID MANURE HANDLING CONSISTING OF TRANSPORTED TO FIELDS; SOLID MANURE APPLICATION TO LAND AND HAULED OFFSITE FOR AN INCREASE IN SOLID MANURE PROCESSING DUE TO A CHANGE IN HERD PROFILE AS AUTHORIZED BY ATC PERMIT N-5591-2-3.
- Unit -5-2: MODIFICATION OF FEED STORAGE AND HANDLING CONSISTING OF SILAGE PILE(S) FOR AN INCREASE IN TOTAL MIXED RATIONS DUE TO A CHANGE IN HERD PROFILE AS AUTHORIZED BY ATC PERMIT N-5591-2-3.

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, Lagoon(s), and Milk Parlor(s) 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 2004-2008 from Los Banos (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	0.046	400
2	2	Freestall Barn 2 VOC	Lbs	0.133	1,148
2	3	Freestall Barn 3 VOC	Lbs	0.892	7,820
2	10	Freestall Barn 4A VOC	Lbs	0.267	2,338
2	11	Freestall Barn 4B VOC	Lbs	0.371	3,248
2	12	Freestall Barn 5 VOC	Lbs	0.463	4,060
3	1	Lagoon VOC	Lbs	0.050	438
3	4	Land App Liquid VOC	Lbs	0.288	2,519
3	4	Land App Liquid NH3	Lbs	1.196	10,476
4	1	Solid Pile Storage NH3	Lbs	0.025	219
4	5	Land App Solid NH3	Lbs	0.188	1,643

Area Source Parameters					
Unit ID	**Unit Description**	**Release Height (m)**	**X-Length (m)**	**Y -Length (m)**	**Area (m^2)**
1	Milk Parlor 1	1.00	17.01	52.53	893.54
2	Freestall Barn 5	1.00	208.33	50.96	10,616.50
2	Freestall Barn 4A	1.00	229.31	37.47	8,592.25
2	Freestall Barn 4B	1.00	229.31	37.47	8,592.25
2	Freestall Barn 2	1.00	224.87	35.08	7,,888.44
2	Freestall Barn 3	1.00	325.23	38.97	12674.21
3	Lagoon 1	0.00	175.13	92.89	16,267.83
4	Soild Pile Storage	1.00	149.23	94.63	14,121.63
4	Soild Pile Storage	1.00	45.09	27.37	1,234.11

Polygon Area Source Parameters				
Unit ID	**Unit Description**	**Release Height (m)**	**No. Vertices**	**Area (m^2)**
3	Land App Liquid	0.00	40	1,559,600
4	Land App Solid	0.00	40	1,559,600

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 NO_2 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. These inputs are described in the sections that follow.

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]**
2	10 & 11	N/A[1]	N/A[1]	N/A[1]	0.0333	0.0125
2	12	N/A[1]	N/A[1]	N/A[1]	0.0333	0.0125

Emission Rates (lbs/year)						
Unit ID	**Process**	**NOx**	**SOx**	**CO**	**PM10**	**PM2.5[2]**
2	10 & 11	N/A[1]	N/A[1]	N/A[1]	288	109.44
2	12	N/A[1]	N/A[1]	N/A[1]	274	210.66

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 62.4% 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 PM_{10} emissions at the proposed dairy (modification) (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 I
Anaerobic Treatment Lagoon Design Check Analysis

Lagoon Design Check in Accordance with NRCS Guideline #359

Proposed Lagoon Volume

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

Primary Treatment Lagoon Dimensions

Length	575	ft
Width	400	ft
Depth	11	ft
Slope	3	ft

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

Primary Lagoon Volume	**2,192,047 ft3**

INSTRUCTIONS

* only input yellow fields

Step 1 Enter primary lagoon dimensions on this sheet

Step 2 Go to "Net Volatile Solids Loading" sheet and enter number of animals flushing manure to lagoon

Step 3 Adjust % in flush and separation as necessary (see notes on sheet)

Step 4 Go to "Minimum Treatment Volume"

Step 5 Minimum treatment volume should be less than lagoon volume to be considered anaerobic treatment lagoon

Step 6 Go to "Hydraulic Retention Time"

Step 7 Adjust fresh water as applicable

Step 8 Hydraulic retention time should be greater than 34 days to be considered anaerobic treatment lagoon.

Lagoon Design Check in Accordance with NRCS Guideline #359

Net Volatile Solids loading Calculation

Net Volatile Solids (VS) Loading of Treatment Lagoons									
Breed: Holstein Type of Cow	**Number of Animals**	**x**	VS Excreted[1] (lb/day)	**x**	% Manure in Flush[2]	**x**	(1 - % VS Removed in Separation[3])	**=**	**Net VS Loading (lb/day)**
Milk Cows	2,500	x	17	x	71%	x	50%	=	**15,088**
Dry Cow	500	x	9.2	x	71%	x	50%	=	**1,633**
Heifer (15 to 24 months)	0	x	7.1	x	48%	x	50%	=	**0**
Heifer (7 to 14 months)	1,500	x	4.9	x	48%	x	50%	=	**1,764**
Heifer (3 to 6 months)	500	x	2.7	x	48%	x	50%	=	**324**
Calf (under 3 months)	0	x	1.0	x	100%	x	50%	=	**0**
Bulls	0	x	9.2	x	48%	x	50%	=	**0**
Total for Dairy									**18,809**

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

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

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

Lagoon Design Check in Accordance with NRCS Guideline #359

Minimum Treatment Volume Calculation

MTV = TVS/VSLR

Where:

MTV = Minimum Treatment Volume (ft^3)

TVS = daily Total Volatile solids Loading (lb/day) = 0.011 lb/ft3-day

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

Minimum Treatment Volume in Primary Lagoon

Breed: Holstein Type of Cow	Net VS Loading (lb/day)		VSLR (lb/ft3-day)[1]		MTV (ft^3)
Milk Cows	15,088	÷	0.011	=	**1,371,591**
Dry Cow	1,633	÷	0.011	=	**148,455**
Heifer (15 to 24 months)	0	÷	0.011	=	**0**
Heifer (7 to 14 months)	1,764	÷	0.011	=	**160,364**
Heifer (3 to 6 months)	324	÷	0.011	=	**29,455**
Calf (under 3 months)	0	÷	0.011	=	**0**
Bulls	0	÷	0.011	=	**0**
Total for Dairy					**1,709,864**

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

Lagoon Design Check in Accordance with NRCS Guideline #359

Sludge Accumulation Volume

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

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

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

SAV = VPL - MTV

Where:

SAV = Sludge Accumulation Volume (ft^3)

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

MTV = Minimum Treatment Volume (ft^3)

SAV =	**VPL**	**-**	**MTV**		
SAV =	**2,192,047**	**1,709,864**	=	**482,183 (ft3)**	

Lagoon Design Check in Accordance with NRCS Guideline #359

Hydraulic Retention Time (HRT) Calculation

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

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

HRT = MTV/HFR

where:

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

The Hydraulic Flow Rate is Calculated below

Type	# of cows		Amount of Manure*			HFR	
Milk Cows	2,500	x	2.40	ft^3	=	6,000	ft^3/day
Dry Cows	500	x	1.30	ft^3	=	650	ft^3/day
Heifers (15-24 mo)	0	x	0.78	ft^3	=	-	ft^3/day
Heifers (7-14 mo)	1,500	x	0.78	ft^3	=	1,170	ft^3/day
Heifers (3-6 mo)	500	x	0.30	ft^3	=	150	ft^3/day
Calves	0	x	0.15	ft^3	=	-	ft^3/day
Bulls	0	x	1.30	ft^3	=	-	ft^3/day
Total	5,000					**7,970**	**ft^3/day**
Fresh water per milk cow used in flush at milk parlor			**50**	gal/day			

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

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

Formula:

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

Total HFR:

50 ~~gal~~	2500 ~~milk cows~~	x	ft3	+	7,970	ft3
~~milk cow *~~ day			7.48 ~~gal~~			day

=	24,681.2	ft3/day

Formula:

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

HRT:

1,709,864 ~~ft3~~	day	=	=	69.2778942	days
	24,681.2 ~~ft3~~				

APPENDIX J
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

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

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

Milking Parlor		NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)		0	0	0	0	1,000	342
Daily PE2 (lb/day)		0.0	0.0	0.0	0.0	2.7	0.9
Quarterly Net Emissions Change (lb/qtr)	1:	0.0	0.0	0.0	0.0	100.00	34.20
	2:	0.0	0.0	0.0	0.0	100.00	34.20
	3:	0.0	0.0	0.0	0.0	100.00	34.20
	4:	0.0	0.0	0.0	0.0	100.00	34.20

Cow Housing		NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)		0	0	11,196	0	39,014	77,110
Daily PE2 (lb/day)		0.0	0.0	30.8	0.0	106.9	211.2
Quarterly Net Emissions Change (lb/qtr)	1:	0.0	0.0	-3,896.75	0.0	2,546.75	6,413.00
	2:	0.0	0.0	-3,896.75	0.0	2,546.75	6,413.00
	3:	0.0	0.0	-3,896.75	0.0	2,546.75	6,413.00
	4:	0.0	0.0	-3,896.75	0.0	2,546.75	6,413.00

Liquid Manure Handling		NOx	SOx	PM10	CO	VOC	NH3	H2S
Annual PE2 (lb/yr)		0	0	0	0	5,845	17,266	419
Daily PE2 (lb/day)		0.0	0.0	0.0	0.0	16.0	47.3	1.2
Quarterly Net Emissions Change (lb/qtr)	1:	0.0	0.0	0.0	0.0	247.25	742.75	0.0
	2:	0.0	0.0	0.0	0.0	247.25	742.75	0.0
	3:	0.0	0.0	0.0	0.0	247.25	742.75	0.0
	4:	0.0	0.0	0.0	0.0	247.25	742.75	0.0

Solid Manure Handling		NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)		0	0	0	0	1,890	10,003
Daily PE2 (lb/day)		0.0	0.0	0.0	0.0	5.1	27.5
Quarterly Net Emissions Change (lb/qtr)	1:	0.0	0.0	0.0	0.0	133.13	772.25
	2:	0.0	0.0	0.0	0.0	133.13	772.25
	3:	0.0	0.0	0.0	0.0	133.13	772.25
	4:	0.0	0.0	0.0	0.0	133.13	772.25

Feed Storage and Handling		NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)		0	0	0	0	53,250	0
Daily PE2 (lb/day)		0.0	0.0	0.0	0.0	145.9	0.0
Quarterly Net Emissions Change (lb/qtr)	1:	0.0	0.0	0.0	0.0	1,418.17	0.0
	2:	0.0	0.0	0.0	0.0	1,418.17	0.0
	3:	0.0	0.0	0.0	0.0	1,418.17	0.0
	4:	0.0	0.0	0.0	0.0	1,418.17	0.0