



MAY 22 2017

Tony Meirinho
Tony Meirinho & Sons Dairy #2
5418 Woodland Ave
Modesto, CA 95358

Re: Notice of Preliminary Decision - Authority to Construct
Facility Number: N-6951
Project Number: N-1140282

Dear Mr. Meirinho:

Enclosed for your review and comment is the District's analysis of Tony Meirinho & Sons Dairy #2's application for an Authority to Construct for a herd profile expansion and facility upgrades, at 4890 Healy Rd, Merced.

The notice of preliminary decision for this project will be published approximately three days from the date of this letter. After addressing all comments made during the 30-day public notice period, the District intends to issue the Authority to Construct. Please submit your written comments on this project within the 30-day public comment period, as specified in the enclosed public notice.

Thank you for your cooperation in this matter. If you have any questions regarding this matter, please contact Ms. Andrea Ogden of Permit Services at (559) 230-5886.

Sincerely,



Arnaud Marjollet
Director of Permit Services

AM:ao

Enclosures

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

Sayed Sadredin
Executive Director/Air Pollution Control Officer

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

Facility Name: Tony Meirinho & Sons Dairy #2	Date: May 15, 2017
Mailing Address: 5418 Woodland Ave Modesto, CA 95358	Engineer: Andrea Ogden Lead Engineer: Joven Refuerzo
Contact Person: Tony Meirinho	
Telephone: (209) 652-9780	
Application #s: N-6951-1-2, -2-2, -3-1, -4-1 and -5-1	
Project #: N-1140282	
Deemed Complete: September 23, 2016	

I. Proposal

Tony Meirinho & Sons Dairy #2 has requested Authority to Construct (ATC) permits to expand and upgrade an existing 1,040 milk cow, 210 dry cow, 545 large heifer, 852 medium heifer, 500 small heifer, 400 calf and 60 bull (3,607 total head) dairy operation. The herd profile after expansion will be 4,800 milk cows, 1,000 dry cows, 1,600 large heifers, 1,400 medium heifers, 1,252 small heifers, 900 calves and 150 bulls (11,102 total head). The upgrade includes two new 1,200 cow freestall barns for milk cows, one new 520 cow freestall barn for special needs animals, new dry cow and heifer housing areas, a liquid manure processing pit, a mechanical separator, and converting an existing storage pond to an anerobic treatment lagoon.

Additionally, the mitigation measures that the applicant has previously selected to comply with District Rule 4570, will also be incorporated into the ATCs for the dairy.

As discussed in more detail below, the expansion of the existing herd size capacity will necessitate modifications to the facility's milking operation, cow housing, liquid manure handling system, solid manure handling operation, and feed storage and handling operation.

The current milking parlor permit (N-6951-1-0) authorizes the facility to milk 1,040 cows. No physical modifications are proposed during this project to the milking parlor. The facility has been issued ATC N-6951-1-3 to convert the milking parlor to an 80 stall rotary milking parlor with continuous flushing. The District has verified that construction on the rotary milking parlor as authorized by previously issued ATC N-6951-1-3 is complete. Therefore ATC N-6951-1-3 will be required to be implemented prior to or concurrently with the ATC issued for the herd size increase for this project. However,

the milking parlor permit will be modified to reflect the proposed increase in maximum milk cow herd size from 1,040 milk cows to 4,800 milk cows and the change to a 80 stall rotary milking parlor.

The proposed expansion also results in multiple modifications to the facility's current cow housing permit (N-6951-2). The facility currently houses all of its cows in three freestall barns, and calf hutches. In order to accommodate the increase in animals, the facility is proposing to construct two new freestall barns, one new special needs freestall barn, a Saudi style barn with nineteen corrals for the small heifers, one loafing barn containing twelve corrals for the medium heifers and sixteen open corrals with shade structures for the large heifers, dry cows and bulls. The herd sizes listed on the cow housing permit will also be modified to reflect the proposed increase in animals. All manure from the cow housing areas will be served by a flush/scrape system.

Because of the proposed increase in herd size, there will also be an increase in liquid manure flushed to the facility's lagoon system. A new processing pit and mechanical separator are proposed and the existing storage pond is proposed to be converted to an anerobic treatment lagoon. As such, the current liquid manure handling permit (N-6951-3) will be modified to account for the increase in capacity and emissions from the lagoon system due to the additional flushed manure from the expanded herd and to add the operating requirements for the anerobic treatment lagoon.

The expansion will also result in an increase in solid manure due to the additional number of cows. Although the facility is not proposing any changes to the way it currently handles solid manure, the existing solid manure handling permit (N-6951-4) will be modified to account for the increase in solid manure from the expanded herd, and the resulting increase in emissions.

Finally, the facility's feed storage and handling permit (N-6951-5) will be modified to account for the increase in emissions from the additional total mixed ration (TMR) fed to the expanded herd.

The proposed modifications for each permit unit are summarized as follows:

N-6951-1 (Milking Operation):

- Expand from 1,040 milk cows to 4,800 milk cows and convert to a rotary milking parlor.

N-6951-2 (Cow Housing):

- Expand from 1,040 milk cows, 1,250 mature cows (milk and dry cows combined), and 2,354 total support stock (heifers, calves, and bulls) to 4,800 milk cows, 5,800 mature cows (milk and dry cows), 4,402 support stock (heifers and bulls), and 900 calves.

- Construct two freestall barns to house 2,400 milk cows and one freestall barn to house 520 special needs animals.
- Construct one Saudi style barn for small heifers, one loafing barn for medium heifers and eight open corrals with shades for large heifers, four open corrals with shades for dry cows and bulls.
- Install windbreaks in accordance with the National Research Conservation Service (NRCS) standard #380.

N-6951-3 (Liquid Manure Handling System):

- Convert a storage pond to an anerobic treatment lagoon and allow for an increase in flushed manure due to the expansion of the herd size, add a processing pit and mechanical separator, and implement anaerobic treatment requirements.

N-6951-4 (Solid Manure Handling Operation):

- Allow for an increase in solid manure due to the expansion of the herd size.

N-6951-5 (Feed Storage and Handling Operation):

- Allow for an increase in TMR due to the expansion of the herd size.

Copies of the Permits to Operate (PTOs) for the existing operation are included in Appendix G. The draft ATC permits for the proposed modifications are included in Appendix F.

II. Applicable Rules

Rule 1070 Inspections (12/17/92)
Rule 2010 Permits Required (12/17/92)
Rule 2201 New and Modified Stationary Source Review Rule (2/18/16)
Rule 2410 Prevention of Significant Deterioration (PSD) (6/16/11)
Rule 2520 Federally Mandated Operating Permits (6/21/01)
Rule 2550 Federally Mandated Preconstruction Review for Major Sources of Air
Toxics (6/18/98)
Rule 4101 Visible Emissions (2/17/05)
Rule 4102 Nuisance (12/17/92)
Rule 4550 Conservation Management Practices (CMP) (8/19/04)
Rule 4570 Confined Animal Facilities (CAF) (10/21/10)
CH&SC 41700 Health Risk Assessment
CH&SC 42301.6 School Notice
Public Resources Code 21000-21177: California Environmental Quality Act (CEQA)
California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000-15387:
CEQA Guidelines

III. Project Location

The facility is located at 4890 Healy Road in Merced, in Merced County. 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 Tony Meirinho & Sons Dairy #2 is the production of milk, which is used to make products for human consumption. Production of milk requires a herd of mature dairy cows that are lactating. In order to produce milk, the cows must be bred and give birth. The gestation period for a cow is 9 months, and dairy cows are bred again 4 months after calving. Thus, a mature dairy cow produces a calf every 12 to 14 months, which is why there will be different ages and types of cows at the dairy, including, heifers, lactating cows, dry cows, calves or mature bulls.

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

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

Cow Housing

All of the 4,800 milk cows and 520 special needs dry cows and large heifers combined will be housed in freestall barns with flushed lanes. In freestall barns, 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. All of the support stock are housed with flushed lanes. The small heifers (4–6 months old) will be housed in a Saudi Style barn, the medium and large heifers (7-14 months and 15-24 months) will be housed in loafing barns and the dry cows will be housed in open corrals with shades. The calves are housed in aboveground hutches with a flush system.

Special Needs Housing

The special needs area serves the gestating cows at the dairy or any cows that are in need of medical attention. This area acts as a veterinary area. It is also the area in which cows are given special attention as they progress from dry cow, a mature cow

that is gestating and not lactating, to maternity, to milking status or until their health improves.

Milking Parlor

The milking parlor is a separate building, apart from the lactating cow confinement. The milking parlor is designed to facilitate changing the groups of cows milked and to allow workers access to the cows during milking. A holding area confines the cows that are ready for milking. The holding area is covered with open sides and is part of the milking parlor, which in turn, is located in the immediate vicinity of the cow housing. The facility is currently permitted for a 24 stall herringbone milk parlor and a 30 stall flat barn milking parlor, however the construction of a 80 stall rotary milking parlor was authorized by ATC N-6951-1-3 and has been completed. The lactating cows will be milked two times per day in the milking parlor. The milking parlor will have concrete floors sloped to a drain. Manure that is deposited in the milking parlor will be sprayed or flushed into the drain using fresh water after each milking. The effluent from the milking parlor will be carried through pipes to the lagoon system. The facility has applied for and received ATC N-6951-1-3 to upgrade the milking parlor to an 80 stall rotary milking parlor with continuous flushing. Construction related to ATC N-6951-1-3 has been completed and the rotary milking parlor is currently in use, therefore ATC N-6951-1-3 will be required to be implemented prior to or concurrently with N-6951-1-2 being issued under this project for the herd size increase.

Liquid Manure Handling System

The liquid manure handling system includes the following:

- A mechanical separator with a dewatering press
- One processing pit
- One anaerobic treatment lagoon
- One storage pond
- Two settling basins

Solids Separation

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

Mechanical Separator:

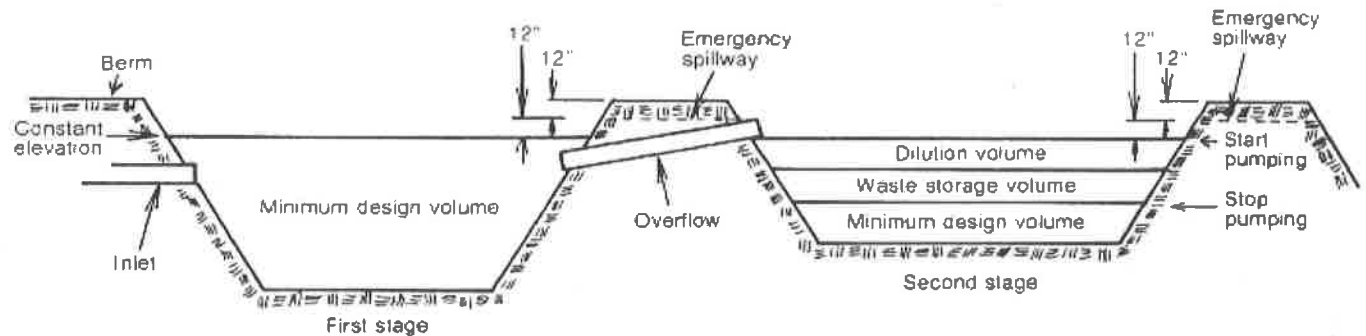
Liquid manure from all flushed areas of the dairy is collected at a central location, from where it will be pumped up onto a mechanical screen separator for solids separation prior to entering the lagoon system. A mechanical separator may achieve a solids removal rate of 50%. The mechanical separator is equipped with roller presses to minimize the moisture content of the separated solids. Conveyors will pile the solids onto the concrete stacking pad. The pad will be sloped to ensure drainage of any remaining liquid. The separated solids will be removed from the stacking pad on a weekly basis. The solids are generally spread out in thin layers to dry. The dried solids are then piled up for storage, and used as needed for bedding in the freestalls.

Anaerobic Treatment Lagoon

Tony Meirinho & Sons Dairy #2 is proposing to convert an existing storage pond to an anaerobic treatment lagoon. The anaerobic treatment lagoon will require that the existing storage pond be utilized to store the effluent from the primary lagoon. The effluent from only the storage pond will be used for irrigation purposes. In addition, this anaerobic treatment system will be maintained and operated to meet the anaerobic treatment lagoon criteria listed below. An anaerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of manure by microbes in the absence of oxygen. This process of anaerobic decomposition results in the preferential conversion of organic compounds in the manure into methane, carbon dioxide, and water rather than intermediate metabolites (VOCs). The National Resource Conservation Service (NRCS) California Field Office Technical Guide Code 359 - Waste Treatment Lagoon specifies the following criteria for anaerobic treatment lagoons:

- 1) Minimum treatment volume - The minimum design volume must account for all potential sludge, treatment, precipitation, and runoff volumes;
- 2) Minimum hydraulic retention time – The retention time of the material in the lagoon must be adequate to provide environmentally safe utilization of waste;
- 3) Maximum Volatile Solids (VS) loading rate – The VS loading rate shall be based on maximum daily loading considering all waste sources that will be treated by the lagoon. The suggested loading rate for the San Joaquin Valley is 6.5-11 lb-VS/1000 ft³/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.

The anaerobic treatment lagoon system consists of two stages, a treatment lagoon (primary lagoon) and a storage pond. The effluent from the treatment lagoon (900' x 300' x 24') overflows into the storage pond/secondary lagoon (1200' x 250' x 15'), which is designed for liquid storage. The liquid level of the storage pond fluctuates because it is used for the irrigation of cropland and can be emptied when necessary. All the liquid manure at the dairy is pumped to the processing pit, through the mechanical separator and then into the anaerobic treatment lagoon system.



Storage Pond/Secondary Lagoon

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

Solid Manure Handling System Manure Stock Piles (Storage)

The scraped manure will either be immediately applied and incorporated into cropland at the dairy or will be dried and stockpiled for use as fertilizer at a later time. The separated solids will be dried and used as fertilizer or as bedding in the freestalls. The applicant proposes to cover the separated solid piles with weatherproof coverings from October through May, so that the solids will remain dry until it is ready to be used.

Feed Handling and Storage

This dairy stores the silage piles underneath a tarp or in an Ag-bag. The entire pile is covered except for the face of the pile. The face of the pile is kept open due to the continual need to extract the silage for feed purposes. The silage pile is disturbed 2-3 times per day.

V. Equipment Listing

Pre-Project Equipment Description:

N-6951-1-0: 1,040 COW MILKING OPERATION WITH ONE 24 STALL HERRINGBONE MILKING PARLOR AND ONE 30 STALL FLAT BARN MILKING PARLOR

- N-6951-2-1: COW HOUSING - 1,250 MATURE COWS (MILK COWS AND DRY COWS), 545 LARGE HEIFERS (15-24 MONTHS), 852 MEDIUM HEIFERS (7-14 MONTHS), 500 SMALL HEIFERS (3-6 MONTHS), AND 60 MATURE BULLS HOUSED IN FREESTALL WITH FLUSH SYSTEM; 400 CALVES (UNDER 3 MONTHS) HOUSED IN ABOVEGROUND CALF HUTCHES WITH FLUSH SYSTEM
- N-6951-3-0: LIQUID MANURE HANDLING SYSTEM CONSISTING OF TWO SETTLING BASINS; ONE STORAGE POND; ONE LAGOON; MANURE LAND APPLIED THROUGH FLOOD IRRIGATION AND FURROW IRRIGATION
- N-6951-4-0: SOLID MANURE HANDLING CONSISTING OF OPEN AND COVERED MANURE STOCK PILES; WINDROW COMPOSTING; SOLID MANURE APPLICATION TO LAND AND HAULED OFFSITE
- N-6951-5-0: FEED STORAGE AND HANDLING CONSISTING OF COVERED FEED STORAGE OR COMMODITY BARN, SILAGE PILES, AG BAGS, DRY GRAIN TANKS AND SILOS

Proposed Modification:

- N-6951-1-2: MODIFICATION OF 1,040 COW MILKING OPERATION WITH ONE 80 STALL ROTARY MILKING PARLOR AND ONE 30 STALL FLAT BARN MILKING PARLOR: INCREASE NUMBER OF MILK COWS TO 4,800
- N-6951-2-2: MODIFICATION OF COW HOUSING - 1,250 MATURE COWS (MILK COWS AND DRY COWS), 545 LARGE HEIFERS (15-24 MONTHS), 852 MEDIUM HEIFERS (7-14 MONTHS), 500 SMALL HEIFERS (3-6 MONTHS), AND 60 MATURE BULLS HOUSED IN FREESTALL WITH FLUSH SYSTEM; 400 CALVES (UNDER 3 MONTHS) HOUSED IN ABOVEGROUND CALF HUTCHES WITH FLUSH SYSTEM: INCREASE NUMBER OF COWS TO 4,800 MILK COWS, NOT TO EXCEED A COMBINED TOTAL OF 5,800 MATURE COWS, 4,402 SUPPORT STOCK (HEIFERS AND BULLS), AND 900 CALVES; CONSTRUCT TWO 1,200-COW FREESTALL BARNS AND ONE 520 COW SPECIAL NEEDS FREESTALL BARN WITH FLUSH SYSTEM; CONSTRUCT EIGHT LARGE HEIFER CORRALS, FOUR DRY COW CORRALS AND ONE SAUDI STYLE AND ONE LOAFING BARN FOR HEIFERS; AND INSTALL WINDBREAKS
- N-6951-3-1: MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF SETTLING BASIN(S); ONE STORAGE POND; ONE LAGOON; MANURE LAND APPLIED THROUGH FLOOD IRRIGATION AND FURROW IRRIGATION: ALLOW INCREASE IN THROUGHPUT DUE TO HERD INCREASE AUTHORIZED BY ATC -2-2; CONSTRUCT A

PROCESSING PIT AND MECHANICAL SEPARATOR; AND CONVERT A
STORAGE POND TO AN ANAEROBIC TREATMENT LAGOON

- N-6951-4-1: MODIFICATION OF SOLID MANURE HANDLING CONSISTING OF OPEN AND COVERED MANURE STOCK PILES; WINDROW COMPOSTING; SOLID MANURE APPLICATION TO LAND AND HAULED OFFSITE: ALLOW INCREASE IN THROUGHPUT DUE TO HERD EXPANSION AUTHORIZED BY ATC -2-2
- N-6951-5-1: MODIFICATION OF FEED STORAGE AND HANDLING CONSISTING OF COVERED FEED STORAGE OR COMMODITY BARN, SILAGE PILES, AG BAGS, DRY GRAIN TANKS AND SILOS AND TMR: ALLOW INCREASE IN THROUGHPUT DUE TO HERD EXPANSION AUTHORIZED BY ATC -2-2

Post Project Equipment Description:

- N-6951-1-2: 4,800 COW MILKING OPERATION WITH ONE 80 STALL ROTARY MILKING PARLOR AND ONE 30 STALL FLAT BARN MILKING PARLOR
- N-6951-2-2: COW HOUSING - 4,800 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 5,800 MATURE COWS (MILK AND DRY); 4,402 SUPPORT STOCK (HEIFERS AND BULLS), AND 900 CALVES (0-3 MONTHS) IN ABOVEGROUND FLUSHED HUTCHES; AND FOUR FREESTALL BARN, ONE SPECIAL NEEDS/HOSPITAL FREESTALL BARN, ONE SAUDI BARN AND TWO LOAFING BARN WITH FLUSH/SCRAPE SYSTEM
- N-6951-3-1: LIQUID MANURE HANDLING SYSTEM CONSISTING OF PROCESSING PIT(S) AND SETTLING BASIN(S); MECHANICAL SEPARATOR(S), ONE ANAEROBIC TREATMENT LAGOON (900' X 300' X 24'); ONE STORAGE POND; MANURE LAND APPLIED THROUGH FLOOD IRRIGATION AND FURROW IRRIGATION
- N-6951-4-1: SOLID MANURE HANDLING CONSISTING OF OPEN AND COVERED MANURE STOCK PILES; WINDROW COMPOSTING; SOLID MANURE APPLICATION TO LAND AND HAULED OFFSITE
- N-6951-5-1: FEED STORAGE AND HANDLING CONSISTING OF COVERED FEED STORAGE OR COMMODITY BARN, SILAGE PILES, AG BAGS, DRY GRAIN TANKS AND SILOS AND TMR

VI. Emission Control Technology Evaluation

Particulate matter (PM₁₀), volatile organic compounds (VOC), hydrogen sulfide (H₂S) and ammonia (NH₃) are the major pollutants of concern from dairy operations. PM₁₀ 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. NH₃ and H₂S emissions are generated from microbial metabolism of nitrogen and sulfur compounds in manure. The quantity of these emissions depends directly on the herd size and profile.¹

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

Milking Parlor:

A flush/spray system is used to wash out the manure from the milking parlor before, during, or after each group of cows is milked. Frequent flushing creates a moist environment that greatly reduces or eliminates PM₁₀ emissions. In addition, flush water dissolves NH₃ as well as various water-soluble VOC in the manure, thereby stopping or decelerating the emission of these pollutants directly into the atmosphere. Both manure and dissolved pollutants are subsequently carried by the flush water into the liquid manure handling system for further treatment.

Cow Housing:

Frequent flushing:

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

Shade Structures and Scraping

Dry cows are housed in open corrals with shade structures. Providing shade for the animals reduces movement and unnecessary activity during hot weather, which reduces PM₁₀ emissions. The surfaces of the exercise corrals from the freestall barns and all other corrals will be scraped in the morning hours on a bi-weekly basis (except during wet conditions). Frequent scraping of the corrals will reduce the amount of dry manure on the corral surfaces that may be pulverized by the cows' hooves and emitted as PM₁₀. This practice will also reduce the chance of anaerobic conditions developing in the manure pack of the corral surface, potentially reducing VOC emissions.

Windbreaks:

Windbreaks are a single row or multiple rows of trees planted on the windward or downwind boundary of a given site. Windbreak design specifications are provided in

¹ 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.

the NRCS standard #380. Guidelines from this standard in conjunction with guidelines discussed with the local NRCS office are summarized as follows:

- Windbreak density on the leeward side of the source and windward of the area to be protected should be at least 65%. This density will provide the optimum particulate matter interception. "Density", when viewing through the windbreak from 60 feet to 100 feet away upwind of the rows, is the percentage of the background view that is obscured or hidden.
- Windbreaks should be irrigated to provide the greatest survivability and the most rapid growth of the trees and shrubs.
- Weed control and prompt replacement of any dead trees or shrubs should be practiced.

The applicant has proposed to establish the windbreaks in accordance with the requirements summarized above.

Liquid Manure Handling:

Solids Separation:

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

Anaerobic Treatment Lagoon System:

A properly designed and operated anaerobic treatment lagoon system reduces VOC emissions by optimizing the anaerobic activity that favors the complete conversion of organic compounds in the manure into methane, carbon dioxide, and water instead of partial conversion into various intermediate metabolites that are predominantly VOC. Pursuant to the design check analysis shown in Appendix B, the proposed anaerobic treatment lagoon system is expected to meet the standard requirements.

Liquid Manure Land Application:

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

Solid Manure Handling:

Based on the information currently available, emissions from solid manure applied to cropland are expected to be low. However, to ensure that any possible emissions are minimized, the manure will be promptly incorporated into the soil after application. This will reduce any volatilization of gaseous pollutants, as the soil provides cover from wind and other weather elements that enhance volatilization. In addition, incorporation reduces emissions by biofilter effect, whereby the adsorption of NH_3 , VOC, and other compounds onto soil particles provides an opportunity for oxidation by the action of various microorganisms the soil.²

Feed Storage and Handling:

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

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

VII. General Calculations

A. Assumptions

- Potential to emit calculations will be based on the permitted limits for the different age categories of cows in the existing and proposed herds.
- Only emissions from the lagoons/storage ponds (Permit # N-6951-3-1) engine (N-6951-6-0) and gasoline dispensing operation (N-6951-7-0) will be used to determine if the facility is a major source since these units are considered to be the only sources of non-fugitive emissions at dairies, as discussed in section VII.C.5
- The conditions on the existing Permits to Operate are based on the Rule 4570 Phase II mitigation measures originally proposed via application/project #N-1104452. Since the applicant has not proposed any Rule 4570 Phase II mitigation measure changes, the existing mitigation measures will be used in the current evaluation. Modifications to specific measures will be made, as necessary, to accommodate New Source Review requirements from the current project.

² 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>)

- All PM₁₀ emissions will be allocated to the cow housing permit unit (N-6951-2).
- All H₂S emissions will be allocated to the liquid manure permit unit - lagoons. (N-6951-3).
- The PM₁₀ control efficiency for shade structures is from a District document titled "Dairy/Feedlot PM₁₀ Mitigation Practices and their Control Efficiencies."³
- The PM₁₀ emission factors are from a District document titled "Dairy and Feedlot PM₁₀ Emissions Factors,"⁴ which compiled data from studies performed by Texas A&M and ASAE, and a USDA/UC Davis report, quantifying dairy and feedlot emissions.
- The VOC emission factors for milk cows are from a District document titled "Air Pollution Control Officer's Revision to the Dairy VOC Emission Factors, February 2012."⁵ Volatile solids excretion ratios were used to derive the proportionate VOC emission factors for dry cows and support stock.
- The NH₃ emission factor for milk cows is based on California Air Resources Board's dairy cattle ammonia emission factor.⁶ Manure-based VOC emission ratios were used to apportion the NH₃ emission factor to the various emissions units. Further, nitrogen excretion ratios were used to derive the proportionate NH₃ 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.
- VOC emission reductions from a properly designed and maintained anaerobic treatment lagoon system are expected to be high. However, in order to be conservative, a control efficiency of 40% for both the lagoons and land application of liquid manure will be applied to this control measure, until better data become available.

B. Emission Factors

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

³ http://www.valleyair.org/busind/pto/dpag/Dairy_PM10_Control_Efficiencies.pdf

⁴ http://www.valleyair.org/busind/pto/dpag/FY1_%20Dairy_Feedlot_PM10_Emission_Factor.pdf

⁵ [http://www.valleyair.org/busind/pto/emission_factors/2012-Final-Dairy-EE-Report/FinalDairyEFReport\(2-23-12\).pdf](http://www.valleyair.org/busind/pto/emission_factors/2012-Final-Dairy-EE-Report/FinalDairyEFReport(2-23-12).pdf)

⁶ <http://www.arb.ca.gov/ei/areasrc/livestockemisfwp.pdf>

C. Calculations

1. Pre-Project Potential to Emit (PE1)

The potential to emit for the operation is calculated in Appendix A, and summarized in the tables below:

PE1 (N-6951-1-0)		
	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO _x	0.0	0
SO _x	0.0	0
PM ₁₀	0.0	0
CO	0.0	0
VOC	1.1	416
NH ₃	0.4	142

PE1 (N-6951-2-1)		
	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO _x	0.0	0
SO _x	0.0	0
PM ₁₀	12.1	4,422
CO	0.0	0
VOC	49.6	18,099
NH ₃	90.5	32,988

PE1 (N-6951-3-0)		
	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO _x	0.0	0
SO _x	0.0	0
PM ₁₀	0.0	0
CO	0.0	0
VOC	11.6	4,249
NH ₃	32.5	11,849
H ₂ S	2.1	741

PE1 (N-6951-4-0)		
	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO _x	0.0	0
SO _x	0.0	0
PM ₁₀	0.0	0
CO	0.0	0
VOC	2.1	819
NH ₃	12.0	4,414

PE1 (N-6951-5-0)		
	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO _x	0.0	0
SO _x	0.0	0
PM ₁₀	0.0	0
CO	0.0	0
VOC	108.2	39,476
NH ₃	0.0	0

2. Post-Project Potential to Emit (PE2)

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

Milking Parlor (N-6951-1-2)

As a condition of approval, this dairy will be required to feed all animals at the dairy in accordance with NRC guidelines. This dairy will also be required to flush the milking parlor after each milking. Therefore, the control efficiency for these practices will be used to calculate post-project VOC emissions from the milking parlor.

The post-project emissions from the milking parlor are calculated in Appendix A and summarized as follows:

Post-Project Potential to Emit (PE2) N-6951-1-2		
	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO _x	0.0	0
SO _x	0.0	0
PM ₁₀	0.0	0
CO	0.0	0
VOC	5.3	1,920
NH ₃	1.8	657

Cow Housing (N-6951-2-2)

VOC

As a condition of approval, this dairy will be required to feed all animals in accordance with NRC guidelines, flush the freestalls for milk cows and dry cows at least four times per day, have concrete lanes, sloped corrals and the required Rule 4570 measures. Therefore, the control efficiencies shown in Appendix A will be used to calculate post-project VOC emissions from the cow housing permit unit.

PM₁₀ and NH₃

As a condition of approval, this dairy will be required to plant trees (shelterbelt) around the downwind sides of the dairy in accordance with the NRCS specifications and standards. In addition, the applicant will install shade structures in all open corrals, feed heifers near dusk, scrape the open corrals and freestall exercise pens bi-weekly in the morning hours and construct freestalls. Therefore, the post-project PM₁₀ emissions from the cow-housing permit will be based on the controlled PM₁₀ emission factors given in Appendix A.

The post-project emissions from the cow housing permit unit are calculated in Appendix A and summarized as follows:

Post-Project Potential to Emit (PE2) N-6951-2-2		
	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO _x	0.0	0
SO _x	0.0	0
PM ₁₀	60.9	22,214
CO	0.0	0
VOC	183.5	66,923
NH ₃	362.8	132,340

Liquid Manure Handling System (N-6951-3-1: Lagoon, Storage Pond, and Liquid Manure Land Application)

As a conditions of approval, this dairy will be required to feed all animals at the dairy in accordance with the NRC guidelines, operate the lagoon in an anerobic state, and only land apply manure from the anerobic treatment lagoon. Therefore, the control efficiencies in Appendix A will be used to calculate post-project VOC emissions from liquid manure land application.

The post-project emissions from liquid manure are calculated in Appendix A and summarized as follows:

Post-Project Potential to Emit (PE2) N-6951-3-1		
	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO _x	0.0	0
SO _x	0.0	0
PM ₁₀	0.0	0
CO	0.0	0
VOC	27.0	9,804
NH ₃	84.1	30,698
H ₂ S	2.1	741

Solid Manure Handling System (N-6951-4-1)

As conditions of approval, this dairy will be required to feed all animals at the dairy in accordance with the NRC guidelines and incorporate solid manure applied to cropland within 2 hours. Therefore, the control efficiencies for feeding all animals in accordance with NRC guidelines and rapid incorporation will be used to calculate post-project VOC emissions from solid manure land application.

The post-project emissions from solid manure are calculated in Appendix A and summarized as follows:

Post-Project Potential to Emit (PE2) N-6951-4-1		
	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO _x	0.0	0
SO _x	0.0	0
PM ₁₀	0.0	0
CO	0.0	0
VOC	6.5	2,366
NH ₃	48.5	17,721

Feed Storage and Handling Permit Unit (N-6951-5-1)

As conditions of approval, this dairy will be required to feed all animals at the dairy in accordance with the NRC guidelines and additional Rule 4570 Mitigation Measures as discussed in the Rule compliance section. Therefore, the control efficiencies for feeding all animals in accordance with NRC guidelines and the additional mitigation measures will be used to calculate post-project VOC emissions from feed storage and handling.

The post-project emissions from feed storage and handling are calculated in Appendix A and summarized as follows:

Post-Project Potential to Emit (PE2) N-6951-5-1		
	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO _x	0.0	0
SO _x	0.0	0
PM ₁₀	0.0	0
CO	0.0	0
VOC	262.4	95,760
NH ₃	0.0	0

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

Pursuant to District Rule 2201, the Pre-Project Stationary Source Potential to Emit (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 that have occurred at the source, and which have not been used on-site.

As previously discussed in section VII.C.1, pre-project emissions for units N-6951-1-0, -2-1, -3-0, -4-0 and -5-0 are calculated in Appendix A. Calculations for units N-6951-6-0 and -7-0 were previously performed in Project N-1104452. These calculations have been reviewed and there has not been any changes to the equipment rating, emission factors, hours of operation or any other parameters used to calculate the emissions for these units, therefore emissions will not be recalculated for this project. The calculated emissions from Project N-1104452 for the emergency IC engine (-6-0) and gasoline dispensing operation (-7-0) are included in the table below.

Pre-Project Stationary Source Potential to Emit [SSPE1] (lb/year)						
	NO _x	SO _x	PM ₁₀	CO	VOC	NH ₃
N-6951-1-0 (Milk Parlor)	0	0	0	0	416	142
N-6951-2-1 (Cow Housing)	0	0	4,422	0	18,099	32,988
N-6951-3-0 (Liquid Manure Handling)	0	0	0	0	4,249	11,849
N-6951-4-0 (Solid Manure Handling)	0	0	0	0	819	4,414
N-6951-5-0 (Feed Storage and Handling)	0	0	0	0	39,476	0
N-6951-6-0 (N-1104452) 120 bhp Diesel-Fired Emergency Engine	937	0	45	285	107	0
N-6951-7-0 (N-1104452) Gasoline Dispensing Operation	0	0	0	0	117	0
Pre-Project SSPE (SSPE1)	937	0	4,467	285	63,283	49,393

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

Pursuant to District Rule 2201, the Post Project Stationary Source Potential to Emit (SSPE2) 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 that have occurred at the source, and which have not been used on-site.

As previously discussed in section VII.C.2, post-project emissions for units N-6951-1-2, -2-2, -3-1, -4-1 and -5-1 are calculated in Appendix A. Calculations for units N-6951-6-0 and -7-0 were previously performed in Project N-1104452. These calculations have been reviewed and there has not been any changes to the equipment rating, emission factors, hours of operation or any other parameters used to calculate the emissions for these units proposed in this project, therefore emissions will not be recalculated for this project. The calculated emissions from Project N-1104452 for the emergency IC engine (-6-0) and gasoline dispensing operation (-7-0) are included in the table below.

Post-Project Stationary Source Potential to Emit [SSPE2] (lb/year)							
	NO _x	SO _x	PM ₁₀	CO	VOC	NH ₃	H ₂ S
N-6951-1-2 (Milk Parlor)	0	0	0	0	1,920	657	0
N-6951-2-2 (Cow Housing)	0	0	20,214	0	66,923	132,345	0
N-6951-3-1 (Liquid Manure Handling)	0	0	0	0	9,804	30,698	741
N-6951-4-1 (Solid Manure Handling)	0	0	0	0	2,366	17,721	0
N-6951-5-1 (Feed Storage and Handling)	0	0	0	0	95,760	0	0
N-6951-6-0 (N-1104452) 120 bhp Diesel-Fired Emergency Engine	937	0	45	285	107	0	0
N-6951-7-0 (N-1104452) Gasoline Dispensing Operation	0	0	0	0	117	0	0
Post-Project SSPE (SSPE2)	937	0	20,259	285	176,997	181,416	741

5. Major Source Determination

Rule 2201 Major Source Determination:

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

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

40 CFR 51.165

Agricultural operations do not belong to any of the source categories specified in 40 CFR 51.165. Since this facility is an agricultural operation, fugitive emissions shall not be included in determining whether it is 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 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 Handling and Storage

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

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

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

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

As previously stated, emissions from liquid manure lagoons and storage ponds have already been determined to be non-fugitive. The facility's non-fugitive

stationary source potential emissions are summarized in the following tables:

Non-Fugitive SSPE1 (lb/year)							
Category	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO	VOC	H ₂ S
N-6951-3-0 - Lagoons only	0	0	0	0	0	2,045	741
N-6951-8-0 - Engine	937	0	45	45	285	107	0
N-6951-9-0 - GDO	0	0	0	0	0	117	0
Non-Fugitive SSPE1	937	0	45	45	285	2,269	741

Non-Fugitive SSPE2 (lb/year)							
Category	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO	VOC	H ₂ S
N-6951-3-1 - Lagoons only	0	0	0	0	0	4,698	741
N-6951-8-0 - Engine	937	0	45	45	285	107	0
N-6951-9-0 - GDO	0	0	0	0	0	117	0
Non-Fugitive SSPE2	937	0	45	45	285	4,922	741

Rule 2201 Major Source Determination						
Category	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO	VOC
SSPE1 (lb/yr)	937	0	45	45	285	2,045
SSPE2 (lb/yr)	937	0	45	45	285	4,922
Major source threshold (lb/yr)	20,000	140,000	140,000	140,000	200,000	20,000
Major Source? (Y/N)	N	N	N	N	N	N

As seen in the table above, the facility is not becoming a Major Source as a result of this project. For Lagoon/Storage Pond Calculations, see Appendix A.

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.

PSD Major Source Determination (tons/year)						
	NO ₂	VOC	SO ₂	CO	PM	PM ₁₀
Estimated Facility PE before Project Increase	0.47	1.13	0	0.14	0.02	0.02
PSD Major Source Thresholds	250	250	250	250	250	250
PSD Major Source ? (Y/N)	N	N	N	N	N	N

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

6. Baseline Emissions (BE)

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

Pursuant to District Rule 2201, BE = PE1 for:

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

Otherwise,

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

Since this facility is not a major source for any pollutants, BE = PE1.

7. SB 288 Major Modification

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

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

8. Federal Major Modification

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

Since this source is not included in the 28 specific source categories specified in 40 CFR 51.165, the increases in fugitive emissions are not included in the Federal Major Modification determination.

Since this facility is not a Major Source for any pollutant, this project does not constitute a Federal Major Modification.

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

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

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

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.

PSD Major Source Determination: Potential to Emit (tons/year)							
	NO ₂	VOC	SO ₂	CO	PM	PM ₁₀	H ₂ S
Total PE from New and Modified Units	0	2.46	0	0	0	0	0
PSD Major Source threshold	250	250	250	250	250	250	250
New PSD Major Source?	N	N	N	N	N	N	N

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 C.

VIII. Compliance

Rule 1070 Inspections

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

This rule allows the District to perform inspections for the purpose of obtaining information necessary to determine whether air pollution sources are in compliance with applicable rules and regulations. The rule also allows the District to require record keeping, to make inspections and to conduct tests of air pollution sources. Therefore, the following conditions will be listed on the 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 3.0, any person building, altering or replacing any operation, article, machine, equipment, or other contrivance, the use of which may cause the issuance of air contaminants or the use of which may eliminate or reduce or control the issuance of air contaminants, shall first obtain authorization for such construction from the APCO. An Authority to Construct shall remain in effect until the Permit to Operate the source operation for which the application was filed is granted or denied, or the application is canceled as described in Rule 2050 (Cancellation of Application).

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

The facility has obtained a Permit to Operate for the existing operation, and has

submitted an Authority to Construct permit application for the proposed modifications. Continued compliance with the requirements of this rule is therefore expected.

Rule 2201 New and Modified Stationary Source Review Rule

A. Best Available Control Technology (BACT)

1. BACT Applicability

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

As discussed in Section VII.A above, only the milking parlor permit unit at the dairy will also be treated as a single emissions unit. For BACT analysis purposes, the cow housing permit unit will treat each corral and barn as an emission unit, the liquid manure handling permit unit will contain two emissions units: lagoons/storage ponds and liquid manure land application, the solid manure handling permit will contain two emissions units: storage piles and solid manure land application, and the feed handling and storage will contain two emission units: the Total Mixed Rations (TMR) and silage piles. The following permit units are new:

Cow Housing (N-6951-2-2):

As seen in Appendix A of this evaluation, the applicant is proposing to install new freestall cow housing for milk cows with a PE greater than 2.0 lbs/day for VOC, PM₁₀, and NH₃; therefore, BACT is triggered for VOC, PM₁₀ and NH₃ from the freestall milk cow housing. The applicant is proposing to install new open corral cow housing for dry cows with a PE greater than 2.0 lbs/day for VOC and NH₃; therefore, BACT is triggered for VOC and NH₃ from the open corral dry cow housing. The PE for the new open corral cow housing for dry

cows is less than 2.0 lbs/day for PM₁₀; therefore, BACT is not triggered for PM₁₀ from the open corral dry cow housing. The PE for VOC, NH₃ and PM₁₀ for all emissions units in the small and medium heifer cow housing is less than 2.0 lb/day ; therefore, BACT is not triggered for any of the emissions units for cow housing for the small and medium heifers. The PE for the housing for large heifers for PM₁₀ and NH₃ is greater than 2.0 lbs/day therefore, BACT is triggered for the large heifer housing. The PE for the housing for dry cow corrals for VOC and NH₃ is greater than 2.0 lbs/day therefore, BACT is triggered for the open corral dry cow housing. The PE for the housing for calves for NH₃ is greater than 2.0 lbs/day therefore, BACT is triggered for the calf housing. The PE for the housing for bulls for PM₁₀ and NH₃ is greater than 2.0 lbs/day therefore, BACT is triggered for the bull housing.

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 relocation of an emissions unit.

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

$$\text{AIPE} = \text{PE}_2 - \text{HAPE}$$

Where,

AIPE = Adjusted Increase in Permitted Emissions, (lb/day)

PE₂ = Post-Project Potential to Emit, (lb/day)

HAPE = Historically Adjusted Potential to Emit, (lb/day)

$$\text{HAPE} = \text{PE}_1 \times (\text{EF}_2/\text{EF}_1)$$

Where,

PE₁ = The emissions unit's PE prior to modification or relocation, (lb/day).

EF₂ = The emissions unit's permitted emission factor for the pollutant after modification or relocation. If EF₂ is greater than EF₁ then EF₂/EF₁ shall be set to 1.

EF₁ = The emissions unit's permitted emission factor for the pollutant before the modification or relocation.

$$\text{AIPE} = \text{PE}_2 - (\text{PE}_1 \times (\text{EF}_2 / \text{EF}_1))$$

Detailed AIPE calculations for each emissions unit are shown in Appendix A. The AIPE is greater than 2 lb/day, and therefore BACT is triggered, for the

emissions units and pollutants summarized below:

Milking Operation (N-6951-1-2):

VOC from the milk parlor.

Cow Housing (N-6951-2-2):

VOC and NH₃ from existing Frestall 2

Liquid Manure Handling System (N-6951-3-1):

VOC from the liquid manure handling system (land application).

Solid Manure Handling System (N-6951-4-1):

VOC and NH₃ from the solid manure/separated solids piles.

Solid Manure Handling System (N-6951-4-1):

VOC and NH₃ from the solid manure (land application).

Feed Handling and Storage (N-6951-5-1):

VOC from the feed storage and handling (Total Mixed Rations).

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 emissions. Therefore BACT is not triggered under this category.

2. Top-Down BACT Analysis

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

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

Milking Parlor (N-6951-1-2)

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

Cow Housing (N-6951-2-2)

PM₁₀:

- 1) Concrete feed lanes and walkways
- 2) Scraping of exercise pens and open corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions
- 3) Shade structures in open corrals
- 4) Feeding heifers in corrals near dusk (within 1 hour of dusk)
- 5) Windbreaks controlling dust from corrals (when feasible and there is adequate space at existing facilities)
- 6) Calf Hutches ($\geq 75\%$ control)

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

- 2) Freestall feed lanes and walkways for milk cows and dry cows flushed four times per day and feed lanes and walkways in the corrals flushed at least one time per day and hutches flushed at least one time per week.
- 3) Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.
- 4) Exercise pens and open corrals properly sloped to promote drainage (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managed to maintain a dry surface (except during periods of rainy weather).
- 5) Scraping of exercise pens and open corrals every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions
- 6) VOC mitigation measures required by District Rule 4570.

NH₃: 1) Concrete feed lanes and walkways in freestall barns

- 2) Freestall feed lanes and walkways for milk and dry cows flushed four times per day and feed lanes and walkways in the corrals flushed at least one time per day and hutches at least one time per week.
- 3) Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.
- 4) Exercise pens and open corrals properly sloped to promote drainage (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal.)

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

Liquid Manure Handling System (N-6951-3-1)

Lagoon & Storage Pond

VOC: Anaerobic treatment lagoon with solids separation.

NH₃: Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.

Land Application

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

NH₃: Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.

Solid Manure Handling and Land Application (N-6951-4-1)

VOC: Daily incorporation or injection of solid manure into cropland (within 2 hours).

NH₃: Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.

Feed Storage and Handling (N-6951-5-1)

Feed/Total Mixed Rations (TMR)

VOC: Implement District Rule 4570 management practices for feed.

B. Offsets

1. Offset Applicability

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

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

Offset Determination (lb/year)					
	NO _x	SO _x	PM ₁₀	CO	VOC
SSPE2	937	0	20,259	285	176,997
Offset Thresholds	20,000	54,750	29,200	200,000	20,000
Offsets triggered?	No	No	Yes	No	Yes

2. Quantity of Offsets Required

Pursuant to Section 4.6.9 of Rule 2201, offsets are not required for agricultural operations that are not major sources. As shown in Section VII.C.5 of this evaluation, this facility is not a major source. Offsets are therefore not required.

C. Public Notification

1. Applicability

Public noticing is required for:

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

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

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

As demonstrated in Sections VII.C.7 and VII.C.8, this project does not constitute an SB 288 or Federal Major Modification; therefore, public noticing for SB 288 or Federal Major Modification purposes is not required.

b. PE > 100 lb/day

The PE2 for the new emissions units with the highest emissions from each permit unit are compared to the daily PE Public Notice thresholds in the following table:

PE > 100 lb/day Public Notice Thresholds			
Pollutant	PE2 (lb/day)	Public Notice Threshold	Public Notice Triggered?
NO _x	0.0	100 lb/day	No
SO _x	0.0	100 lb/day	No
PM ₁₀	3.0	100 lb/day	No
CO	0.0	100 lb/day	No
VOC	32.4	100 lb/day	No
NH ₃	69.5	100 lb/day	No
H ₂ S	0	100 lb/day	No

As shown in the previous table the PE2 is less than 100 lb/day for all new emissions units, therefore, public noticing for PE > 100 lb/day purposes is not required.

c. Offset Threshold

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

Offset Threshold				
Pollutant	SSPE1 (lb/year)	SSPE2 (lb/year)	Offset Threshold	Public Notice Required?
NO _x	937	937	20,000 lb/year	No
SO _x	0	0	54,750 lb/year	No
PM ₁₀	4,467	20,259	29,200 lb/year	No
CO	285	285	200,000 lb/year	No
VOC	63,283	176,997	20,000 lb/year	No
NH ₃	49,393	181,416	NA	No

As detailed above, no thresholds for were 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.

Stationary Source Increase in Permitted Emissions [SSIPE] – Public Notice					
Pollutant	SSPE2 (lb/year)	SSPE1 (lb/year)	SSIPE (lb/year)	SSIPE Public Notice Threshold	Public Notice Required?
NO _x	937	937	0	20,000 lb/year	No
SO _x	0	0	0	20,000 lb/year	No
PM ₁₀	20,259	4,467	15,792	20,000 lb/year	No
CO	285	285	0	20,000 lb/year	No
VOC	176,997	63,283	113,714	20,000 lb/year	Yes
NH ₃	181,416	49,393	132,023	20,000 lb/year	Yes
H ₂ S	741	741	0	20,000 lb/year	No

As demonstrated above, the SSIPE for VOC and NH₃ are 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 because the SSIPE for VOC and NH₃ are greater than 20,000 lb/year. Therefore, public notice documents will be submitted to the California Air Resources Board (CARB) and a public notice will be published in a local newspaper of general circulation in Merced County prior to the issuance of the ATCs for the dairy construction.

D. Daily Emission Limits (DELs)

Daily Emissions Limitations (DELs) and other enforceable conditions are required by Section 3.16 to restrict a unit's maximum daily emissions, to a level at or below the emissions associated with the maximum design capacity. Per Sections 3.16.1 and 3.16.2, the DEL must be contained in the latest ATC and contained in or enforced by the latest PTO and enforceable, in a practicable manner, on a daily basis. DELs are also required to enforce the applicability of BACT.

For dairies, the DEL is satisfied based on the number and types of cows at the dairy and the required controls and mitigation measures. The number and types of cows are listed in the permit equipment description for the Cow Housing (Permit N-6951-2).

Milking Parlor (N-6951-1-2)

For the milking parlor the DEL is satisfied by the number of cows listed in the permit description. Additionally, the following condition will be placed on the ATC:

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

Cow Housing (N-6951-2-2)

The total number of cattle housed at this dairy at any one time shall not exceed any of the following: 5,800 mature cows (milk and dry); 1,600 heifers (15-24 months); 1,400 heifers (7-14 months); 1,252 heifers (4-6 months), 900 calves and 150 bulls. [District Rule 2201]

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

Open corrals and exercise pens shall be scraped every other week using a pull-type scraper in the morning hours, except when prevented by wet conditions. [District Rules 2201 and 4570]

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

Permittee shall establish windbreaks along the direction of the prevailing wind for the upwind and downwind sides of the cow housing at the dairy. Windbreaks shall consist of the following rows with the first row closest to the dairy: the first row shall consist of Leland Cypress, planted 10 feet apart and the second row shall consist of Aptos Blue Redwood, planted 14 feet apart. Each row should be offset from the adjacent row. Spacing between rows shall be sufficient to accommodate cultivation equipment. This spacing shall not exceed 20 feet. An alternative windbreak proposal must be approved by the District. [District Rule 2201]

The open corrals shall be equipped with shade structures for the all cows. [District Rule 2201]

At least one of the feedings of the heifers at this dairy shall be within one hour of dusk. [District Rule 2201]

Permittee shall flush or hose freestall lanes immediately prior to, immediately after or during each milking. [District Rules 2201 and 4570]

Permittee shall scrape, vacuum or flush concrete lanes in corrals at least four (4) times every day for mature cows and twice a day for heifers and once a week for calves. [District Rules 2201 and 4570]

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]

All animals at this dairy shall be fed in accordance with the National Research Council (NRC) guidelines utilizing routine dairy nutritionist analyses of rations. [District Rule 2201]

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]

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]

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]

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

Liquid Manure Handling System (N-6951-3-1)

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

The liquid manure handling system shall handle flush manure from no more than 5,800 mature cows (milk and dry) 1,600 heifers (15-24 months); 1,400 heifers (7-

14 months); 1,252 heifers (4-6 months), 900 calves and 150 bulls. [District Rule 2201]

Permittee shall operate the lagoon (900' x 300') as an anaerobic treatment lagoon designed according to NRCS Guideline No. 359. [District Rule 2201]

Permittee shall only apply liquid manure that has been treated with an anaerobic treatment lagoon. [District Rules 2201 and 4570]

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

Permittee shall not allow liquid manure to stand in the fields for more than twenty-four (24) hours after irrigation. [District Rules 2201 and 4570]

Solid Manure Handling System (N-6951-4-1)

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

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

Remove separated solids from the facility within seventy-two (72) hours of removal from the drying process. Within seventy two (72) hours of removal from the drying process, 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. [District Rules 2201 and 4570]

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

Permittee shall incorporate all solid manure within two (2) hours of land application. [District Rules 2201 and 4570]

Feed Storage and Handling (N-6951-5-1)

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

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]

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

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

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

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

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]

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]

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]

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]

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]

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]

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]

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]

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

The conditions imposed under Rule 4570 are sufficient to enforce the monitoring requirements of Rule 2201. Rule 2201 will be added as a rule reference to the conditions listed in the Rule 4570 compliance discussion.

3. Recordkeeping

Recordkeeping is required to demonstrate compliance with the public notification and daily emission limit requirements of Rule 2201. In general, recordkeeping for the Milking Parlor (N-6951-1-2), the Liquid Manure Handling System (N-6951-3-1), and the Solid Manure Handling System (N-6951-4-1) 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-6951-2-2). The following conditions will be placed on the ATC permits:

Milking Parlor (N-6951-1-2)

The following conditions will appear on the ATC for the Milking Parlor:

- Permittee shall maintain daily records of the number of cows milked in the milking parlor. [District Rules 1070 and 2201]
- {modified 4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

Cow Housing (N-6951-2-2)

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

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

- Permittee shall maintain records of: (1) the number of times feed lanes are flushed per day and (2) the frequency of scraping and manure removal from open corrals. [District Rules 2201 and 4570]
- Permittee shall maintain records sufficient to demonstrate that freestall lanes are flushed, scraped or vacuumed immediately prior to, immediately after or during each milking. [District Rules 2201 and 4570]
- {4490} Permittee shall keep records or maintain an operating plan that requires freestall flush lanes to be flushed or scraped at least three times per day. [District Rule 4570]
- Permittee shall maintain records of the date that water pipes and troughs are inspected and leaks are repaired. [District Rules 2201 and 4570]
- Permittee shall maintain an operating plan that requires the feed lanes and walkways to be flushed at least four times per day for mature cows and at least two times per day for all other cows. [District Rules 2201 and 4570]
- Permittee shall maintain records of: (1) the date that animal waste that is not dry is removed from individual cow freestall beds; (2) the date that water pipes and troughs are inspected and leaks are repaired. [District Rules 2201 and 4570]
- 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]
- 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]
- 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 4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

Liquid Manure Handling System (N-6951-3-1)

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

- Permittee shall maintain records of design specifications and calculations for the Anaerobic Treatment Lagoon system in order to demonstrate that the system has been designed and is operating in accordance with the applicable National Resource Conservation Service (NRCS) technical guide. [District Rule 2201]
- Permittee shall maintain records that only liquid animal waste treated with an anaerobic treatment lagoon is applied to fields. [District Rules 2201 and 4570]

- Permittee shall maintain records to demonstrate liquid animal waste does not stand in the fields for more than twenty-four (24) hours after irrigation. [District Rules 2201 and 4570]
- {modified 4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

Solid Manure Handling System (N-6951-4-1)

To ensure that the solid manure is handled properly, the following conditions will be placed on the ATC for the Solid Manure Handling System:

- {4527} Permittee shall keep records of dates when manure is removed from the dairy or permittee shall maintain records to demonstrate that dry manure piles outside the pens are covered with a weatherproof covering from October through May. [District Rules 2201 and 4570]
- {4528} Permittee shall maintain records, such as manufacturer warranties or other documentation, demonstrating that the weatherproof covering over solid animal waste and/or weatherproof covering over separated solids, are installed, used, and maintained in accordance with manufacturer recommendations and applicable standards listed in NRCS Field Office Technical Guide Code 313 or 367, or any other applicable standard approved by the APCO, ARB, and EPA. [District Rules 2201 and 4570]
- Permittee shall keep records of dates when manure is removed from the facility or permittee shall maintain records to demonstrate that dry manure piles outside the pens are covered with a weatherproof covering from October through May. [District Rules 2201 and 4570]
- Permittee shall maintain records to demonstrate that all solid manure has been incorporated within two (2) hours of land application. [District Rules 2201 and 4570]
- {modified 4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

Feed Storage and Handling (N-6951-5-1)

To ensure that the BACT requirements are satisfied, the following conditions will be placed on the ATC for the Feed Storage and Handling Permit:

- {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]
- 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]

- 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]
- Permittee shall maintain records demonstrating that uneaten wet feed was removed from feed bunks within twenty-four (24) hours after the end of a rain event. [District Rules 2201 and 4570]
- Permittee shall maintain records of when uneaten wet feed was removed from feed bunks. [District Rules 2201 and 4570]
- 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]
- {4461} Permittee shall maintain records when grain is stored in a weatherproof storage structure from October through May. [District Rules 2201 and 4570]
- 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]
- 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]
- 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]
- 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]
- 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]
- 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]

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

4. Reporting

No reporting is required to demonstrate compliance with Rule 2201.

F. Ambient Air Quality Analysis

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

The proposed location is in an attainment area for NO_x, CO, and SO_x. The proposed dairy construction 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 PM₁₀. The increase in the ambient PM₁₀ concentration due to the proposed dairy construction is shown on the table titled Calculated Contribution. The District level of significance is shown on the table titled Significance Levels.

Significance Levels				
Pollutant	District Significance Level (µg/m ³)			
	24 hr Avg.	8 hr Avg.	3 hr Avg.	1 hr Avg.
PM ₁₀	10.4	N/A	N/A	N/A

Calculated Contribution				
Pollutant	Calculated Contributions (µg/m ³)			
	24 hr Avg.	8 hr Avg.	3 hr Avg.	1 hr Avg.
PM ₁₀	9.56	N/A	N/A	N/A

As shown above, the calculated contribution of PM₁₀ will not exceed the District significance level. Therefore, this project is not expected to cause or make worse a violation of an air quality standard.

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.

Under Rule 2550, newly constructed facilities or reconstructed units or sources⁷ at existing facilities would be subject to preconstruction review requirements if they have the potential to emit hazardous air pollutants (air toxics) in "major" amounts (10 tons or more of an individual pollutant or 25 tons or more of a combination of pollutants) and the new units are not already subject to a standard promulgated under Section 112(d), 112(j), or 112(h) of the Clean Air Act." Facilities or sources subject to Rule 2550 would be subject to stringent air pollution control requirements, referred to Maximum Achievable Control Technology.

The federal Clean Air Act lists 189 substances as potential HAPs (Clean Air Act Section 112(b)(1)). Based on the current emission factor for dairies, the following table outlines the HAPs expected to be emitted at dairies. Since this dairy is complying with Best Available Control Technology (BACT) emissions control requirements, many of the pollutants listed below are expected to be reduced significantly; however, no control is being applied in the emissions estimates in order to calculate worst-case emissions. Please note that a conclusion that MACT requirements are triggered would necessarily involve consideration of controlled emissions levels. The following is a list of HAPs generated at dairies including the associated emission factor.

⁷ Reconstruction" is defined as a change that costs 50 percent of the cost of constructing a new unit or source like the one being rebuilt.

Hazardous Air Pollutant Emissions		
HAP	lb-milk cow-yr	Source
Methanol	1.35	UC Davis - <i>VOC Emission from Dairy Cows and their Excreta</i> , 2005
Carbon disulfide	0.027	Dr. Schmidt - <i>Dairy Emissions using Flux Chambers (Phase I & II)</i> , 2005
Eythylbenzene	0.003	
o-Xylene	0.005	
1,2-Dibromo-3chloropropane	0.011	
1,2,4-Trichlorobenzene	0.025	
Napthalene	0.012	
Hexachlorobutadiene	0.012	
Formaldehyde	0.005	
Acetaldehyde	0.029	
Chloroform	0.017	
Styrene	0.01	California State University Fresno (CSUF) - <i>Monitoring and Modeling of ROG at California Dairies</i> , 2005
Vinyl acetate ⁸	0.08	Dr. Schmidt - <i>Dairy Emissions using Flux Chambers (Phase I & II)</i> & California State University Fresno (CSUF) - <i>Monitoring and Modeling of ROG at California Dairies</i> , 2005
Toluene ⁹	0.162	
Cadmium	0.009	Air Resources Board's Profile No. 423, <i>Livestock Operations Dust</i>
Hexavalent Chromium	0.004	
Nickel	0.026	
Arsenic	0.005	
Cobalt	0.003	
Lead	0.033	
Total	1.828	

Although some of the pollutants listed above may have been misidentified as HAPs due to similarities of many compounds consisting of very similar spikes (as measured through the gas Chromatograph Mass Spectroscopy - GCMS), all of these pollutants will be used in calculating the worst-case HAP emissions. Since this dairy is complying with all of the Best Available Control Technology (BACT) requirements and Rule 4570 mitigation measures, many of the pollutants listed above are expected to be mitigated, however, no control is being applied to these factors at this time in order to calculate the worst-case emissions. The emission calculations are shown below:

⁸ 0.01 + 0.07 = 0.08 lbs/hd-yr

⁹ 0.012 + 0.15 = 0.162 lbs/hd-yr

HAP Emissions						
Type of Cow	Number of cows	Emission Factor lbs/hd-yr ¹⁰			lbs/yr	tons/yr
Milking Cow	4800	x	1.828	=	8,774	4.39
Dry Cow	1000	x	1.123	=	1,123	0.56
Heifer (15-24 mo)	1600	x	0.786	=	1,258	0.63
Heifer (7-14 mo)	1400	x	0.686	=	960	0.48
Heifer (4-6 mo)	1252	x	0.621	=	777	0.39
Calf (under 3 mo)	900	x	0.584	=	526	0.26
Bulls	150	x	1.123	=	168	0.08
Total	11,102			=	13,586	6.79

As shown above, each individual HAP is expected to be below 10 tons per year and total HAP emissions are expected to be below 25 tons per year. The largest individual HAP would be methanol, at 5.01 tons per year (6.79 tons x (1.35 lb-methanol/1.828 lb-HAPs)). Therefore, this facility will not be a major air toxics source and the provisions of Rule 2550 do not apply.

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

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

Rule 4101 Visible Emissions

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

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

¹⁰ The emission factor has been adjusted for each type of cow based on the ratio of amount of manure generated for each cow.

Pursuant to District Rule 8081, Section 4.1, on-field agricultural sources are exempt from the requirements of Regulation VIII.

An on-field agricultural source is 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;

The units involved in this project are used solely for the raising of dairy animals. Therefore, these units are exempt from the provisions of this rule.

Rule 4102 Nuisance

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

The applicant is proposing BACT and has proposed all mitigation measures required by Rule 4570. Therefore, this dairy is expected to comply with this rule.

California Health and Safety Code 41700 (Health Risk Assessment)

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

An HRA is not required for a project with a total facility prioritization score of less than one. According to the Technical Services Memo for this project (Appendix E), the total facility prioritization score including this project was greater than one. Therefore, a health risk assessment 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:

RMR Summary						
Categories	Milk Parlor (Unit 1-2)	Dairy Cow Housing (Unit 2-2)	Lagoons & Land Application (Unit 3-1)	Dry Manure (Unit 4-1)	Project Totals	Facility Totals
Prioritization Score	3.29	214	183	1.14	>1	>1
Acute Hazard Index	0.00	0.19	0.37 ¹	0.02	0.58 ¹	0.58 ¹
Chronic Hazard Index	0.00	0.10	0.01	0.00	0.11	0.11
Maximum Individual Cancer Risk	1.43E-07	5.70E-06	2.09E-06	N/A ³	7.94E-06	7.94E-06
T-BACT Required?	No	Yes/No	Yes	No		
Special Permit Requirements?	No	No	Yes	No		

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 E of this report, the emissions increases for this project was determined to be less than significant.

- The quarterly H₂S concentration shall not exceed 5.0 mg/L.

Rule 4550 Conservation Management Practices (CMP)

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

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

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

The facility received District approval for its current CMP plan on February 14, 2012. Continued compliance with the requirements of District Rule 4550 is expected.

Rule 4570 Confined Animal Facilities (CAF)

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

Section 5.0 Requirements

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

Pursuant to Section 5.1.2, a thirty-day public noticing and commenting period shall be required for all large CAF's receiving their initial Permit-to-Operate or Authority-to-Construct.

The applicant has submitted an application containing all the requirements above. This facility is not receiving their initial Authority to Construct, therefore, public noticing is not required for Rule 4570 purposes. However, a public notice will be published in a local newspaper of general circulation prior to the issuance of these ATC's for compliance with Rule 2201 requirements.

Pursuant to Section 5.1.3, owners/operators shall submit a facility emissions mitigation plan of the Permit-to-Operate application or Authority-to-Construct application. The mitigation plan shall contain the following information:

- The name, business address, and phone number of the owners/operators responsible for the preparation and the implementation of the mitigation measures listed in the permit.
- The signature of the owners/operators attesting to the accuracy of the information provided and adherence to implementing the activities specified in the mitigation plan at all times and the date that the application was signed.
- A list of all mitigation measures shall be chosen from the application portions of Sections 5.5 or 5.6.

Pursuant to Section 5.1.4, the Permit to Operate or Authority to Construct application shall include the following information, which is in addition to the facility emission mitigation plan:

- The maximum number of animals at the facility in each production stage (facility capacity).
- Any other information necessary for the District to prepare an emission inventory of all regulated air pollutants emitted from the facility as determined by the APCO.
- The approved mitigation measures from the facility's mitigation plan will be listed on the Permit to Operate or Authority to Construct as permit conditions.
- The District shall act upon the Authority to Construct application or Permit to Operate application within six (6) months of receiving a complete application.

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

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

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

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

The following condition will be placed on each permit.

- {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]

Section 7.0 Administrative Requirements

Section 7.2 General Records for CAFs Subject to Section 5.0 Requirements:

- Copies of all of the facility's permits
- Copies of all laboratory tests, calculations, logs, records, and other information required to demonstrate compliance with all applicable requirements of this rule, as determined by the APCO, ARB, EPA.
- Records of the number of animals of each species and production group at the facility on the permit issuance date. Quarterly records of any changes to this

information shall also be maintained, (e.g. Dairy Herd Improvement Association records, animal inventories done for financial purposes, etc.)

The following condition will be placed on the cow housing permit:

- {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]

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

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

- {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]

Section 7.10 requires specific monitoring or source testing conditions for each mitigation measure. These conditions are shown below with each mitigation measure.

The Dairy has chosen the following Mitigation Measures. All conditions required for compliance with Rule 4570 for the mitigation measures selected by the applicant are shown below. These conditions will be placed on the appropriate permits.

General Conditions

- {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 and 4570]

Feed Mitigation Measures Required

Feed according to National Research Council (NRC) guidelines.

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

Push feed so that it is within three (3) feet of 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.

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

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

- {4458} Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
- {4459} Permittee shall maintain an operating plan/record of when feeding of total mixed rations began within two hours of grinding and mixing rations. [District Rules 2201 and 4570]

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

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

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

- {4464} Permittee shall remove uneaten wet feed from feed bunks within twenty-four (24) hours after the end of a rain event. [District Rules 2201 and 4570]
- {4465} Permittee shall maintain records demonstrating that uneaten wet feed was removed from feed bunks within twenty-four (24) hours after the end of a rain event. [District Rules 2201 and 4570]

Silage

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

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

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

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

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

- Harvest silage crop at $\geq 65\%$ moisture for corn; and $\geq 60\%$ moisture for alfalfa/grass and other silage crops; and
- Manage silage material delivery such that no more than six (6) inches of materials are un-compacted on top of the pile.

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

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

- {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]
- {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]
- {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]
- {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]
- {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]

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

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

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

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

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

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

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

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

- {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]
- {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]
- {4482} For each silage pile that Option 2 (Shaver/Facer or Smooth Face) is chosen as a mitigation measure for building the pile, the permittee shall maintain records that a shaver/facer was used to remove silage from the pile or shall visually inspect the pile at least daily to verify that the working face was smooth and maintain records of the visual inspections. [District Rules 2201 and 4570]
- {4483} For each silage pile that Option 3 (Silage Additives) is chosen as a mitigation measure for building the pile, records shall be maintained of the type additive (e.g. inoculants, preservative, other District & EPA-approved additive), the quantity of the additive applied to the pile, and a copy of the manufacturers instructions for application of the additive. [District Rules 2201 and 4570]

Milking Parlor

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

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

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

Freestall Barn

Pave feed lanes, 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.

- {4486} Permittee shall pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers. [District Rules 2201 and 4570]

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

- {4487} Permittee shall flush, scrape or vacuum freestall lanes immediately prior to, immediately after or during each milking. [District Rules 2201 and 4570]
- {4488} Permittee shall maintain records sufficient to demonstrate that freestall lanes are flushed, scraped or vacuumed immediately prior to, immediately after or during each milking. [District Rule 4570]

For a LARGE dairy only (1000 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 seven (7) days.

- {4492} Permittee shall remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every seven (7) days. [District Rules 2201 and 4570]
- {4493} Permittee shall record the date that manure that is not dry is removed from individual cow freestall beds or raked, harrowed, scraped, or freestall bedding is graded at least once every seven (7) days. [District Rules 2201 and 4570]

Corral

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.

- {4486} Permittee shall pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers. [District Rules 2201 and 4570]

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

- {4499} Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rules 2201 and 4570]
- {4500} Permittee shall maintain records demonstrating that water pipes and troughs are inspected and leaks are repaired at least once every seven (7) days. [District Rules 2201 and 4570]

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

- {4501} Permittee shall clean manure from corrals at least four (4) times per year with at least sixty (60) days between each cleaning, or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]
- {4502} Permittee shall record the date that animal waste is cleaned from corrals or demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning. [District Rules 2201 and 4570]

Implement one of the following three mitigation measures: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 square feet or less, and slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 square 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.

- {4554} Permittee shall implement at least one of the following corral mitigation measures: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 square feet or less and shall slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 square feet per animal; 2) maintain corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface except during periods of rainy weather. [District Rules 2201 and 4570]
- {4555} Permittee shall either 1) maintain sufficient records to demonstrate that corrals are maintained to ensure proper drainage preventing water from standing for more than forty-eight hours or 2) maintain records of dates pens are groomed (i.e., harrowed, raked, or scraped, etc.). [District Rules 2201 and 4570]

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

- {4508} Permittee shall scrape, vacuum or flush concrete lanes in corrals at least four times every day for mature cows twice every day for heifers and once a week for calves. [District Rules 2201 and 4570]
- {4556} Permittee shall maintain records demonstrating that concrete lanes in corrals are scraped, vacuumed, or flushed at least four times every day for mature cows and at least twice every day for heifers and once a week for calves.. [District Rules 2201 and 4570]

Install all shade structures uphill of any slope in the corral.

- {4513} 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]

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. The facility must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible.

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

Solid Manure

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

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

- {4526} Within seventy two (72) hours of removal of solid manure from housing, permittee shall either 1) remove dry manure from the dairy, or 2) cover dry manure outside the housing with a weatherproof covering from October through May, except

for times when wind events remove the covering, not to exceed twenty-four (24) hours per event. [District Rules 2201 and 4570]

- {4527} Permittee shall keep records of dates when manure is removed from the dairy or permittee shall maintain records to demonstrate that dry manure piles outside the pens are covered with a weatherproof covering from October through May. [District Rules 2201 and 4570]
- {4528} Permittee shall maintain records, such as manufacturer warranties or other documentation, demonstrating that the weatherproof covering over dry manure are installed, used, and maintained in accordance with manufacturer recommendations and applicable standards listed in NRCS Field Office Technical Guide Code 313 or 367, or any other applicable standard approved by the APCO, ARB, and EPA. [District Rules 2201 and 4570]
- {4529} Within seventy two (72) hours of removal of separated solids from the drying process, permittee shall either 1) remove separated solids from the dairy, or 2) cover separated solids outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed twenty-four (24) hours per event. [District Rules 2201 and 4570]
- {4530} Permittee shall keep records of dates when separated solids are removed from the dairy 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]

Liquid Manure

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

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

Land Application

Solid

Incorporate all solid manure within seventy-two (72) hours of land application. BACT is more stringent and requires daily (within 2 hours) of application.

- {4541} Permittee shall incorporate all solid manure within two (2) hours of land application. [District Rules 2201 and 4570]
- {4542} Permittee shall maintain records to demonstrate that all solid manure has been incorporated within two (2) hours of land application. [District Rules 2201 and 4570]

Liquid

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

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

California Health and Safety Code 42301.6 (School Notice)

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

California Environmental Quality ACT (CEQA)

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

- Inform governmental decision-makers and the public about the potential, significant environmental effects of proposed activities.
- Identify the ways that environmental damage can be avoided or significantly reduced.

- Prevent significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures when the governmental agency finds the changes to be feasible.
- Disclose to the public the reasons why a governmental agency approved the project in the manner the agency chose if significant environmental effects are involved.

County of Merced (County) is the Agency which has principal responsibility for approving this dairy project. The County determined that the Project would have a significant adverse environmental impact and prepared an Environmental Impact Report (EIR) for the Project. In certifying the Final EIR, the County determined that after implementing all feasible mitigation measures certain impacts on air quality would be significant and unavoidable. The County approved the Project and adopted a Statement of Overriding Considerations (SOC), in accordance with CEQA Guidelines §15093(a), stating that economic, legal, social, technological, and other benefits resulting from the project will outweigh the unavoidable adverse environmental effects. The District is a Responsible Agency 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) Rule 2010 requires operators of emission sources to obtain an Authority to Construct (ATC) and Permit to Operate (PTO) from the District. Rule 2201 requires that new and modified stationary sources of emissions mitigate their emissions using best available control technology (BACT) and for non-agricultural sources offsetting emissions when above certain thresholds (SB 700). As a responsible agency the District complies with CEQA by considering the EIR prepared by the Lead Agency, and by reaching its own conclusion on whether and how to approve the project involved (CEQA Guidelines §15096).

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

IX. Recommendation

Compliance with all applicable rules and regulations is expected. Pending a successful Public Noticing period, issue Authorities to Construct N-6951-1-2, -2-2, -3-1, -4-1, and -5-1 subject to the permit conditions on the attached draft Authorities to Construct in Appendix F.

X. Billing Information

Annual Permit Fees			
Permit Number	Fee Schedule	Fee Description	Annual Fee
N-6951-1-2	3020-06	Milking Parlor	\$116
N-6951-2-2	3020-06	Cow Housing	\$116
N-6951-3-1	3020-06	Liquid Manure Handling System	\$116
N-6951-4-1	3020-06	Solid Manure Handling System	\$116
N-6951-5-1	3020-06	Feed Storage and Handling	\$116

Appendixes

- A: Emission Factors and Calculations
- B: Anaerobic Treatment Lagoon Design Check
- C: Quarterly Net Emissions Change
- D: BACT Analysis
- E: Summary of Health Risk Assessment (HRA) and Ambient Air Quality Analysis (AAQA)
- F: Draft ATCs
- G: Current Permits to Operate (PTOs)

Appendix A

Emission Factors and Calculations

Pre-Project Facility Information

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

Pre-Project Herd Size							
Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals		
Milk Cows	1,040				1,040		
Dry Cows	210				210		
Support Stock (Heifers, Calves, and Bulls)					0		
Large Heifers	545				545		
Medium Heifers	852				852		
Small Heifers	500				500		
Bulls	60				60		
	Calf Hutches				Calf Corrals		Total # of Calves
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	
Calves	400						400

Total Herd Summary	
Total Milk Cows	1,040
Total Mature Cows	1,250
Support Stock (Heifers, Calves, and Bulls)	1,957
Total Calves	400
Total Dairy Head	3,607

Pre-Project Silage Information			
Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	1	25	85
Alfalfa	1	12	12
Wheat	2	25	85

Post-Project Facility Information

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

Post-Project Herd Size							
Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals		
Milk Cows	4,800				4,800		
Dry Cows	500		500		1,000		
Support Stock (Heifers, Calves, and Bulls)					0		
Large Heifers			1,600		1,600		
Medium Heifers			1,400		1,400		
Small Heifers	1,252				1,252		
Bulls			150		150		
	Calf Hutches				Calf Corrals		Total # of Calves
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	
Calves	900						900

Total Herd Summary	
Total Milk Cows	4,800
Total Mature Cows	5,800
Support Stock (Heifers, Calves, and Bulls)	4,402
Total Calves	900
Total Dairy Head	11,102

Post-Project Silage Information			
Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	1	25	85
Alfalfa	1	12	12
Wheat	2	25	85

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.	0%	5%
☐	☒	Install all shade structures uphill of any slope in the corral. Note: If selected for dairies > 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.		
☐	☐	Clean manure from under corral shades at least once every 14 days, when weather permits access into corral. Note: If selected for dairies > 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.		
☐	☐	Install shade structure so that the structure has a North/South orientation. Note: If selected for dairies > 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.	0%	0%
☒	☒	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.		
☐	☐	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.		
☐	☐	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	19.00%	23.05%
		Bedding Mitigations		
☒	☒	Feed according to NRC guidelines	10%	10%
☐	☐	Use non-manure-based bedding and non-separated solids based bedding for at least 90% of the bedding material, by weight, for freestalls (e.g. rubber mats, almond shells, sand, or waterbeds).	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.	0%	10%
☐	☐	(D) Have no animals in exercise pens or corrals at any time.	0%	0%
Total Control Efficiency			10.00%	19.00%

Liquid Manure Handling				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	VOC Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Lagoons/Storage Ponds Mitigations		
☒	☒	Feed according to NRC guidelines	10%	10%
☐	☐	Use phototropic lagoon	0%	0%
☐	☒	Use an anaerobic treatment lagoon designed according to NRCS Guideline No. 359	0%	40%
☒	☒	Remove solids from the waste system with a solid separator system, prior to the waste entering the lagoon. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF.	0%	0%
☐	☐	Maintain lagoon pH between 6.5 and 7.5	0%	0%
Total Control Efficiency			10.00%	46.00%
		Liquid Manure Land Application Mitigations		
☒	☒	Feed according to NRC guidelines	10%	10%
☐	☒	Only apply liquid manure that has been treated with an anaerobic or aerobic treatment lagoon, aerobic lagoon, or digester system	0%	40%
☒	☒	Allow liquid manure to stand in the fields for no more than 24 hours after irrigation. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF.	0%	0%
☐	☐	Apply liquid/slurry manure via injection with drag hose or similar apparatus	0%	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%
TRUE	TRUE			
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%
TRUE	TRUE			
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%
TRUE	TRUE			
☐	☒	Only apply solid manure that has been treated with an anaerobic treatment lagoon, aerobic lagoon or digester system.	0%	40%
☐	☐	Apply no solid manure with a moisture content of more than 50%	0%	0%
Total Control Efficiency			10.00%	46.00%

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 propionic acid, benzoic acid, sorbic acid, sodium benzoate, or potassium sorbate at a rate specified by the manufacturer to reduce yeast counts when forming silage pile; or b) apply other additives at specified rates that have been demonstrated to reduce alcohol concentrations in silage and/or VOC emissions from silage and have been approved by the District and EPA.	39.0%	39.0%
TRUE	TRUE			
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%
TRUE	TRUE			
☒	☒	(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%
TRUE	TRUE			
☐	☐	Feed steam-flaked, dry rolled, cracked or ground corn or other ground cereal grains.	0%	0%
☒	☒	Remove uneaten wet feed from feed bunks within 24 hrs after the end of a rain event.	10%	10%
TRUE	TRUE			
☐	☐	(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%
TRUE	TRUE			
Total Control Efficiency			19.00%	19.00%

Ammonia Mitigation Measures and Control Efficiencies

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

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

Liquid Manure Handling				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	NH3 Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Lagoons/Storage Ponds Mitigations		
☒	☒	Feed according to NRC guidelines	28%	28%
☒	☒	Use phototropic lagoon OR Remove solids from the waste system with a solid separator system, prior to the waste entering the lagoon.	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/dry Dairy Emissions Factors for Holstein Cows											
		Large Heifers (15 to 24 months)				Medium Heifers (7 to 14 months)				Small Heifers (3 to 6 months)			
		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled	
		<1000 mil/cows	1000 mil/cows	EF1	EF2	<1000 mil/cows	1000 mil/cows	EF1	EF2	<1000 mil/cows	1000 mil/cows	EF1	EF2
Milking Parlor	VOC	0.43	0.41	0.37	0.37	-	-	-	-	-	-	-	-
	NH3	0.24	0.23	0.03	0.03	-	-	-	-	-	-	-	-
Cow Housing	VOC	0.47	0.44	0.40	0.40	-	-	-	-	-	-	-	-
	NH3	0.19	0.19	0.14	0.14	-	-	-	-	-	-	-	-
Liquid Manure Handling	VOC	3.69	3.69	3.32	3.32	2.23	2.23	2.01	2.01	1.81	1.71	1.54	1.54
	NH3	10.00	8.90	5.35	5.06	5.40	3.55	2.91	2.76	4.30	2.76	2.23	2.12
Solid Manure Handling	VOC	1.05	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
	NH3	0.84	0.80	0.72	0.66	0.46	0.44	0.39	0.35	0.33	0.27	0.21	0.18
Feed Storage and Handling	VOC	15.18	12.09	10.20	9.88	8.75	6.90	5.78	5.27	8.22	4.41	4.27	4.22
	NH3	41.90	41.90	15.08	15.08	31.20	21.20	7.63	7.63	11.00	11.00	3.96	3.96
Manure Storage	VOC	6.90	6.90	2.37	2.37	3.20	3.20	1.20	1.20	1.70	1.70	0.64	0.64
	NH3	5.10	5.10	3.67	3.67	2.60	2.60	1.87	1.87	1.30	1.30	0.94	0.94
Manure Application	VOC	83.30	83.30	21.13	21.13	27.00	27.00	10.71	10.71	14.00	14.00	5.54	5.54
	NH3	1.52	1.30	1.17	1.17	0.62	0.71	0.64	0.54	0.49	0.29	0.43	0.37
Manure Storage	VOC	1.64	1.40	1.26	0.76	0.89	0.76	0.69	0.41	0.69	0.58	0.53	0.32
	NH3	3.16	2.70	2.43	1.46	1.71	1.47	1.33	0.79	1.33	1.02	0.61	0.90
Manure Application	VOC	8.90	8.90	6.41	3.72	4.50	4.50	3.24	1.88	2.20	2.20	0.32	0.32
	NH3	12.10	12.10	7.68	4.86	8.70	8.70	3.44	2.49	4.50	4.50	1.87	1.18
Manure Storage	VOC	0.18	0.15	0.12	0.12	0.09	0.09	0.07	0.07	0.06	0.06	0.05	0.04
	NH3	0.08	0.06	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02
Manure Application	VOC	0.39	0.33	0.30	0.18	0.21	0.18	0.16	0.10	0.14	0.12	0.07	0.11
	NH3	0.61	0.54	0.47	0.35	0.33	0.29	0.25	0.19	0.26	0.23	0.20	0.15
Manure Storage	VOC	0.95	0.95	0.95	0.95	0.48	0.48	0.48	0.48	0.25	0.25	0.18	0.18
	NH3	0.36	0.36	0.36	0.36	0.19	0.19	0.19	0.19	0.10	0.10	0.07	0.07
Manure Application	VOC	2.09	2.09	1.50	1.50	1.06	1.06	0.76	0.76	0.55	0.55	0.40	0.39
	NH3	3.42	3.42	2.83	2.83	1.73	1.73	1.43	1.43	0.90	0.90	0.75	0.75

Sludge and TMR (Total Mixed Ration) Emissions (µg/m ³ ·2-min)					
Feed Storage and Handling	VOC	Sludge Type	Uncontrolled		EF2
			EF1		
		Com Silage	34.681	21.155	21.155
		Alfalfa Silage	10.649	10.649	10.649
		Wheat Stalks <td>43.844</td> <td>26.745</td> <td>26.745</td>	43.844	26.745	26.745
		TMR <td>13.056</td> <td>10.575</td> <td>10.575</td>	13.056	10.575	10.575
Assumptions: 1) Each silage pile is completely covered except for the top face and 2) Pans are first within 48 hours.					

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

PM ₁₀ Emission Factors (lb/dry·yr)		Source	
Type of Cow	Dairy EF	Based on a Summer 2003 study by Texas A&M ASAE at a West Texas Dairy	
		Uncontrolled	Controlled
Cows in Free-stalls	1.37	34.681	21.155
Milk/Dry in Loafing Barns	2.73	17.458	10.649
Heifers/Bulls in Loafing Barns	0.69	43.844	26.745
Cows in Loafing Barns	5.46	13.056	10.575
Heifers/Bulls in Open Corral	1.37	13.056	10.575
Calf (under 3 mo.) open corral	0.543	13.056	10.575
Calf on-ground hutch	0.069	13.056	10.575
Calf above-ground hutch	0.200	13.056	10.575

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.

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%
8-weekly corral/exercise pen scraping and/or manure removal using a pull type manure harvesting equipment in morning hours when moisture in air except during periods of rainy weather	15%
Sprinkling of open corrals/exercise pens	15%
Feeding young stock (heifers and calves) near dusk	10%

Pre-Project PM10 Mitigation Measures														
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	Existing Freestall 1	milk cows	1,040	1,200	1	☐	☐	☐	☐	☐	☐	☐	☐	☐
2	Existing Freestall 1	dry cows	210	1,200	1	☐	☐	☐	☐	☐	☐	☐	☐	☐
3	Existing Freestall 2	large heifers	545	1,200	1	☐	☐	☐	☐	☐	☐	☐	☐	☐
4	Existing Freestall 2	medium heifers	270	1,200	1	☐	☐	☐	☐	☐	☐	☐	☐	☐
5	Existing Freestall 2	medium heifers	362	1,200	1	☐	☐	☐	☐	☐	☐	☐	☐	☐
6	Existing Freestall 2	small heifers	500	1,200	1	☐	☐	☐	☐	☐	☐	☐	☐	☐
7	Hutches	calves	400	400	1	☐	☐	☐	☐	☐	☐	☐	☐	☐
8	Existing Freestall 2	bulls	60	1,200	1	☐	☐	☐	☐	☐	☐	☐	☐	☐
9	Existing Freestall 2	medium heifers	220	1,200	1	☐	☐	☐	☐	☐	☐	☐	☐	☐
10						☐	☐	☐	☐	☐	☐	☐	☐	☐
11						☐	☐	☐	☐	☐	☐	☐	☐	☐
12						☐	☐	☐	☐	☐	☐	☐	☐	☐
13						☐	☐	☐	☐	☐	☐	☐	☐	☐
14						☐	☐	☐	☐	☐	☐	☐	☐	☐
15						☐	☐	☐	☐	☐	☐	☐	☐	☐
16						☐	☐	☐	☐	☐	☐	☐	☐	☐
17						☐	☐	☐	☐	☐	☐	☐	☐	☐
18						☐	☐	☐	☐	☐	☐	☐	☐	☐
19						☐	☐	☐	☐	☐	☐	☐	☐	☐
20						☐	☐	☐	☐	☐	☐	☐	☐	☐
21						☐	☐	☐	☐	☐	☐	☐	☐	☐
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23						☐	☐	☐	☐	☐	☐	☐	☐	☐
24						☐	☐	☐	☐	☐	☐	☐	☐	☐
25						☐	☐	☐	☐	☐	☐	☐	☐	☐
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28						☐	☐	☐	☐	☐	☐	☐	☐	☐
29						☐	☐	☐	☐	☐	☐	☐	☐	☐
30						☐	☐	☐	☐	☐	☐	☐	☐	☐
31						☐	☐	☐	☐	☐	☐	☐	☐	☐
32						☐	☐	☐	☐	☐	☐	☐	☐	☐
33						☐	☐	☐	☐					

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	Existing Freestall 1	milk cows	1,040	1,200	1		120E	120E				120E		
2	Existing Freestall 1	milk cows	160	1,200	1		120E	120E				120E		
3	Existing Freestall 2	milk cows	200	1,200	1		120E	120E				120E		
4	Existing Freestall 2	milk cows	200	1,200	1		120E	120E				120E		
5	Existing Freestall 2	milk cows	200	1,200	1		120E	120E				120E		
6	Existing Freestall 2	milk cows	200	1,200	1		120E	120E				120E		
7	Hutches	calves	400	900	1									
8	Existing Freestall 2	milk cows	200	1,200	1		120E	120E				120E		
9	Existing Freestall 2	milk cows	200	1,200	1		120E	120E				120E		
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Post-Project PM10 Mitigation Measures for New Housing Units at an Expanding Dairy														
Housing Name(s) or #s	Type of Housing	Type of cow	Total # of cows in Each Housing Structure(s)	Maximum Design Capacity of Each Structure	# of Combined Housing Structures in row	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	8+ weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk
1	New Freestall 3	milk cows	1200	1200	1	☐	120E	120E	☐	☐	☐	120E	☐	☐
2	New Freestall 4	milk cows	1200	1200	1	☐	120E	120E	☐	☐	☐	120E	☐	☐
3	New Freestall (Special Needs)	dry cows	500	520	1	☐	120E	120E	☐	☐	☐	120E	☐	☐
4	New Small Heifers	saudi style barn	70	70	7	☐	120E	120E	☐	☐	☐	120E	☐	120E
5	New Small Heifers	saudi style barn	62	60	1	☐	120E	120E	☐	☐	☐	120E	☐	120E
6	New Small Heifers	saudi style barn	80	80	2	☐	120E	120E	☐	☐	☐	120E	☐	120E
7	New Small Heifers	saudi style barn	90	90	6	☐	120E	120E	☐	☐	☐	120E	☐	120E
8	New Medium Heifers	loafing barn	91	90	3	☐	120E	120E	☐	☐	☐	120E	☐	120E
9	New Medium Heifers	loafing barn	161	155	7	☐	120E	120E	☐	☐	☐	120E	☐	120E
10	New Large Heifers	open corral	177	155	8	☐	120E	120E	☐	☐	☐	120E	☐	120E
11	New Large Heifers	open corral	184	155	4	☐	120E	120E	☐	☐	☐	120E	☐	120E
12	New Dry Cows	open corral	125	155	4	☐	120E	120E	☐	☐	☐	120E	☐	120E
13	New Calves	aboveground flushed hutches	500	900	1	☐	120E	120E	☐	☐	☐	120E	☐	120E
14	New bulls	open corral	150	150	1	☐	120E	120E	☐	☐	☐	120E	☐	☐
Post-Project Total # of Cows:			11,102		(The post-project total includes		2,800	dairy cows already on-site and		8,302	new cows from the expansion.)			

Housing Name(s) or #()	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-mature 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 Existing Freestall 1	freestall	milk cows	1,040	1,200	1,370		12.5%	10%				15%			0.92
2 Existing Freestall 1	freestall	milk cows	160	1,200	1,370		12.5%	10%				15%			0.92
3 Existing Freestall 2	freestall	milk cows	200	1,200	1,370		12.5%	10%				15%			0.92
4 Existing Freestall 2	freestall	milk cows	200	1,200	1,370		12.5%	10%				15%			0.92
5 Existing Freestall 2	freestall	milk cows	200	1,200	1,370		12.5%	10%				15%			0.92
6 Existing Freestall 2	freestall	milk cows	200	1,200	1,370		12.5%	10%				15%			0.92
7 Hutches	aboveground flushed hutches	calves	400	900	0.069		12.5%	10%				15%			0.07
8 Existing Freestall 2	freestall	milk cows	200	1,200	1,370		12.5%	10%				15%			0.92
9 Existing Freestall 2	freestall	milk cows	200	1,200	1,370		12.5%	10%				15%			0.92
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Post-Project PM10 Control Efficiencies and Emission Factors for New Housing Emissions Units

Housing Name(s) or #()	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-mature 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 New Freestall 3	freestall	milk cows	1200	1200	1,370		12.5%	10%				15%			0.92
2 New Freestall 4	freestall	milk cows	1200	1200	1,370		12.5%	10%				15%			0.92
3 New Freestall (Special Needs)	freestall	dry cows	500	520	1,370		12.5%	10%				15%			0.92
4 New Small Heifers	saudi style barn	small heifers	70	70	1,370		12.5%	10%				15%		10%	0.83
5 New Small Heifers	saudi style barn	small heifers	62	60	1,370		12.5%	10%				15%		10%	0.83
6 New Small Heifers	saudi style barn	small heifers	80	80	1,370		12.5%	10%				15%		10%	0.83
7 New Small Heifers	saudi style barn	small heifers	90	90	1,370		12.5%	10%				15%		10%	0.83
8 New Medium Heifers	loafing barn	medium heifers	91	90	5,280		12.5%	10%				15%		10%	3.18
9 New Medium Heifers	loafing barn	medium heifers	161	155	5,280		12.5%	10%				15%		10%	3.18
10 New Large Heifers	open corral	large heifers	177	155	10,550	8.3%	12.5%	10%				15%		10%	5.83
11 New Large Heifers	open corral	large heifers	184	155	10,550	8.3%	12.5%	10%				15%		10%	5.83
12 New Dry Cows	open corral	dry cows	125	155	5,460	16.7%	12.5%	10%				15%		10%	3.04
13 New Calves	aboveground flushed hutches	calves	500	900	0.069		12.5%	10%				15%		10%	0.05
14 New bulls	open corral	bulls	150	150	10,550	8.3%	12.5%	10%				15%			6.48

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	Existing Freestall 1	milk cows	1,040	10.2	21.13	1.37	29.1	10,608	60.2	21,973	3.9	1,425
2	Existing Freestall 1	dry cows	210	5.75	10.71	1.37	3.3	1,208	6.2	2,249	0.8	288
3	Existing Freestall 2	large heifers	545	4.41	5.54	1.37	6.6	2,403	8.3	3,017	2.0	747
4	Existing Freestall 2	medium heifers	270	3.01	4.02	1.37	2.2	813	3.0	1,084	1.0	370
5	Existing Freestall 2	medium heifers	362	3.01	4.02	1.37	3.0	1,090	4.0	1,454	1.4	496
6	Existing Freestall 2	small heifers	500	1.67	3.00	1.37	2.3	835	4.1	1,501	1.9	685
7	Hutches	calves	400	0.8	0.90	0.07	0.9	320	1.0	362	0.1	28
8	Existing Freestall 2	bulls	60	2.67	7.74	1.37	0.4	160	1.3	465	0.2	82
9	Existing Freestall 2	medium heifers	220	3.01	4.02	1.37	1.8	662	2.4	883	0.8	301
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	Pre-Project Total # of Cows		3,607				49.6	18,099	90.5	32,988	12.1	4,422

Pre-Project Totals						
Total # of Cows	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
3,607	49.6	18,099	90.5	32,988	12.1	4,422

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	Existing Freestall 1	milk cows	1,040	9.86	21.13	0.92	28.1	10,254	60.2	21,973	2.6	954
2	Existing Freestall 1	milk cows	160	9.86	21.13	0.92	4.3	1,578	9.3	3,381	0.4	147
3	Existing Freestall 2	milk cows	200	9.86	21.13	0.92	5.4	1,972	11.6	4,226	0.5	183
4	Existing Freestall 2	milk cows	200	9.86	21.13	0.92	5.4	1,972	11.6	4,226	0.5	183
5	Existing Freestall 2	milk cows	200	9.86	21.13	0.92	5.4	1,972	11.6	4,226	0.5	183
6	Existing Freestall 2	milk cows	200	9.86	21.13	0.92	5.4	1,972	11.6	4,226	0.5	183
7	Hutches	calves	400	0.78	0.90	0.07	0.9	312	1.0	362	0.1	28
8	Existing Freestall 2	milk cows	200	9.86	21.13	0.92	5.4	1,972	11.6	4,226	0.5	183
9	Existing Freestall 2	milk cows	200	9.86	21.13	0.92	5.4	1,972	11.6	4,226	0.5	183
10												
11												
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40												
Post-Project # of Cows (non-expansion)				2,800			65.7	23,976	140.1	51,072	6.1	2,227

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	New Freestall 3	milk cows	1200	9.86	21.13	0.92	32.4	11,832	69.5	25,354	3.0	1,100
2	New Freestall 4	milk cows	1200	9.86	21.13	0.92	32.4	11,832	69.5	25,354	3.0	1,100
3	New Freestall (Special Net)	dry cows	500	5.57	10.71	0.92	7.6	2,785	14.7	5,354	1.3	459
4	New Small Heifers	small heifers	490	1.62	3.00	0.83	2.2	794	4.0	1,471	1.1	404
5	New Small Heifers	small heifers	62	1.62	3.00	0.83	0.3	100	0.5	186	0.1	51
6	New Small Heifers	small heifers	160	1.62	3.00	0.83	0.7	259	1.3	480	0.4	132
7	New Small Heifers	small heifers	540	1.62	3.00	0.83	2.4	875	4.4	1,622	1.2	446
8	New Medium Heifers	medium heifers	273	2.91	4.02	3.18	2.2	794	3.0	1,096	2.4	868
9	New Medium Heifers	medium heifers	1127	2.91	4.02	3.18	9.0	3,280	12.4	4,526	9.8	3,585
10	New Large Heifers	large heifers	1416	4.27	5.54	5.83	16.6	6,046	21.5	7,839	22.6	8,252
11	New Large Heifers	large heifers	184	4.27	5.54	5.83	2.2	786	2.8	1,019	2.9	1,072
12	New Dry Cows	dry cows	500	5.57	10.71	3.04	7.6	2,785	14.7	5,354	4.2	1,522
13	New Calves	calves	500	0.78	0.90	0.05	1.1	390	1.2	452	0.1	25
14	New bulls	bulls	150	2.59	7.74	6.48	1.1	389	3.2	1,161	2.7	971
Total # of Cows From Expansion				8,302			117.8	42,947	222.7	81,268	54.8	19,987

Post-Project Totals						
Total # of Cows	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
11,102	183.5	66,923	362.8	132,340	60.9	22,214

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	1,040	0	0	0	1,040	
Dry Cows	210	0	0	0	210	
Support Stock (Heifers, Calves and Bulls)	0	0	0	0	0	
Large Heifers	545	0	0	0	545	
Medium Heifers	852	0	0	0	852	
Small Heifers	500	0	0	0	500	
Bulls	60	0	0	0	60	
Calf Hutches					Calf Corrals	
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped
Calves	400	0	0	0	0	0
					Total # of Calves	
					400	

Silage Information				
Feed Type	Maximum # Open Piles	Maximum Height (ft)	Maximum Width (ft)	Open Face Area (ft ²)
Corn	1	25	85	1,696
Alfalfa	1	12	12	128
Wheat	2	25	85	3,392

Milking Parlor				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	1.1	416	0.4	142

Cow Housing						
Cow	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Total	49.6	18,099	90.5	32,988	12.1	4,422

Liquid Manure Handling						
Cow	VOC		NH3		H2S*	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	6.9	2,527	21.6	7,894	1.6	567
Dry Cows	0.8	279	2.2	806	0.2	60
Support Stock (Heifers, Calves and Bulls)	0.0	0	0.0	0	0	0
Large Heifers	1.5	556	2.9	1,074	0.1	51
Medium Heifers	1.6	588	3.4	1,227	0.1	30
Small Heifers	0.5	190	1.5	555	0.1	22
Calves	0.2	72	0.4	128	0	5
Bulls	0.1	37	0.5	166	0	6
Total	11.6	4,249	32.5	11,849	2.1	741

Solid Manure Handling				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	1.3	489	8.1	2,943
Dry Cows	0.1	53	0.8	300
Support Stock (Heifers, Calves and Bulls)	0.0	0	0.0	0
Large Heifers	0.3	109	1.1	409
Medium Heifers	0.3	111	1.2	452
Small Heifers	0.1	35	0.5	200
Calves	0.0	16	0.1	48
Bulls	0.0	7	0.2	62
Total	2.1	819	12.0	4,414

Feed Handling and Storage		
	Daily PE (lb-VOC/day)	Annual PE (lb-VOC/yr)
Corn Emissions	10.6	3,854
Alfalfa Emissions	0.2	73
Wheat Emissions	26.7	9,744
TMR	70.7	25,805
Total	108.2	39,476

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	1.1	0.4	0.0
Cow Housing	0.0	0.0	12.1	0.0	49.6	90.5	0.0
Liquid Manure	0.0	0.0	0.0	0.0	11.6	32.5	2.1
Solid Manure	0.0	0.0	0.0	0.0	2.1	12.0	0.0
Feed Handling	0.0	0.0	0.0	0.0	108.2	0.0	0.0
Total	0.0	0.0	12.1	0.0	172.6	135.4	2.1

Total Annual Pre-Project Potential to Emit (lb/yr)							
Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	416	142	0
Cow Housing	0	0	4,422	0	18,099	32,988	0
Liquid Manure	0	0	0	0	4,249	11,849	741
Solid Manure	0	0	0	0	819	4,414	0
Feed Handling	0	0	0	0	39,476	0	0
Total	0	0	4,422	0	63,059	49,394	741

Calculations for milking parlor:

$$\text{Annual PE} = (\# \text{ milk cows}) \times (\text{EF1 lb-pollutant/hd-yr})$$

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

Calculations for cow housing:

See detailed calculations under Cow Housing Calculations worksheet.

Calculations for liquid manure and solid manure handling:

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

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

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

Calculations for silage emissions:

$$\text{Annual PE} = (\text{EF1}) \times (\text{area ft}^2) \times (0.0929 \text{ m}^2/\text{ft}^2) \times (8,760 \text{ hr/yr}) \times (60 \text{ min/hr}) \times (2.20\text{E-}9 \text{ lb}/\mu\text{g})$$

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

Calculation for TMR emissions:

$$\text{Annual PE} = (\# \text{ cows}) \times (\text{EF1}) \times (0.658 \text{ m}^3) \times (525,600 \text{ min/yr}) \times (2.20\text{E-}9 \text{ lb}/\mu\text{g})$$

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

Calves are not included in TMR calculation.

*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.

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	2,045
Solid Manure	0	0	0	0	0
Feed Handling	0	0	0	0	0
Total	0	0	0	0	2,045

Post-Project Potential to Emit (PE2)

Post-Project Herd Size						
Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals	
Milk Cows	4,800	0	0	0	4,800	
Dry Cows	500	0	500	0	1,000	
Support Stock (Heifers, Calves, and Bulls)	0	0	0	0	0	
Large Heifers	0	0	1,600	0	1,600	
Medium Heifers	0	0	1,400	0	1,400	
Small Heifers	1,252	0	0	0	1,252	
Bulls	0	0	150	0	150	
Calf Hutches					Calf Corrals	
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped
Calves	900	0	0	0	0	0
					Total # of Calves	
					900	

Silage Information				
Feed Type	Maximum # Open Piles	Maximum Height (ft)	Maximum Width (ft)	Open Face Area (ft ²)
Corn	1	25	85	1,696
Alfalfa	1	12	12	128
Wheat	2	25	85	3,392

Milking Parlor				
Cow	VOC		NH3	
Milk Cows	lb/day	lb/yr	lb/day	lb/yr
Total	5.3	1,920	1.8	657

Cow Housing						
	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Total	183.5	66,923	362.8	132,340	60.9	22,214

Liquid Manure Handling						
Cow	VOC		NH3		H2S	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	19.2	7,008	64.4	23,520	1.6	567
Dry Cows	2.2	790	6.8	2,480	0.2	60
Support Stock (Heifers, Calves, and Bulls)	0.0	0	0.0	0	0	0
Large Heifers	2.7	976	5.6	2,048	0.1	51
Medium Heifers	1.6	588	3.6	1,302	0.1	30
Small Heifers	0.8	288	2.5	901	0.1	22
Calves	0.3	99	0.5	180	0	5
Bulls	0.2	56	0.7	267	0	6
Total	27.0	9,804	84.1	30,698	2.1	741

Solid Manure Handling				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	4.6	1,680	37.2	13,584
Dry Cows	0.5	190	3.9	1,430
Support Stock (Heifers, Calves, and Bulls)	0.0	0	0.0	0
Large Heifers	0.7	240	3.3	1,200
Medium Heifers	0.4	140	2.0	742
Small Heifers	0.2	75	1.4	501
Calves	0.1	27	0.3	108
Bulls	0.0	14	0.4	156
Total	6.5	2,366	48.5	17,721

Feed Handling and Storage		
	Daily PE (lb-VOC/day)	Annual PE (lb-VOC/yr)
Corn Emissions	10.6	3,854
Alfalfa Emissions	0.2	73
Wheat Emissions	26.7	9,744
TMR	224.9	82,089
Total	262.4	95,760

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	5.3	1.8	0.0
Cow Housing	0.0	0.0	60.9	0.0	183.5	362.8	0.0
Liquid Manure	0.0	0.0	0.0	0.0	27.0	84.1	2.1
Solid Manure	0.0	0.0	0.0	0.0	6.5	48.5	0.0
Feed Handling	0.0	0.0	0.0	0.0	262.4	0.0	0.0
Total	0.0	0.0	60.9	0.0	484.7	497.2	2.1

Total Annual Post-Project Potential to Emit (lb/yr)							
Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	1,920	657	0
Cow Housing	0	0	22,214	0	66,923	132,340	0
Liquid Manure	0	0	0	0	9,804	30,698	741
Solid Manure	0	0	0	0	2,366	17,721	0
Feed Handling	0	0	0	0	95,760	0	0
Total	0	0	22,214	0	175,773	181,416	741

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

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

Calculation for TMR emissions:

Annual PE = (# cows) x (EF2) x (0.658 m²) 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.

Major Source Emissions (lb/yr)					
Permit	NOx	SOx	PM10	CO	VOC
Milking Parlor	0	0	0	0	0
Cow Housing	0	0	0	0	0
Liquid Manure	0	0	0	0	4,698
Solid Manure	0	0	0	0	0
Feed Handling	0	0	0	0	0
Total	0	0	0	0	4,698

BACT Applicability

Milking Parlor					
VOC Emissions					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	5.3	1.1	0.40	0.40	4.2
Total					4.2
BACT triggered for VOC for milking parlor					
NH3 Emissions					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	1.8	0.4	0.14	0.14	1.4
Total					1.4

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

Liquid Manure Handling					
VOC Emissions - Lagoon/Storage Pond(s)					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	9.2	3.3	0.70	1.17	7.2
Dry Cows	1.0	0.4	0.38	0.64	0.8
Support Stock (Heifers, Calves, and Bulls)	0.0	0.0	0.29	0.49	0.0
Large Heifers	1.3	0.7	0.29	0.49	0.9
Medium Heifers	0.8	0.8	0.20	0.33	0.3
Small Heifers	0.4	0.3	0.11	0.19	0.2
Calves	0.1	0.1	0.05	0.09	0.0
Bulls	0.1	0.0	0.18	0.30	0.1
Total					9.5
BACT triggered for VOC for Lagoon/Storage Ponds					
VOC Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	9.9	3.6	0.76	1.26	7.7
Dry Cows	1.1	0.4	0.41	0.69	0.9
Support Stock (Heifers, Calves, and Bulls)	0.0	0.0	0.32	0.53	0.0
Large Heifers	1.4	0.8	0.32	0.53	0.9
Medium Heifers	0.8	0.8	0.22	0.36	0.3
Small Heifers	0.4	0.3	0.12	0.20	0.2
Calves	0.1	0.1	0.06	0.10	0.0
Bulls	0.1	0.1	0.19	0.32	0.0
Total					10.1
BACT triggered for VOC for Liquid Manure Land Application					
NH3 Emissions - Lagoon/Storage Pond(s)					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	15.5	3.4	1.18	1.18	12.1
Dry Cows	1.7	0.3	0.60	0.60	1.4
Support Stock (Heifers, Calves, and Bulls)	0.0	0.0	0.32	0.32	0.0
Large Heifers	1.4	0.5	0.32	0.32	0.9
Medium Heifers	0.8	0.5	0.22	0.22	0.3
Small Heifers	0.6	0.2	0.17	0.17	0.4
Calves	0.1	0.1	0.05	0.05	0.0
Bulls	0.2	0.1	0.43	0.43	0.1
Total					15.2
BACT triggered for NH3 for Lagoon/Storage Ponds					
NH3 Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	48.9	18.3	3.72	6.41	38.3
Dry Cows	5.1	1.9	1.88	3.24	4.0
Support Stock (Heifers, Calves, and Bulls)	0.0	0.0	0.96	1.66	0.0
Large Heifers	4.2	2.5	0.96	1.66	2.8
Medium Heifers	2.7	2.9	0.71	1.22	1.0
Small Heifers	1.9	1.3	0.54	0.94	1.1
Calves	0.4	0.3	0.15	0.27	0.2
Bulls	0.6	0.4	1.35	2.33	0.4
Total					47.8
BACT triggered for NH3 for Liquid Manure Land Application					
H2S Emissions - Lagoon/Storage Pond(s)					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	1.6	1.6	0.12	0.12	0.0
Dry Cows	0.2	0.2	0.06	0.06	0.0
Support Stock (Heifers, Calves, and Bulls)	0.0	0.0	0.03	0.03	0.0
Large Heifers	0.1	0.1	0.03	0.03	0.0
Medium Heifers	0.1	0.1	0.02	0.02	0.0
Small Heifers	0.1	0.1	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	2.2	0.5	0.17	0.17	1.7
Dry Cows	0.3	0.1	0.09	0.09	0.2
Support Stock (Heifers, Calves, and Bulls)	0.0	0.0	0.10	0.07	0.0
Large Heifers	0.3	0.1	0.07	0.07	0.2
Medium Heifers	0.2	0.1	0.05	0.05	0.1
Small Heifers	0.1	0.0	0.03	0.03	0.1
Calves	0.0	0.0	0.01	0.01	0.0
Bulls	0.0	0.0	0.05	0.05	0.0
Total					2.3
BACT triggered for VOC for Solid Manure Storage					
VOC Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	2.3	0.8	0.18	0.30	1.8
Dry Cows	0.3	0.1	0.10	0.16	0.2
Support Stock (Heifers, Calves, and Bulls)	0.0	0.0	0.07	0.12	0.0
Large Heifers	0.3	0.2	0.07	0.12	0.2
Medium Heifers	0.2	0.2	0.05	0.08	0.1
Small Heifers	0.1	0.1	0.03	0.05	0.0
Calves	0.0	0.0	0.01	0.02	0.0
Bulls	0.0	0.0	0.04	0.07	0.0
Total					2.4
BACT triggered for VOC for Solid Manure Land Application					
NH3 Emissions - Solid Manure Storage/Separated Solids Piles					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	17.5	3.8	1.33	1.33	13.7
Dry Cows	1.8	0.4	0.67	0.67	1.4
Support Stock (Heifers, Calves, and Bulls)	0.0	0.0	0.35	0.35	0.0
Large Heifers	1.5	0.5	0.35	0.35	1.0
Medium Heifers	1.0	0.6	0.25	0.25	0.4
Small Heifers	0.6	0.2	0.18	0.18	0.4
Calves	0.1	0.1	0.06	0.06	0.0
Bulls	0.2	0.1	0.49	0.49	0.1
Total					17.0
BACT triggered for NH3 for Solid Manure Storage					
NH3 Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	19.8	4.3	1.50	1.50	15.5
Dry Cows	2.1	0.4	0.76	0.76	1.7
Support Stock (Heifers, Calves, and Bulls)	0.0	0.0	0.40	0.40	0.0
Large Heifers	1.7	0.6	0.40	0.40	1.1
Medium Heifers	1.1	0.7	0.28	0.28	0.4
Small Heifers	0.7	0.3	0.22	0.22	0.4
Calves	0.2	0.1	0.06	0.06	0.1
Bulls	0.2	0.1	0.55	0.55	0.1
Total					19.3
BACT triggered for NH3 for Solid Manure Land Application					

Feed Storage and Handling					
VOC Emissions - Silage					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Corn Silage	10.6	10.6	21,155	21,155	0.0
Alfalfa Silage	0.2	0.2	10,649	10,649	0.0
Wheat Silage	26.7	26.7	26,745	26,745	0.0
Total					0.0
VOC Emissions - TMR					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
TMR	224.9	70.7	10,575	10,575	154.2
Total					154.2
BACT triggered for VOC for TMR					

*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.

calculated for EACH emissions unit in this row

Cow Housing - PM10 Emissions							
	Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)	BACT Triggered?
1	Existing Freestall 1	3.0	4.5	0.92	1.37	0.0	No
2	Existing Freestall 1	3.0	4.5	0.92	1.37	0.0	No
3	Existing Freestall 2	3.0	4.5	0.92	1.37	0.0	No
4	Existing Freestall 2	3.0	4.5	0.92	1.37	0.0	No
5	Existing Freestall 2	3.0	4.5	0.92	1.37	0.0	No
6	Existing Freestall 2	3.0	4.5	0.92	1.37	0.0	No
7	Hutches	0.2	0.1	0.07	0.07	0.1	No
8	Existing Freestall 2	3.0	4.5	0.92	1.37	0.0	No
9	Existing Freestall 2	3.0	4.5	0.92	1.37	0.0	No
10							
11							
12							
13							
14							
15							
16							
17							
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33							
34							
35							
36							
37							
38							
39							
40							
New Units from Expansion							
	Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)	BACT Triggered?
1	New Freestall 3	3.0	0.0	0.92	0.00	3.0	Yes
2	New Freestall 4	3.0	0.0	0.92	0.00	3.0	Yes
3	New Freestall (Special Heifers)	1.3	0.0	0.92	0.00	1.3	No
4	New Small Heifers	0.2	0.0	0.83	0.00	0.2	No
5	New small Heifers	0.1	0.0	0.83	0.00	0.1	No
6	New Small Heifers	0.2	0.0	0.83	0.00	0.2	No
7	New Small Heifers	0.2	0.0	0.83	0.00	0.2	No
8	New Medium Heifers	0.8	0.0	3.18	0.00	0.8	No
9	New Medium Heifers	1.4	0.0	3.18	0.00	1.4	No
10	New Large Heifers	2.5	0.0	5.83	0.00	2.5	Yes
11	New Large Heifers	2.5	0.0	5.83	0.00	2.5	Yes
12	New Dry Cows	1.3	0.0	3.04	0.00	1.3	No
13	New Calves	0.1	0.0	0.05	0.00	0.1	No
14	New bulls	2.7	0.0	6.48	0.00	2.7	Yes

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

Increase in Emissions

SSIPE (lb/yr)							
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	1,504	514	0
Cow Housing	0	0	17,792	0	48,824	99,352	0
Liquid Manure	0	0	0	0	5,556	18,849	0
Solid Manure	0	0	0	0	1,546	13,307	0
Feed Handling	0	0	0	0	56,284	0	0
Total	0	0	17,792	0	113,714	132,022	0

Total Daily Change in Emissions (lb/day)							
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0.0	0.0	0.0	0.0	4.2	1.4	0.0
Cow Housing	0.0	0.0	48.8	0.0	133.9	272.3	0.0
Liquid Manure	0.0	0.0	0.0	0.0	15.4	51.6	0.0
Solid Manure	0.0	0.0	0.0	0.0	4.4	36.5	0.0
Feed Handling	0.0	0.0	0.0	0.0	154.2	0.0	0.0
Total	0.0	0.0	48.8	0.0	312.1	361.8	0.0

Total Annual Change in Non-Fugitive Emissions (Major Source Emissions) (lb/yr)							
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	0	0	0
Cow Housing	0	0	0	0	0	0	0
Liquid Manure	0	0	0	0	2,652	0	0
Solid Manure	0	0	0	0	0	0	0
Feed Handling	0	0	0	0	0	0	0
Total	0	0	0	0	2,652	0	0

Appendix B

Anaerobic Treatment Lagoon Design Check

Lagoon Design Check in Accordance with NRCS Guideline #359

Proposed Lagoon Volume

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

Primary Treatment Lagoon Dimensions

Length	870	ft
Width	300	ft
Depth	22	ft
Slope	1.5	ft

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

Primary Lagoon Volume **4,924,524 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 or Cow	Number of Animals	VS Excreted ^[1] (lb/day)	% Manure in Flush ^[2]	(1 - % VS Removed in Separation ^[3])		Net VS Loading (lb/day)
Milk Cows	4,800	x 17	x 71%	x 50%	=	28,968
Dry Cow	1,000	x 9.2	x 71%	x 50%	=	3,266
Heifer (15 to 24 months)	1,600	x 7.1	x 48%	x 50%	=	2,726
Heifer (7 to 14 months)	1,400	x 4.9	x 48%	x 50%	=	1,646
Heifer (3 to 6 months)	1,252	x 2.7	x 48%	x 50%	=	811
Calf (under 3 months)	900	x 1.0	x 100%	x 50%	=	450
Bulls	150	x 9.2	x 48%	x 50%	=	331
Total for Dairy						38,199

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

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

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

Lagoon Design Check in Accordance with NRCS Guideline #359

Minimum Treatment Volume Calculation

MTV = TVS/VSLR

Where:

MTV = Minimum Treatment Volume (ft³)

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

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

Minimum Treatment Volume in Primary Lagoon				
Breed: Holstein				
Type of Cow	Net VS Loading (lb/day)		VSLR (lb/ft ³ -day)[1]	MTV (ft ³)
Milk Cows	28,968	÷	0.011	= 2,633,455
Dry Cow	3,266	÷	0.011	= 296,909
Heifer (15 to 24 months)	2,726	÷	0.011	= 247,855
Heifer (7 to 14 months)	1,646	÷	0.011	= 149,673
Heifer (3 to 6 months)	811	÷	0.011	= 73,754
Calf (under 3 months)	450	÷	0.011	= 40,909
Bulls	331	÷	0.011	= 30,109
Total for Dairy				3,472,663

[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 (ft³)

VPL = total Volume of Primary Lagoon (ft³)

MTV = Minimum Treatment Volume (ft³)

SAV =	VPL	-	MTV	
SAV =	4,924,524	3,472,663	=	1,451,861 (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:

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

where:

HFR = Hydraulic flow rate (1000ft³/day)

HRT = Hydraulic Retention Time (day)

The Hydraulic Flow Rate is Calculated below

Type	# of cows	Amount of Manure*	HFR
Milk Cows	4,800	x 2.40 ft ³	= 11,520 ft ³ /day
Dry Cows	1,000	x 1.30 ft ³	= 1,300 ft ³ /day
Heifers (15-24 mo)	1,600	x 0.78 ft ³	= 1,248 ft ³ /day
Heifers (7-14 mo)	1,400	x 0.78 ft ³	= 1,092 ft ³ /day
Heifers (3-6 mo)	1,252	x 0.30 ft ³	= 376 ft ³ /day
Calves	900	x 0.15 ft ³	= 135 ft ³ /day
Bulls	150	x 1.30 ft ³	= 195 ft ³ /day
Total	11,102		15,866 ft ³ /day
Fresh water per milk cow used in flush at milk parlor		12 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	ft ³	+	ft ³	day
Milk Cow*Day	Milk Cows		gallon			

Total HFR:

12 gal	4800 milk-cows	x	ft ³	+	15,866	ft ³
milk-cow*day			gal			day

=	23,566.1	ft ³ /day
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Formula:

MTV (ft ³)	/	(day)	=
		HFR (ft ³)	

HRT:

3,472,663 ft ³	day	=	147.358203	days
	23,566.1 ft ³			

Appendix C

Quarterly Net Emissions Change

Quarterly Net Emissions Change (QNEC)

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

QNEC = PE2 - PE1, where:

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

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

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

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

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

Milking Parlor						
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	0	0	1,920	657
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	5.3	1.8
Quarterly Net Emissions Change (lb/qtr)	1: 0.0	0.0	0.0	0.0	376.0	128.6
	2: 0.0	0.0	0.0	0.0	376.0	128.6
	3: 0.0	0.0	0.0	0.0	376.0	128.6
	4: 0.0	0.0	0.0	0.0	376.0	128.6

Cow Housing						
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	22,214	0	66,923	132,340
Daily PE2 (lb/day)	0.0	0.0	60.9	0.0	183.5	362.8
Quarterly Net Emissions Change (lb/qtr)	1: 0.0	0.0	4,448.0	0.0	12,206.0	24,838.0
	2: 0.0	0.0	4,448.0	0.0	12,206.0	24,838.0
	3: 0.0	0.0	4,448.0	0.0	12,206.0	24,838.0
	4: 0.0	0.0	4,448.0	0.0	12,206.0	24,838.0

Liquid Manure Handling							
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Annual PE2 (lb/yr)	0	0	0	0	9,804	30,698	741
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	27.0	84.1	2.1
Quarterly Net Emissions Change (lb/qtr)	1: 0.0	0.0	0.0	0.0	1388.9	4,712.3	0.0
	2: 0.0	0.0	0.0	0.0	1388.9	4,712.3	0.0
	3: 0.0	0.0	0.0	0.0	1388.9	4,712.3	0.0
	4: 0.0	0.0	0.0	0.0	1388.9	4,712.3	0.0

Solid Manure Handling						
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	0	0	2,366	17,721
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	6.5	48.5
Quarterly Net Emissions Change (lb/qtr)	1: 0.0	0.0	0.0	0.0	386.6	3,326.6
	2: 0.0	0.0	0.0	0.0	386.6	3,326.6
	3: 0.0	0.0	0.0	0.0	386.6	3,326.6
	4: 0.0	0.0	0.0	0.0	386.6	3,326.6

Feed Storage and Handling						
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	0	0	95,760	0
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	262.4	0.0
Quarterly Net Emissions Change (lb/qtr)	1: 0.0	0.0	0.0	0.0	14,071.1	0.0
	2: 0.0	0.0	0.0	0.0	14,071.1	0.0
	3: 0.0	0.0	0.0	0.0	14,071.1	0.0
	4: 0.0	0.0	0.0	0.0	14,071.1	0.0

Appendix D

BACT Analysis

Top Down BACT Analysis for the Milking Parlor

1. BACT Analysis for VOC Emissions from the Milking Parlor

a. Step 1 - Identify all control technologies

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

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

Description of Control Technology

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

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

b. Step 2 - Eliminate technologically infeasible options

The option identified in step 1 is technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

Only one option was previously identified in step 1:

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

d. Step 4 - Cost Effectiveness Analysis

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

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

e. Step 5 - Select BACT

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

Top-Down BACT Analysis for the Cow Housing Permit Unit: Dairy Freestall Barns, Open Corrals and Calf Hutches

1. BACT Analysis for PM₁₀ Emissions:

a. Step 1 - Identify all control technologies

The following control options were identified for PM₁₀ emissions.

Freestall Barns

1) Design and Management Practices

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

Open Corrals

1) Design and Management Practices

- Concrete feed lanes and walkways
- Scraping of open corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions
- Shade structures in open corrals
- Feeding heifers in corrals near dusk (within 1 hour of dusk)
- Windbreaks controlling dust from corrals (when feasible and there is adequate space at existing facilities)
- Sprinklers for dust control in corrals

Calf Area

- 1) Calf Hutches ($\geq$ 75% control)

Description of Control Technologies

Concrete Feedlanes and Walkways

Constructing the feed lanes and walkways of concrete causes the dairy animals to spend an increased amount of time on a paved surface rather than dry dirt, thus reducing PM₁₀ emissions. Additionally, the manure that is deposited in the lanes and walkways will be flushed, which will prevent PM₁₀ emissions from drying manure.

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

Other than the paved feed lanes and walkways, exercise pen/corral 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 cows' hooves and subsequently emitted as PM₁₀.

Shade Structures in Open Corrals

Installing shade structures in corral areas helps to decrease PM₁₀ emissions. Dairy animals are easily susceptible to heat stress and will tend to seek out shade to reduce the effects of heat, particularly in the warmer months when higher PM₁₀ emissions are expected because of drier conditions. PM₁₀ emissions are reduced because the cows will spend less time walking on the dry corral surface.

Feeding Heifers in Corrals Near Dusk (within 1 hour of dusk)

Feeding the heifers near dusk will reduce their activity during this time, which is the time when the corral surface is the driest and there is greater chance for particulate matter from the corral to be entrained into the atmosphere.

Shelterbelts/Windbreaks Controlling Dust from Corrals

A windbreak, or shelterbelt, is composed of one or more rows of trees or shrubs, which are planted in a manner that breaks up wind and reduces the force of wind on downwind of the windbreak. Windbreaks can be used to prevent soil erosion, improve air quality by intercepting dust, chemicals, and odors, to protect crops, and to provide habitat for wildlife. The District has worked with NRCS to establish guidelines for windbreaks used for dust control around dairies. In general, the guidelines require that a downwind shelterbelt with three rows be installed, the first row consisting of shrubs, second row consisting of a medium size tree and the last row consisting of an evergreen (larger tree). NRCS also requires that an irrigation system be maintained so that there is greater survivability and rapid growth of the trees and shrubs. A windbreak will reduce the amount of particulate matter entrained into the atmosphere.

There may be instances where windbreaks are not practical or feasible for a particular operation such as existing dairy facilities that is expanding but lacks adequate space for a windbreak or when there is insufficient water for establishment of a windbreak. Windbreaks will not be required if an operation demonstrates satisfactorily that they are infeasible or impractical for the particular operation.

b. Step 2 - Eliminate technologically infeasible options

The options listed in Step 1 above are technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

The options identified in step 1 for freestalls and open corrals are assumed to have the same control effectiveness:

Freestall Barns

Design and Management Practices

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

Open Corrals

Design and Management Practices

- Concrete feed lanes and walkways
- Scraping of open corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions
- Shade structures in open corrals
- Feeding heifers in corrals near dusk (within 1 hour of dusk)
- Windbreaks controlling dust from corrals (when feasible and there is adequate space at existing facilities)

Calf Area

Calf Hutches ($\geq 75\%$ control)

d. Step 4 - Cost Effectiveness Analysis

Freestall Barns

Design and Management Practices

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

Open Corrals

Design and Management Practices

- Concrete feed lanes and walkways
- Scraping of open corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions
- Shade structures in open corrals
- Feeding heifers in corrals near dusk (within 1 hour of dusk)

- Windbreaks controlling dust from corrals (when feasible and there is adequate space at existing facilities)

Calf Area

Calf Hutches ($\geq 75\%$ control)

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

e. Step 5 - Select BACT

BACT for PM₁₀ from freestall barns is satisfied with:

- 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

BACT for PM₁₀ from open corrals is satisfied with:

- Concrete feed lanes and walkways
- Scraping of open corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions
- Shade structures in open corrals
- Feeding heifers in corrals near dusk (within 1 hour of dusk)
- Windbreaks controlling dust from corrals (when feasible and there is adequate space at existing facilities)

BACT for PM₁₀ from Calf Area is satisfied with:

- Calf Hutches ($\geq 75\%$ control)

2. BACT Analysis for VOC Emissions:

a. Step 1 - Identify all control technologies

Freestall Barns and Open Corrals

Feed and Manure Management Practices Dairy

- Concrete feed lanes and walkways
- Flushing feed lanes and walkways for mature cows (milk and dry cows) at least four times per day and flushing feed lanes and walkways for support stock at least once per day;
- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines
- Exercise pens and open corrals properly sloped to promote drainage (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for

each animal is more than 400 square feet per animal), or managed to maintain a dry surface (except during periods of rainy weather)

- Scraping of exercise pens and open corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions
- VOC mitigation measures required by District Rule 4570

Calf Area

- Flushing feed lanes and walkways for calves at least once per week;
- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines

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).

Frequent Cleaning 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 (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.¹¹ This undigested protein also produces ammonia and hydrogen sulfide 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 VOCs, ammonia, and hydrogen sulfide.

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

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

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.

¹¹ "Emissions of Volatile Organic Compounds Originating from UK Livestock Agriculture", Hobbs, P.J. 2004 – Journal of the Science of Food and Agriculture

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

Many dairies use equipment pulled by tractors to periodically scrape the surfaces of corrals. Frequent scraping the freestall exercise pens and corrals will reduce the amount of manure on the corral surfaces, which will reduce VOC and ammonia emissions resulting from decomposition of this manure. This practice will also provide a uniform surface, reducing anaerobic conditions on the corral surface, which will reduce gaseous pollutants from this area. The frequency that corrals are scraped at dairies can vary from as little as once a year to every week.

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

b. Step 2 - Eliminate Options

All the options identified in step 1 are technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

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

Freestalls and Open Corrals

Feed and Manure Management Practices

- Concrete feed lanes and walkways
- Feed lanes and walkways for mature cows (milk and dry cows) flushed four times per day. Feed lanes and walkways for support stock (heifers) flushed at least once per day.
- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines
- Exercise pens and open corrals properly sloped to promote drainage (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal), or managed to maintain a dry surface (except during periods of rainy weather)
- Scraping of exercise pens and open corrals every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions
- VOC mitigation measures required by District Rule 4570

Calf Area

- Flushing feed lanes and walkways for calves at least once per week;
- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines

d. Step 4 - Cost Effectiveness Analysis

Freestalls and Open Corrals

Feed and Manure Management Practices

- Concrete feed lanes and walkways
- Feed lanes and walkways for mature cows (milk and dry cows) flushed four times per day and Feed lanes and walkways for support stock (heifers) flushed at least once per day; or for dairies that are not able to use a flush system, Feed lanes and walkways for mature cows scraped four times per day with an automatic scraper (or equivalent) and Feed lanes and walkways for support stock (heifers) cleaned at least once per day
- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines
- Exercise pens and open corrals properly sloped to promote drainage (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal), or managed to maintain a dry surface (except during periods of rainy weather)
- Scraping of exercise pens and open corrals every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions
- VOC mitigation measures required by District Rule 4570

Calf Area

- Flushing feed lanes and walkways for calves at least once per week;
- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines

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

e. Step 5 - Select BACT

BACT for VOC from Dairy Freestall Barns and Open Corrals is:

- Concrete feed lanes and walkways
- Feed lanes and walkways for mature cows (milk and dry cows) flushed four times per day. Feed lanes and walkways for support stock (heifers) flushed at least once per day.
- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines

- Exercise pens and open corrals properly sloped to promote drainage (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal), or managed to maintain a dry surface (except during periods of rainy weather)
- Scraping of exercise pens and open corrals every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions
- VOC mitigation measures required by District Rule 4570

BACT for VOC from the Calf Area is:

- Flushing feed lanes and walkways for calves at least once per week;
- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines

2. BACT Analysis for NH₃ Emissions from Dairy Freestall Barns and Open Corrals:

a. Step 1 - Identify all control technologies

Freestalls and Open Corrals

1) Feed and Manure Management Practices

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

Calf Area

- Flushing feed lanes and walkways for calves at least once per week;
- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines

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).

Frequent Cleaning 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. 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 (NRC) or other District-approved Guidelines

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

A diet that is formulated to feed proper amounts of ruminantly degradable protein will result in improved nitrogen utilization by the animal and corresponding reduction in urea and organic nitrogen content of the manure, which will reduce the production of

VOCs and ammonia. The latest National Research Council (NRC) guidelines for the selection of an optimal bovine diet should be followed to the maximum extent possible. The diet recommendations made in this publication seek to achieve the maximum uptake of protein by the animal and the minimum carryover of nitrogen into the manure.

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 and Open Corrals with a Pull-Type Scraper

Many dairies use equipment pulled by tractors to periodically scrape the surfaces of corrals. Frequent scraping the freestall exercise pens and corrals will reduce the amount of manure on the corral surfaces, which will reduce VOC and ammonia emissions resulting from decomposition of this manure. This practice will also provide a uniform surface, reducing anaerobic conditions on the corral surface, which will reduce gaseous pollutants from this area. The frequency that corrals are scraped at dairies can vary from as little as once a year to every week.

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

Freestalls and Open Corrals

Feed and Manure Management Practices

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

- All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines
- Exercise pens and open corrals properly sloped to promote drainage (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal), or managed to maintain a dry surface (except during periods of rainy weather)
- Scraping of exercise pens and open corrals every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions

Calf Area

- Flushing feed lanes and walkways for calves at least once per week;
- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

BACT for NH₃ from Dairy Freestall Barns and Open Corrals is:

- Concrete feed lanes and walkways;
- Flushing feed lanes and walkways for mature cows (milk and dry cows) at least four times per day and flushing feed lanes and walkways for support stock at least once per day;
- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
- Properly sloping 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 of exercise pens and open corrals every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions

BACT for NH₃ from the Calf Area is:

- Flushing feed lanes and walkways for calves at least once per week;
- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines

Top Down BACT Analysis for Liquid Manure Handling

1. BACT for VOC Emissions from the Lagoon & Storage Pond(s)

a. Step 1 - Identify all control technologies

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

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

Description of Control Technologies

1) Aerobic Treatment Lagoon or Mechanically Aerated Lagoon

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

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

and the control efficiencies will therefore be lower.

2) Covered Lagoon Digester

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

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

3) Anaerobic Treatment Lagoon and Solids Removal/Separation System

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

- Required volume - the minimum design volume should account for all potential sludge, treatment, precipitation, and runoff volumes.
- Treatment period - retention time of the material in the lagoon shall be the time required to provide environmentally safe utilization of waste. The minimum hydraulic retention time for a covered lagoon in the San Joaquin Valley is about 38 days.
- Waste loading shall be based on the maximum daily loading considering all waste sources that will be treated by the lagoon. The loading rate is typically based on volatile solids (VS) loading per unit of volume. The suggested loading rate for the San Joaquin Valley is 6.5-11 lb-VS/1000 ft³/day depending on separation and type of system.
- The operating depth of the lagoon shall be 12 feet or greater. Maximizing the depth of the lagoon minimizes the surface area, which in turn minimizes the cover size and cost. Increasing the lagoon depth has the following advantages:
 - Minimizes surface area in contact with the atmosphere, thus reducing surface available to convection, evaporation
 - Smaller surface areas provide a more favorable and stable environment for methane bacteria
 - Better mixing of lagoon due to rising gas bubbles
 - Requires less land
 - More efficient for mechanical mixing

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

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

A properly designed anaerobic treatment lagoon will reduce the volatile solids (VS) by at least 50%. This will reduce the biological oxygen demand (BOD) and increase the efficiency at which organic compounds are converted into methane and carbon dioxide rather than VOC. Although the VS reduction is expected to

be at least 50%, a conservative control efficiency of 40% will be assumed, until better data becomes available.

Solids Removal/Separation - Mechanical Separator(s)

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

- 1) Aerobic treatment lagoon or mechanically aerated lagoon (95% control efficiency)
- 2) Covered lagoon digester vented to a control device (80% control efficiency)
- 3) Anaerobic treatment lagoon designed to meet Natural Resources Conservation Service (NRCS) standards (40% control efficiency)
- 4) Solids Removal/Separation

d. Step 4 - Cost Effectiveness Analysis

Aerobic Treatment Lagoon or Mechanically Aerated Lagoon

Aerobic Treatment Lagoon

NRCS Practice Standard Code 359 requires that naturally aerobic lagoons be designed to have a minimum treatment surface area as determined on the basis of daily BOD₅ loading per unit of lagoon surface. The standard specifies that the maximum loading rate of naturally aerobic lagoons shall not exceed the loading rate indicated by the NRCS Agricultural Waste Management Field Handbook

(AWMFH) or the maximum loading rate according to state regulatory requirements, whichever is more stringent. According to Figure 10-30 (August 2009) of the latest version of the AWMFH, the maximum aerobic lagoon loading rate for the San Joaquin Valley is 45 - 55 lb-BOD₅/acre-day. According to Table 4-5 (March 2008) of the NRCS AWMFH, the total daily manure produced by a milk cow will have 2.9 lb-BOD₅/day. Assuming that at least 80% of the manure will be flushed to the lagoon system, the minimum lagoon surface area required for a naturally aerobic lagoon treating manure from 4,800 milk cows in the San Joaquin Valley can be calculated as follows:

$$\begin{aligned}\text{BOD}_5 \text{ loading (lb/day)} &= 4,800 \text{ milk cows} \times 2.9 \text{ lb-BOD}_5/\text{cow-day} \times 0.80 \\ &= 11,136 \text{ lb-BOD}_5/\text{day}\end{aligned}$$

$$\begin{aligned}\text{Minimum Surface Area (acres)} &= 11,136 \text{ lb-BOD}_5/\text{day} \div 55 \text{ lb-BOD}_5/\text{acre-day} \\ &= 202.5 \text{ acres}\end{aligned}$$

As shown above, the minimum surface area required for a naturally aerobic lagoon to treat manure from the proposed number of milk cows is 202.5 acres. This does not include the additional surface area that would be required to treat manure from support stock. Based on the space requirements alone it is clear that this option cannot reasonably be required and no further analysis is needed.

Mechanically Aerated Lagoon

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

Biological Oxygen Demand (BOD₅)

In order to effectively calculate the cost of this control option, the energy requirement for complete aeration must be determined. It should be noted that approximately 1.5 to 2.5 pounds of oxygen is required to digest 1 pound of Biological Oxygen Demand (BOD₅) with additional oxygen required for conversion of ammonia to nitrate (nitrification). It is generally accepted that at least twice the BOD should be provided for complete aeration. According to Dr. Ruihong Zhang of the University of California, Davis, 2.4 lb (1.1 kg) of oxygen per cow must be provided each day for removal of BOD and an additional 3 lb (1.4 kg) per cow for oxidation of 70% of the nitrogen.

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 BOD₅ loading. As discussed above, the total daily manure produced by a milk cow will have a BOD₅ of 2.9 lb/day and a lagoon handling flushed manure from 4,800 milk cows will have a loading rate of approximately 11,136 lb- BOD₅/day (5,051 kg-BOD₅/day).

Energy Requirement

Based on the data gathered in a UC Davis study on aerator performance for wastewater lagoons, aeration efficiencies for mechanical aerators ranged from 0.10 to 0.68 kg of oxygen provided per kW-hr of energy utilized. The most efficient aerator tested that had been installed in dairy lagoons had an aeration efficiency of 0.49 kg-O₂/kW-hr. These efficiency tests were performed in clean water and lower aeration efficiencies are expected in liquid manure because of the significant amount of solids that it contains. The yearly energy requirement for a mechanically aerated lagoon system treating flushed manure from 4,800 milk cows is calculated as follows:

$$5,051 \text{ kg-BOD}_5/\text{day} \div (0.68 \text{ kg-O}_2/\text{kW-hr}) \times (365 \text{ day/year}) = 2,711,199 \text{ kW-hr/year}$$

Cost of Electricity

The cost of electricity will be based upon the average price for industrial electricity in California as of January 2016, as taken from the Energy Information Administration (EIA) website:¹²

$$\text{Average cost of electricity} = \$0.1052/\text{kW-hr}$$

The electricity cost for complete aeration is calculated as follows:

$$2,711,199 \text{ kW-hr/year} \times \$0.1052/\text{kW-hr} = \$285,218/\text{year}$$

VOC Emissions Reductions

It will be conservatively assumed that a mechanically aerated lagoon providing 1 lb of oxygen for every 1 lb of BOD₅ loading will control 90% of the VOC emissions from the lagoon/storage pond. However, as noted above, it is generally accepted that the oxygen provided should be twice the BOD₅ loading rate for complete aeration. Thus, the actual control from providing 1 lb of oxygen for every 1 lb of BOD₅ loading is probably in the 50% range.

¹² http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_06_b

The annual VOC emissions reductions are calculated as:

$$\begin{aligned} & [\text{Number of cows}] \times [\text{Lagoon/Storage Pond VOC EF (lb/cow-year)}] \times \\ & [\text{Complete Aeration Control Efficiency for Lagoon/Storage Pond}] \\ & = 4,800 \text{ cows} \times 1.3 \text{ lb-VOC/cow-yr} \times 90\% \text{ control} \\ & = 5,616 \text{ lb-VOC/yr} \end{aligned}$$

Cost of Reductions

$$\begin{aligned} \text{Cost of reductions} &= (\$285,218/\text{year}) / [(5,616 \text{ lb-VOC/year})(1 \text{ ton}/2000 \text{ lb})] \\ &= \$101,573/\text{ton} \end{aligned}$$

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

Covered Lagoon Digester

Capital Cost for Installation

The capital cost estimates for installation of a covered lagoon digester are based on information from the United States EPA AgSTAR publication "Anaerobic Digestion Capital Costs for Dairy Farms" (May 2010)¹³ and the California Energy Commission (CEC) Public Interest Energy Research (PIER) Program Dairy Methane Digester System Program Evaluation Report (Feb 2009).¹⁴ The formula in the AgSTAR publication results in a capital cost of \$1,032 per cow. This estimate excludes costs of solids separation after digestion, hydrogen sulfide removal, and utility charges including line upgrades and interconnection costs and fees. Based on information from installations in California, the CEC PIER Dairy Methane Digester Program Evaluation Report gives an average cost of \$585 per cow for installation of covered lagoon anaerobic digesters (see Table 9 - Total Project Costs and Cost per Cow and per kW).

For the purposes of this analysis, the more conservative capital cost of \$585/cow will be used. Thus, the installation capital cost for the proposed herd of 4,800 milk cows is at least \$2,808,000 (\$585/cow x 4,800 cows).

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

¹³ "Anaerobic Digestion Capital Costs for Dairy Farms" (May 2010), EPA AgSTAR http://www.epa.gov/agstar/pdf/digester_cost_fs.pdf

¹⁴ "Dairy Power Production Program – Dairy Methane System Program Evaluation Report" (February 2009). Western United Resource Development, Inc. prepared for the California Energy Commission (CEC) Public Interest Energy Research Program. (CEC-500-2009-009) <http://www.energy.ca.gov/2009publications/CEC-500-2009-009/CEC-500-2009-009.PDF>

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

Where:

A = Equivalent annual capital cost of the control equipment

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

i = Interest rate (assumed to be 10%)

n = Equipment life (assumed to be 10 years)

$$\begin{aligned} A &= [\$2,808,000 \times 0.1(1.1)^{10}]/[(1.1)^{10}-1] \\ &= \$456,989/\text{year} \end{aligned}$$

Potential Production of Electricity

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

The potential quantity of electricity produced is calculated as follows:

$$\begin{aligned} \text{Electrical Produced} &= 670.3 \text{ kW-hr}/(\text{milk cow-yr}) \times 4,800 \text{ milk cows} \\ &= 3,217,440 \text{ kW-hr/yr} \end{aligned}$$

Potential Cost Savings from Production of Electricity

The value of electricity generated will be calculated using the previously cited EIA rate of \$0.1052/kW-hr.

$$\begin{aligned} \text{Potential Cost Savings} &= 3,217,440 \text{ kW-hr/yr} \times \$0.1052/\text{kW-hr} \\ &= \$338,475/\text{yr} \end{aligned}$$

The annualized capital cost less the potential savings from electricity produced is \$118,514 (\$456,989 - \$338,475).

VOC Emissions Reductions

The annual VOC emissions reductions are calculated as:

$$[\text{Number of cows}] \times [\text{Lagoon/Storage Pond VOC EF (lb/cow-year)}] \times [\text{Covered Lagoon Digester Efficiency for Lagoon/Storage Pond}]$$

$$4,800 \text{ cows} \times 1.3 \text{ lb-VOC/cow-yr} \times 80\% \text{ control} \\ = 4,992 \text{ lb-VOC/yr}$$

Cost of Reductions

$$\text{Cost of reductions} = (\$118,514/\text{year}) / [(4,992 \text{ lb-VOC/year})(1 \text{ ton}/2000 \text{ lb})] \\ = \$47,482/\text{ton}$$

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

Anaerobic Treatment Lagoon and Solids Removal/Separation System

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

e. Step 5 - Select BACT

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

2. BACT for NH₃ Emissions from the Lagoon & Storage Pond(s)

a. Step 1 - Identify all control technologies

The following option was identified as a possible control for NH₃ emissions from the lagoons & storage ponds:

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

Description of Control Technology

- 1) Feeding all animals in accordance with NRC or other District-approved guidelines

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

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

b. Step 2 - Eliminate technologically infeasible options

The option listed in Step 1 above is technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

The remaining option is listed below:

- 1) Feeding all animals in accordance with NRC or other District-approved guidelines

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

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

Top Down BACT Analysis for Liquid/Slurry Manure Land Application

1. BACT for VOC Emissions from Liquid/Slurry Manure Land Application

a. Step 1 - Identify all control technologies

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

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

Description of Control Technologies

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

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

In completely aerated lagoons, sufficient oxygen must be provided to sustain the aerobic microorganisms. NRCS Practice Standard Code 359 specifies that naturally aerobic lagoons have a minimum surface area determined by regional climate and daily Biological Oxygen Demand (BOD_5) and requires naturally aerobic lagoons to have a maximum depth no greater than five feet. For mechanically aerated lagoons, NRCS Practice Standard Code 359 specifies that the aeration equipment shall provide a minimum of 1 pound of oxygen for each pound of daily BOD_5 loading. The mechanical aerators that provide the required oxygen may float on the lagoon surface or be submerged in the lagoon. Aeration can also be performed by injection of tiny air bubbles into the lagoon water, mixing of the lagoon water, or spraying of the water into the air. According to Dr.

Ruihong Zhang, a researcher at the University of California, Davis, at least 95% VOC control can be achieved if the dissolved oxygen (DO) concentration of the liquid manure is 2.0 mg/L or more. However, the DO concentrations achieved in mechanically aerated lagoons treating manure are typically much less than this and the control efficiencies will therefore be lower.

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

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

Assumptions:

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

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

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

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

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

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

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

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

The NRCS guideline suggests that this system consist of two cells, a treatment lagoon (primary lagoon) and a storage pond (secondary lagoon). The first stage of the lagoon system is the biological treatment stage and is designed with a

constant liquid level to stabilize the anaerobic digestion. The effluent from the first stage overflows into a second lagoon designed for liquid storage capacity. Effluent from the second lagoon is used in the flush lanes and for the irrigation of cropland. The secondary (overflow) lagoon acts as the storage pond, which can be emptied when necessary.

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

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

d. Step 4 - Cost Effectiveness Analysis

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

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

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

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

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

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

e. Step 5 - Select BACT

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

2. BACT for NH₃ Emissions from Liquid/Slurry Manure Land Application

a. Step 1 - Identify all control technologies

The following option has been identified as a possible control option for NH₃ emissions from land application of liquid manure:

- 1) Feeding all animals in accordance with NRC or other District-approved guidelines

Description of Control Technology

- 1) Feeding all animals in accordance with NRC or other District-approved guidelines

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

the level of microbial action and the lower the production of ammonia and VOCs.

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

b. Step 2 - Eliminate technologically infeasible options

The option listed in Step 1 above is technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

The remaining option is listed below:

- 1) Feeding all animals in accordance with NRC or other District-approved guidelines

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

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

Top Down BACT Analysis for Solid Manure Handling

1. BACT for VOC Emissions from Solid Manure Storage and Land Application

a. Step 1 - Identify all control technologies

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

- 1) Land application of solid manure processed by either an open or enclosed negatively-aerated static pile (ASP) vented to a biofilter (or equivalent), with rapid incorporation of the manure into the soil after land application

- 2) Land application of solid manure processed by an in-vessel/enclosed negatively-aerated static pile vented to a biofilter $\geq 80\%$ destruction efficiency for both active and curing phases (or a combination of controls)
- 3) Land application of solid manure processed by an open negatively-aerated static pile vented to a biofilter $\geq 80\%$ destruction efficiency for both active and curing phases (or a combination of controls)
- 4) Land application of solid manure processed by an open negatively-aerated static pile (ASP) (with thick layer of bulking agent or equivalent), with rapid incorporation of the manure into the soil after land application
- 5) Rapid incorporation of solid manure into the soil after land application

Description of Control Technologies

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

Various types of spreading techniques, such as box spreaders, flail type spreaders, side discharge spreaders, and spinner spreaders, are used to apply solid manure to cropland. Regardless of which technique is used, this practice requires the immediate incorporation of the manure into the soil, reducing emissions and surface run-off while minimizing the loss of nitrogen into the atmosphere. Based on a study by a local Valley dairy, there is a great potential of reducing emissions by incorporating slurry manure rapidly into the soil. A similar reduction may be obtained by the rapid incorporation of solid manure. This technology is expected to yield a VOC control efficiency of up to 58%.¹⁵

2) Land Application of Solid Manure Processed by an Open Negatively-Aerated Static Pile (ASP) (With Thick Layer of Bulking Agent or Equivalent)

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

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

¹⁵ Page 87 of "Recommendations to the San Joaquin Valley Air Pollution Control Officer Regarding Best Available Control Technology for Dairies in the San Joaquin Valley" January 31, 2006 (http://www.valleyair.org/busind/pto/dpag/dpag_idx.htm).

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

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

A study conducted by City of Columbus, Ohio, demonstrated that the weighted-average odor emissions from an outdoor negative aeration pile is approximately 67% lower than those from an outdoor positive aeration pile. Negative aeration is usually used during the beginning of the composting process to greatly reduce odors. In enclosed active composting area, negative pressure aeration also reduces moisture released into the building, and thus, reduces fogging. Positive aeration is used mostly near the end of the composting cycle for more efficient drying of the compost.¹⁶

An odor and emissions study done at the City of Philadelphia biosolids co-composting facility by the Department of Water¹⁷ also concluded that controlling the temperature by controlling the oxygen availability using negative aeration composting is expected to result in lower emissions than those from open windrow composting.

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

No control is expected from the land application of the manure since the manure is not being injected or incorporated into the soil. However, since the manure has gone through a pre-control system, the control efficiency of that system would carry over to land application

¹⁶ Technology Assessment for SCAQMD proposed Rule 1133 Table 3-2

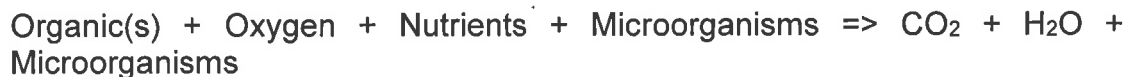
¹⁷ Conclusion # 2, "Measurement and Control of Odor and VOC emissions from the largest municipal aerated-static pile biosolids composting facility in the United States". William Toffey, Philadelphia Water Department; Lawrence Hentz, Post, Buckley, Schuh and Jernigan.

3) Land Application of Solid Manure Processed by an Open Negatively-Aerated Static Pile (ASP) (With Thick Layer of Bulking Agent or Equivalent) Vented to a Biofilter (or Equivalent)

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

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

In the biofiltration process, live bacteria biodegrade organic contaminants from air into carbon dioxide and water. Bacterial cultures (microorganisms that typically consist of several species coexisting in a colony) that use oxygen to biodegrade organics are called aerobic cultures. These bacteria are found in soil, peat, compost and natural water bodies including ponds, lakes, rivers and oceans. They are environmentally friendly and non-harmful to humans unless ingested. Chemically, the biodegradation reaction for aerobic cultures is written as:



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

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

a well-designed, well-operated, and well-maintained biofilter is capable of achieving 80% control efficiency for VOC and ammonia.¹⁸

No control is expected from the land application of the manure since the manure is not being injected or incorporated into the soil. However, since the manure has gone through an ASP vented to biofilter, the 80% control efficiency of that system would carry over to land application.

4) Land Application of Solid Manure Processed by an Enclosed Aerated Static Pile (AgBag, Gore Cover, or Equivalent)

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

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

AgBag International Ltd.

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

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

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

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

The oxygen supply is replenished by forced aeration. This eliminates the labor-

¹⁸ SCAQMD Final Staff Report for Rule 1133, page 18

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

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

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

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

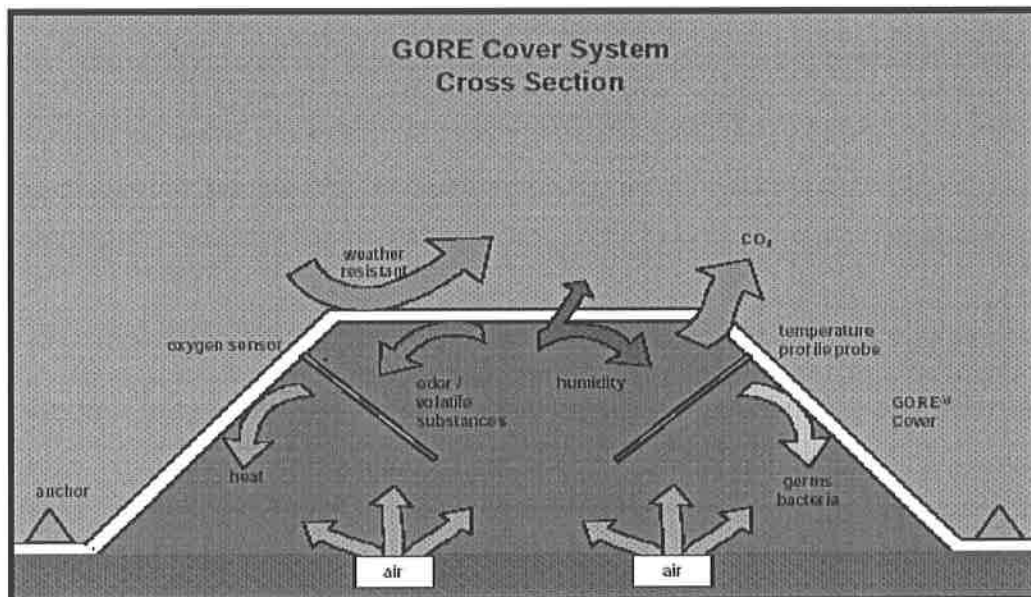
Gore Cover

The Gore Cover, manufactured by Gore Creative Technologies Worldwide, utilizes positive aeration and a specially designed cover to create an enclosed system that controls odors, microorganisms and creates a consistent product unaffected by outside environmental conditions. Medium pressure aerators connect to aeration pipes on the floor or aeration ducts in the floor. Stainless steel probes inserted into the pile monitor oxygen and temperature parameters. The data is relayed to and stored in a computer. This data controls the aerators to keep pile conditions consistent. The Gore Cover system can significantly reduce odors by the controlled use of a semi permeable membrane that is permeable to oxygen but impermeable to large molecules. The cover protects the pile from weather conditions, but allows release of CO₂. These controlled conditions allow consistent product to be produced without risk of damp pockets that may create anaerobic conditions and increased odors.

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

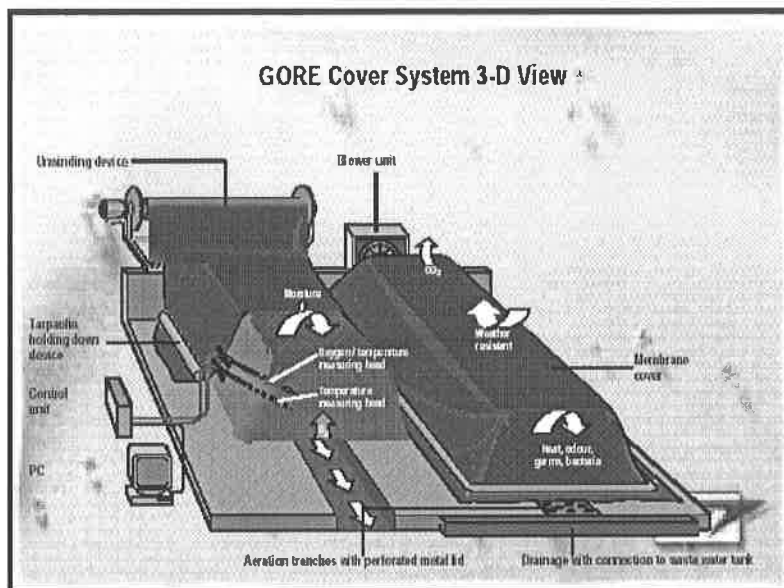
is secured to the ground, allowed to compost for four weeks, then moved and re-covered for two weeks for stabilization. During the final two weeks of curing, the heap is uncovered.

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



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

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



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

No control is expected from the land application of the manure since the manure is not being injected or incorporated into the soil. However, since the manure has gone through a pre-control system, the control efficiency of that system would carry over to land application

5) Land Application of Solid Manure Processed by an In-Vessel/Enclosed (Building, AgBag, Gore Cover, or Equivalent) Negatively-Aerated Static Pile Vented to a Biofilter

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

According to the SCAQMD Rule 1133.2 final staff report (page 18) "Technology Assessment Report states a well-designed, well operated, and well-maintained biofilter is capable of achieving 80% destruction efficiency for VOC and NH₃." The overall control efficiency of this technology is equal to the combined control efficiencies of the enclosed aerated system (33.2%) and the biofilter (80%), calculated as follows:

$$CE = (0.332) + (1-0.332)*0.8 = 86.6\%$$

No control is expected from the land application of the manure since the manure is not being injected or incorporated into the soil. However, since the manure has gone through a pre-control system, the control efficiency of that system would carry over to land application.

6) Land Application of Solid Manure Processed by an Open Negatively-Aerated Static Pile (ASP) (With Thick Layer of Bulking Agent or Equivalent) With Rapid Incorporation of the Manure Into the Soil After Land Application

This technology is the same as described in Option 3 above but with the added control of rapid incorporation of the manure into the soil.

As discussed in Option 1, the VOC control efficiency from immediate incorporation is up to 58%. The overall control efficiency of the combination of both practices is equal to the combined control efficiencies of the open aerated system (23%) and the control efficiency of immediate incorporation.

$$\text{VOC Overall Control efficiency } (0.23) + (1-0.23)*(58\%) = 67.7\%$$

7) Land Application of Solid Manure Processed by Either an Open or Enclosed Negatively-Aerated Static Pile (ASP) Vented to a Biofilter With Rapid Incorporation of the Manure Into the Soil After Land Application

This technology is the same as described in Options 4 and 6 above but with the added control of rapid incorporation of the manure into the soil.

As discussed in Option 1, the VOC control efficiency from immediate incorporation is up to 58%. The overall control efficiency of the combination of both practices is equal to the combined control efficiencies of the ASP and biofilter system (80%) and the control efficiency of immediate incorporation.

$$\text{VOC Overall Control efficiency } (0.80) + (1-0.80)*(58\%) = 91.6\%$$

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

- 1) Land application of solid manure processed by either an open or enclosed negatively-aerated static pile (ASP) vented to a biofilter with rapid incorporation of the manure into the soil after land application (91.6% control efficiency)

- 2) Land application of solid manure processed by an in-vessel/enclosed negatively-aerated static pile vented to a biofilter $\geq 80\%$ destruction efficiency for both active and curing phases (or a combination of controls) ($\approx 86.6\%$ control efficiency)
- 3) Land application of solid manure processed by an open negatively-aerated static pile vented to a biofilter $\geq 80\%$ destruction efficiency for both active and curing phases (or a combination of controls) ($\approx 80\%$ control efficiency)
- 4) Land application of solid manure processed by an open negatively-aerated static pile (ASP) (with thick layer of bulking agent or equivalent) with rapid incorporation of the manure into the soil after land application (67.7% control efficiency)
- 5) Rapid incorporation of solid manure into the soil after land application (58% control efficiency)

d. Step 4 - Cost Effectiveness Analysis

In-Vessel/Enclosed Negatively-Aerated Static Pile (ASP) Vented to a Biofilter or Open Negatively-Aerated Static Pile Vented to a Biofilter

The following costs are taken from the final staff report for District Rule 4565 - Biosolids, Animal Manure, and Poultry Litter Operations (May 30, 2007).¹⁹ The cost information is based on a large composting facility with a throughput of 200,000 wet tons per year. On a per ton basis, the costs for smaller composting operations are expected to be higher since the economies of scale associated with larger operations would not apply.

Costs for ASP Vented to Biofilter	
Total capital cost	\$7,775,000
Annualized capital cost (10% interest - 10 years)	\$1,265,345
Total annual operation & maintenance cost	\$124,305
Total Annualized Cost	\$1,389,650

VOC Emission Reductions

The expected VOC emission reductions are calculated as follows:

$$[\text{Number of cows}] \times [\text{Solid Manure VOC EF (lb/cow-year)}] \times [\text{ASP/In-Vessel Capture Efficiency}] \times [\text{Control Device VOC Control Efficiency}]$$

¹⁹ The capital and operation costs for ASP and in-vessel composting given in the final staff report were taken from: United States Environmental Protection Agency, "Biosolids Technology Fact Sheet: Use of Composting for Biosolids Management" EPA 832-F-02-024, September 2002, http://water.epa.gov/scitech/wastetech/upload/2002_10_15_mtb_combioman.pdf. These costs were not adjusted for inflation.

$[(4,800 \text{ milk cows} \times 0.54 \text{ lb/cow-yr}) + (1,000 \text{ dry cows} \times 0.29 \text{ lb/cow-yr}) + (1,600 \text{ L. heifers} \times 0.23 \text{ lb/cow-yr}) + (1,400 \text{ M. heifers} \times 0.15 \text{ lb/cow-yr}) + (1,252 \text{ S. heifers} \times 0.09 \text{ lb/cow-yr}) + (900 \text{ calves} \times 0.04 \text{ lb/cow-yr})] \times 50\%^{20} \times 80\%$

$= [(2,592 + 290 + 368 + 210 + 113 + 36) \text{ lb/yr}] \times 50\% \times 80\%$
 $= 3,609 \text{ lb/yr} \times 50\% \times 80\%$
 $= 1,444 \text{ lb/yr}$

Cost of Reductions

Cost of Reductions = $(\$1,389,650/\text{year}) / [(1,444 \text{ lb/year})(1 \text{ ton}/2000 \text{ lb})]$
 $= \$1,925,256/\text{ton}$

As shown above, the cost of the VOC reductions for ASP with biofilter is greater than the \$17,500/ton cost effectiveness threshold specified by the District's BACT policy. Control options based on ASP with biofilter are therefore not cost effective and will not be required.

Open or Enclosed Negatively-Aerated Static Pile (ASP)

Cost effectiveness was evaluated by SCAQMD for a variety of controls for new and existing co-composting facilities based on implementation of several possible scenarios. The cost effectiveness for new co-composting facilities was estimated to be about \$24,000 to \$27,000 per ton of VOC reduced or \$11,000 to \$12,000 per ton of VOC and ammonia reduced based on fabric or concrete type of enclosure for the active phase of composting and forced aeration system for the active and curing phases vented to a bio-filter.²¹

For existing co-composting operations, SCAQMD analyzed a few different scenarios. Under one of the scenarios, assuming enclosure without an aeration system for active phase of composting and a forced aeration system for curing phase (both vented to a biofilter) and depending on the type of enclosure, the cost-effectiveness ranged from \$11,400 to \$15,400 per ton of VOC and ammonia reduced, or \$30,000 to \$40,000 per ton of VOC reduced. Under another scenario, using enclosure and aeration system for active phase, and aeration system for curing phase, both vented to biofilter, the cost effectiveness ranged from \$8,700 to \$10,000 per ton of VOC and ammonia reduced or \$23,000 to \$26,500 per ton of VOC reduced (depending on the type of enclosure). Under another scenario, assuming that forced aeration system (in combination with process controls, optimized feedstock mix ratios, and best management

²⁰ The capture efficiency is conservatively assumed to be 50%. The technical assessment of SCAQMD Rule 1133.2 and the staff report for District Rule 4565 give a capture efficiency of 33% for composting facilities, which would result in lower emission reductions.

²¹ Final Staff report for proposed Rule 1133, 1133.1, and 1133.2).

practices) for both active and curing phases (combined with a biofiltration system) could achieve the required reductions (i.e., 70% for VOC and ammonia), the cost-effectiveness could be as low as \$6,500 per ton of VOC and ammonia reduced or \$17,000 per ton of VOC reduced. However, SCAQMD stated that additional test data would be necessary to validate the efficiency of such control methods.²²

The VOC and NH₃ baseline emission factors (1.78 lb-VOC and 2.93 lb-NH₃ per ton) used in determining the cost effectiveness (also included in Rule 1133.2) were developed from AQMD source tests conducted in 1995 and 1996 for three windrow co-composting facilities. These emission factors do not accurately represent the baseline emissions of manure storage piles from dairies. The emission factor for manure piles may in fact be lower.

Based on the preceding analysis, the District cannot determine at this point that ASP composting is cost effective for dairies. Control options involving ASP will therefore not be required for this project.

Rapid Incorporation of Solid Manure into the Soil After Land Application

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

e. Step 5 - Select BACT

The applicant has proposed rapid incorporation (within 24 hours) of solid manure into the soil after land application. The proposal satisfies BACT for this category.

2. BACT for NH₃ Emissions from Solid Manure Land Application

a. Step 1 - Identify all control technologies

The following options have been identified as possible controls for NH₃ emissions from land application of solid manure:

- 1) Rapid incorporation of solid manure into the soil after land application
- 2) All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines

²² The cost assumptions used in this analysis (capital and operating cost) are included in the Technology Assessment Report for SCAQMD PR1133 (Attachment A to the Final Staff Report).

Description of Control Technology

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

Various types of spreading techniques, such as box spreaders, flail type spreaders, side discharge spreaders, and spinner spreaders, are used to apply solid manure to cropland. Regardless of which technique is used, this practice requires the immediate incorporation of the manure into the soil, reducing emissions and surface run-off while minimizing the loss of nitrogen into the atmosphere. Based on a study by a local Valley dairy, there is a great potential of reducing emissions by incorporating slurry manure rapidly into the soil. A similar reduction may be obtained by the rapid incorporation of solid manure. This technology is expected to yield a NH₃ control efficiency ranging from 49% to upwards of 98%.²³

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

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

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

b. Step 2 - Eliminate technologically infeasible options

The options listed in Step 1 above are both technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

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

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).

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

d. Step 4 - Cost Effectiveness Analysis

Rapid incorporation of solid manure into the soil after land application

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

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

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

e. Step 5 - Select BACT

The applicant has proposed to rapidly (within 24 hours) incorporate solid manure into the soil after land application and to feed all animals in accordance with NRC or other District-approved guidelines. The proposal satisfies BACT for this category.

**Top-Down BACT Analysis for the Feed Storage and Handling System
– Total Mixed Ration (TMR)**

1. BACT Analysis for VOC Emissions

a. Step 1 - Identify all control technologies

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

- 1) District Rule 4570 measures

Description of Control Technology

District Rule 4570 measures

District Rule 4570 requires the implementation of various management practices to reduce VOC emissions from TMR. These practices include pushing feed so that it is within three feet of feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals, so the area of the feed is minimized and the feed can be consumed by the cows in a shorter time period instead of continuing to emit VOCs; beginning feeding total mixed rations within two hours of grinding and mixing rations,

reducing the time that fresh feed emits VOCs; storing grain in a weatherproof storage structure or under a weatherproof covering from October through May; feeding steam-flaked, dry rolled, cracked or ground corn or other ground cereal grains; removal of uneaten wet feed from feeding areas; and preparing TMR with a minimum moisture content, which reduces VOC since most of the compounds emitted are highly soluble in water.

b. Step 2 - Eliminate technologically infeasible options

The option identified in step 1 is technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

Only one option was previously identified in step 1:

- 1) District Rule 4570 measures

d. Step 4 - Cost Effectiveness Analysis

District Rule 4570 Measures

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

e. Step 5 - Select BACT

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

Appendix E
Summary of Health Risk Assessment
(HRA) and Ambient Air Quality Analysis
(AAQA)

San Joaquin Valley Air Pollution Control District Risk Management Review

To: Andrea Ogden – Permit Services
From: Kyle Melching & Cheryl Lawler – Technical Services
Date: July 28, 2016
Facility Name: Tony Meirinho & Sons Dairy #2
Location: 4890 Healy Rd., Merced
Application #(s): N-6951-1-2, 2-2, 3-1, 4-1, & 5-1
Project #: N-1140282

A. RMR SUMMARY

RMR Summary						
Categories	Milk Parlor (Unit 1-2)	Dairy Cow Housing (Unit 2-2)	Lagoons & Land Application (Unit 3-1)	Dry Manure (Unit 4-1)	Project Totals	Facility Totals
Prioritization Score	3.29	214	183	1.14	>1	>1
Acute Hazard Index	0.00	0.19	0.37 ¹	0.02	0.58 ¹	0.58 ¹
Chronic Hazard Index	0.00	0.10	0.01	0.00	0.11	0.11
Maximum Individual Cancer Risk	1.43E-07	5.70E-06	2.09E-06	N/A ³	7.94E-06	7.94E-06
T-BACT Required?	No	Yes/No ²	Yes	No		
Special Permit Requirements?	No	No	Yes	No		

¹Risk total includes the acute risk from the Dairy H₂S Calculator.

²T-BACT is determined on a corral by corral basis. T-BACT will be addressed in the Conclusions Section of this report.

³The Maximum Individual Cancer Risk was not calculated since there are no risk factors associated with any of the Toxic Air Contaminants (TACs) under analysis.

Proposed Permit Requirements

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

Unit # 3-1

1. The quarterly H₂S concentration cannot exceed 5.0 mg/L.

B. RMR REPORT

I. Project Description

Technical Services received a Risk Management Review (RMR) and Ambient Air Quality Analysis (AAQA) on April 22, 2015, for modifications to an existing dairy which will increase the total head from 3,607 to 11,102. The milk parlor will see an increase of 3,760 new milk cows. The cow housing permit will need to be modified to account for the new three milk cow freestalls, 1 new dry cow corral, and a special needs barn. The Lagoons unit will be evaluated with the total herd increase of 7,495 head and the new lagoon will be evaluated for H₂S emissions based on the total surface area of the new lagoon. There will also be increases in ammonia emissions for the Dry Manure and Land Application.

II. Analysis

Technical Services performed a prioritization using the District's HEARTs database. Emissions calculated using District-developed spreadsheets for dairies, which were then input into the San Joaquin Valley APCD's Hazard Assessment and Reporting Program (SHARP). In accordance with the District's Risk Management Policy for Permitting New and Modified Sources (APR 1905, May 28, 2015), risks from the project were prioritized using the procedures in the 1990 CAPCOA Facility Prioritization Guidelines. The prioritization score for the facility is 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 2009-2013 from Merced 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 risk associated with the new lagoon was derived using the H₂S file generator's quarterly emission files for the lagoon source. Each quarterly concentration was recorded and inputted into the Dairy H₂S Concentration Calculator to obtain the acute hazard index risk of 0.35. The H₂S risk is then added to the acute risk from the rest of the project to obtain the project acute hazard index risk of 0.37.

The following parameters were used for the review:

Analysis Parameters Unit 1-1 Milk Parlor			
# of Cows	3,760*	Receptor Distance (m)	25
Ammonia (lb/hr)	0.1	Receptor Type	Resident
Ammonia (lb/yr)	514	Release Height (m)	1

*Used to calculate VOC TAC emissions

Analysis Parameters Unit 2-2 (Freestall 1)			
# of Cows	160*	Receptor Distance (m)	25
PM10 (lb/hr)	N/A	Receptor Type	Resident
PM10 (lb/yr)	N/A	Ammonia (lb/hr)	0.39
		Ammonia (lb/yr)	3,381

*Used to calculate VOC TAC emissions

Analysis Parameters Unit 2-2 (Freestall 2)			
# of Cows	990*	Receptor Distance (m)	25
PM10 (lb/hr)	0.113	Receptor Type	Resident
PM10 (lb/yr)	1007	Ammonia (lb/hr)	2.64
		Ammonia (lb/yr)	23,105

*Used to calculate VOC TAC emissions

Analysis Parameters Unit 2-2 (Corral 1)			
# of Cows	2*	Receptor Distance (m)	25
PM10 (lb/hr)	N/A	Receptor Type	Resident
PM10 (lb/yr)	N/A	Ammonia (lb/hr)	N/A
		Ammonia (lb/yr)	N/A

*Used to calculate VOC TAC emissions

Analysis Parameters Unit 2-2 (Corral 17E)			
# of Cows	14*	Receptor Distance (m)	25
PM10 (lb/hr)	N/A	Receptor Type	Resident
PM10 (lb/yr)	N/A	Ammonia (lb/hr)	N/A
		Ammonia (lb/yr)	N/A

*Used to calculate VOC TAC emissions

Analysis Parameters Unit 2-2 (Corral 18E)			
# of Cows	14*	Receptor Distance (m)	25
PM10 (lb/hr)	N/A	Receptor Type	Resident
PM10 (lb/yr)	N/A	Ammonia (lb/hr)	N/A
		Ammonia (lb/yr)	N/A

*Used to calculate VOC TAC emissions

Analysis Parameters Unit 2-2 (Corral 19E)			
# of Cows	14*	Receptor Distance (m)	25
PM10 (lb/hr)	N/A	Receptor Type	Resident
PM10 (lb/yr)	N/A	Ammonia (lb/hr)	N/A
		Ammonia(lb/yr)	N/A

*Used to calculate VOC TAC emissions

Analysis Parameters Unit 2-2 (Calf Hutch Area)			
# of Cows	500*	Receptor Distance (m)	25
PM10 (lb/hr)	0.008	Receptor Type	Resident
PM10 (lb/yr)	82	Ammonia (lb/hr)	0.05
		Ammonia(lb/yr)	452

*Used to calculate VOC TAC emissions

Analysis Parameters Unit 2-2 (Bulls & Corrals 20-26)			
# of Cows	1175*	Receptor Distance (m)	25
PM10 (lb/hr)	0.53	Receptor Type	Resident
PM10 (lb/yr)	4673	Ammonia (lb/hr)	0.55
		Ammonia(lb/yr)	4855

*Used to calculate VOC TAC emissions

Analysis Parameters Unit 2-2 (Freestall 3)			
# of Cows	1200*	Receptor Distance (m)	25
PM10 (lb/hr)	0.15	Receptor Type	Resident
PM10 (lb/yr)	1295	Ammonia (lb/hr)	2.89
		Ammonia(lb/yr)	25,354

*Used to calculate VOC TAC emissions

Analysis Parameters Unit 2-2 (Freestall 4)			
# of Cows	1200*	Receptor Distance (m)	25
PM10 (lb/hr)	0.15	Receptor Type	Resident
PM10 (lb/yr)	1295	Ammonia (lb/hr)	2.89
		Ammonia(lb/yr)	25,354

*Used to calculate VOC TAC emissions

Analysis Parameters Unit 2-2 (Freestall 5)			
# of Cows	500*	Receptor Distance (m)	25
PM10 (lb/hr)	0.06	Receptor Type	Resident
PM10 (lb/yr)	540	Ammonia (lb/hr)	0.61
		Ammonia(lb/yr)	5354

*Used to calculate VOC TAC emissions

Analysis Parameters Unit 2-2 (Corrals 27-35)			
# of Cows	1600*	Receptor Distance (m)	25
PM10 (lb/hr)	0.68	Receptor Type	Resident
PM10 (lb/yr)	5987	Ammonia (lb/hr)	1.03
		Ammonia(lb/yr)	8858

*Used to calculate VOC TAC emissions

Analysis Parameters Unit 2-2 (Corrals 36-39)			
# of Cows	500*	Receptor Distance (m)	25
PM10 (lb/hr)	0.18	Receptor Type	Resident
PM10 (lb/yr)	1612	Ammonia (lb/hr)	0.61
		Ammonia(lb/yr)	5354

*Used to calculate VOC TAC emissions

Analysis Parameters Unit 3-1 Liquid Manure Handling (All Lagoons)			
Source Type	Area	Location Type	Rural
Approx. Area (m ²)	58,460	Release Height (m)	0
# of Cows	7495*	Ammonia (lb/hr)	2.15
		Ammonia(lb/yr)	18,849

*Used to calculate VOC TAC emissions

Analysis Parameter Unit 4-1 Solid Manure Handling			
Source Type	Area	Location Type	Rural
Approx. Area (m ²)	1,936	Release Height (m)	0
Ammonia (lb/hr)	1.52	Ammonia (lb/yr)	13,307

Analysis Parameters Land Application			
Source Type	Area	Location Type	Rural
Approx. Area (m ²)	3,301,521	Release Height (m)	0
Land Application Ammonia (lb/hr)	2.79	Land Application Ammonia (lb/yr)	24,492

*For modeling purposes, Ammonia from both liquid and solid manure was totaled together; and the risk was included with Unit 3-1 (Lagoons).

The results from the Criteria Pollutant Modeling are as follows:

PM₁₀ Pollutant Modeling Results*
Values are in µg/m³

Category	24 Hours	Annual
Net Value	9.56	0.93
Interim Significance Level	10.4 ¹	2.08 ¹
Result	Pass	Pass

¹The District has decided on an interim basis to use a threshold for fugitive dust sources of 10.4 µg/m³ for the 24-hour average concentration and 2.08 µg/m³ for the Annual concentration.

H₂S Pollutant Modeling Results*
Values are in µg/m³

Category	1 Hour
Max Quarterly Value	29.12
Interim Significance Level	42 ¹
Result	Pass

¹The California Ambient Air Quality Standard threshold for H₂S sources is 42 µg/m³ for the 1-hour Maximum concentration.

III. Conclusions

The emissions from the proposed equipment will not cause or contribute significantly to a violation of the State and National AAQS.

Unit 1-2

The acute and chronic indices are below 1.0; and the maximum individual cancer risk associated with the unit is **1.43E-07**, which is less than the 1 in a million threshold. In accordance with the District's Risk Management Policy, the unit is approved **without** Toxic Best Available Control Technology (T-BACT).

Unit 2-2 (Corral 1, Corrals 17-19, Freestalls 1-3, Freestall 5, Calf Hutches, & Corrals 36-39)

The acute and chronic indices are below 1.0; and the maximum individual cancer risk associated with the cow housing units are **each** less than the 1 in a million threshold. In accordance with the District's Risk Management Policy, the above listed corrals are all approved **without** Toxic Best Available Control Technology (T-BACT).

Unit 2-2 (Freestall 4 & Corrals 20-35)

The acute and chronic indices are below 1.0; and the maximum individual cancer risk associated with the cow housing units are **each** greater than the 1 in a million threshold. In accordance with the District's Risk Management Policy, the above listed corrals are all approved **with** Toxic Best Available Control Technology (T-BACT).

Unit 3-1

The acute and chronic indices are below 1.0; and the maximum individual cancer risk associated with the unit is **2.09E-06**, which is greater than the 1 in a million threshold. In accordance with the District's Risk Management Policy, the unit is approved **with** Toxic Best Available Control Technology (T-BACT).

Unit 4-1

The acute hazard index is below 1.0; and there is no maximum individual cancer risk or chronic hazard index associated with the unit. In accordance with the District's Risk Management Policy, the unit is approved **without** Toxic Best Available Control Technology (T-BACT).

Land Application (added Acute Index with Unit 3-1)

The acute hazard index is below 1.0; and there is no maximum individual cancer risk or chronic hazard index associated with the unit. In accordance with the District's Risk Management Policy, the unit is approved **without** Toxic Best Available Control Technology (T-BACT).

To ensure that human health risks will not exceed District allowable levels; the permit requirements listed on Page 1 of this report must be included for the proposed unit.

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

IV. Attachments

- A. RMR Request Form & Attachments
- B. Prioritization
- C. SHARP Risk Results
- D. Facility Summary

Appendix F

Draft ATCs

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT

PERMIT NO: N-6951-1-2

LEGAL OWNER OR OPERATOR: TONY MEIRINHO & SONS DAIRY #2

MAILING ADDRESS: 5418 WOODLAND
MODESTO, CA 95358

LOCATION: 4890 HEALY RD
MERCED, CA 95341

EQUIPMENT DESCRIPTION:

MODIFICATION OF 1,040 COW MILKING OPERATION WITH ONE 80 STALL ROTARY MILKING PARLOR AND ONE 30 STALL FLAT BARN MILKING PARLOR: INCREASE NUMBER OF MILK COWS TO 4,800

CONDITIONS

1. Authority to Construct (ATC) N-6951-1-3 shall be implemented concurrently, or prior to the modification and startup of the equipment authorized by this Authority to Construct. [District Rule 2201]
2. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
3. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
4. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]
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]

CONDITIONS CONTINUE ON NEXT PAGE

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

Seyed Sadredin, Executive Director / APCO

Arnaud Marjollet, Director of Permit Services

N-6951-1-2 : Apr 21 2017 3:15PM - OGDENA : Joint Inspection NOT Required

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 maintain daily records of the number of cows milked in the milking parlor. [District Rules 1070 and 2201]
9. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

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San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT

PERMIT NO: N-6951-2-2

LEGAL OWNER OR OPERATOR: TONY MEIRINHO & SONS DAIRY #2

MAILING ADDRESS: 5418 WOODLAND
MODESTO, CA 95358

LOCATION: 4890 HEALY RD
MERCED, CA 95341

EQUIPMENT DESCRIPTION:

MODIFICATION OF COW HOUSING - 1,250 MATURE COWS (MILK COWS AND DRY COWS), 545 LARGE HEIFERS (15-24 MONTHS), 852 MEDIUM HEIFERS (7-14 MONTHS), 500 SMALL HEIFERS (3-6 MONTHS), AND 60 MATURE BULLS HOUSED IN FREESTALL WITH FLUSH SYSTEM; 400 CALVES (UNDER 3 MONTHS) HOUSED IN ABOVEGROUND CALF HUTCHES WITH FLUSH SYSTEM; INCREASE NUMBER OF COWS TO 4,800 MILK COWS, NOT TO EXCEED A COMBINED TOTAL OF 5,800 MATURE COWS, 4,402 SUPPORT STOCK (HEIFERS AND BULLS), AND 900 CALVES; CONSTRUCT TWO 1,200-COW FREESTALL BARN AND ONE 520 COW SPECIAL NEEDS FREESTALL BARN WITH FLUSH SYSTEM; CONSTRUCT EIGHT LARGE HEIFER CORRALS, FOUR DRY COW CORRALS AND ONE SAUDI STYLE AND ONE LOAFING BARN FOR HEIFERS; AND INSTALL WINDBREAKS

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.

Seyed Sadredin, Executive Director / APCO

Arnaud Marjollet, Director of Permit Services

N-6951-2-2 : May 11 2017 2:30PM - OGDENA : Joint Inspection NOT Required

4. If a licensed veterinarian, a certified nutritionist, the California Department of Food and Agriculture (CDFA), or the United States Department of Agriculture (USDA) determines that any VOC mitigation measure (with a Rule 4570 reference) is detrimental to animal health and needs to be suspended, the Permittee 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 2201]
5. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
6. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
7. Permittee shall pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers. [District Rules 2201 and 4570]
8. Permittee shall flush, scrape or vacuum freestall lanes immediately prior to, immediately after or during each milking. [District Rules 2201 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 and 4570]
10. 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]
11. 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]
12. Permittee shall keep records or maintain an operating plan that requires freestall flush lanes to be flushed or scraped at least four (4) times per day. [District Rules 2201 and 4570]
13. Open corrals and exercise pens shall be scraped every other week using a pull-type scraper in the morning hours, except when this is prevented by wet conditions. [District Rules 2201 and 4570]
14. Permittee shall establish windbreaks along the direction of the prevailing wind for the upwind and downwind sides of the cow housing at the dairy. Windbreaks shall consist of the following rows with the first row closest to the dairy: the first row shall consist of Leland Cypress, planted 10 feet apart and the second row shall consist of Aptos Blue Redwood, planted 14 feet apart. Each row should be offset from the adjacent row. Spacing between rows shall be sufficient to accommodate cultivation equipment. This spacing shall not exceed 20 feet. An alternative windbreak proposal must be approved by the District. [District Rule 2201]
15. Trees/shrubs that are initially planted as part of the windbreak shall have a minimum container size of five gallons. [District Rule 2201]
16. Windbreaks shall be irrigated and maintained for survivability and rapid growth. Dead trees and shrubs shall be replaced as necessary to maintain a windbreak density of 65%. [District Rule 2201]
17. Density is the percentage of the background view that is obscured or hidden when viewing through the windbreak from 60 ft to 100 ft upwind of the rows. [District Rule 2201]
18. The open corrals shall be equipped with shade structures for the all cows. [District Rule 2201]
19. At least one of the feedings of the heifers at this dairy shall be near (within one hour of) dusk. [District Rule 2201]
20. Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rules 2201 and 4570]
21. 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]

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CONDITIONS CONTINUE ON NEXT PAGE

22. 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]
23. 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]
24. 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]
25. 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]
26. Permittee shall scrape, vacuum or flush concrete lanes in corrals at least four (4) times every day for mature cows and twice a day for heifers and once a week for calves. [District Rules 2201 and 4570]
27. Permittee shall maintain records demonstrating that concrete lanes in corrals are scraped, vacuumed, or flushed at least four (4) times every day for mature cows and at least twice every day for support stock and once a week for calves. [District Rules 2201 and 4570]
28. 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]
29. 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]
30. 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]
31. Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rules 2201 and 4570]
32. {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 Rule 4570]
33. The total number of cattle housed at this dairy at any one time shall not exceed any of the following: 5,800 mature cows (milk cows and dry cows); 1,600 large heifers (15-24 months); 1,400 medium heifers (7-14 months); 1,752 small heifers (3-6 months); 900 calves (under 3 months); and 150 mature bulls. [District Rule 2201]
34. Permittee shall maintain daily records of the number of milk cows, dry cows, large heifers (15-24 months), medium heifers (7-14 months), small heifers (3-6 months), small calves (under 3 months), and mature bulls at this dairy. [District Rule 2201]
35. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

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San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT

PERMIT NO: N-6951-3-1

LEGAL OWNER OR OPERATOR: TONY MEIRINHO & SONS DAIRY #2
MAILING ADDRESS: 5418 WOODLAND
MODESTO, CA 95358

LOCATION: 4890 HEALY RD
MERCED, CA 95341

EQUIPMENT DESCRIPTION:

MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF SETTLING BASIN(S); ONE STORAGE POND; ONE LAGOON; MANURE LAND APPLIED THROUGH FLOOD IRRIGATION AND FURROW IRRIGATION; ALLOW INCREASE IN THROUGHPUT DUE TO HERD INCREASE AUTHORIZED BY ATC -2-2; CONSTRUCT A PROCESSING PIT AND MECHANICAL SEPARATOR; AND CONVERT A STORAGE POND TO AN ANAEROBIC TREATMENT LAGOON

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

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Seyed Sadredin, Executive Director, APCO

Arnaud Marjolle, Director of Permit Services
N-6951-3-1 : May 11 2017 2:32PM - OGDENA : Joint Inspection NOT Required

4. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
5. The liquid manure handling system shall handle flush manure from no more than 5,800 mature cows (milk and dry); 1,600 heifers (15-24 months); 1,400 heifers (7-14 months); 1,252 heifers (4-6 months), 900 calves and 150 bulls. [District Rule 2201]
6. Permittee shall operate the lagoon (900' x 300') as an anaerobic treatment lagoon designed according to NRCS Guideline No. 359. [District Rule 2201]
7. Permittee shall only apply liquid manure that has been treated with an anaerobic treatment lagoon, an aerobic lagoon or a digester system. [District Rule 2201]
8. Permittee shall remove solids with a solid separator system, prior to the manure entering the lagoon. [District Rules 2201 and 4570]
9. Permittee shall not allow liquid manure to stand in the fields for more than twenty-four (24) hours after irrigation. [District Rules 2201 and 4570]
10. The quarterly H₂S concentration shall not exceed 5.0 mg/L. [District Rule 4102]
11. Permittee shall maintain records of design specifications and calculations for the Anaerobic Treatment Lagoon system in order to demonstrate that the system has been designed and is operating in accordance with the applicable National Resource Conservation Service (NRCS) technical guide. [District Rule 2201]
12. Permittee shall maintain records that only liquid animal waste treated with an anaerobic treatment lagoon is applied to fields. [District Rules 2201 and 4570]
13. Permittee shall maintain records to demonstrate liquid manure did not stand in the fields for more than twenty-four (24) hours after irrigation. [District Rules 2201 and 4570]
14. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

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San Joaquin Valley Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT

PERMIT NO: N-6951-4-1

LEGAL OWNER OR OPERATOR: TONY MEIRINHO & SONS DAIRY #2

MAILING ADDRESS: 5418 WOODLAND
MODESTO, CA 95358

LOCATION: 4890 HEALY RD
MERCED, CA 95341

EQUIPMENT DESCRIPTION:

MODIFICATION OF SOLID MANURE HANDLING CONSISTING OF OPEN AND COVERED MANURE STOCK PILES;
WINDROW COMPOSTING; SOLID MANURE APPLICATION TO LAND AND HAULED OFFSITE: ALLOW INCREASE IN
THROUGHPUT DUE TO HERD EXPANSION AUTHORIZED BY ATC -2-2

CONDITIONS

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

CONDITIONS CONTINUE ON NEXT PAGE

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Sayed Sadredin, Executive Director / APCO

Arnaud Marjollet, Director of Permit Services

N-6951-4-1 : May 11 2017 2:32PM - OGDENA : Joint Inspection NOT Required

5. Within seventy two (72) hours of removal of solid manure from housing, permittee shall either 1) remove dry manure from the facility, or 2) cover dry manure outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed twenty-four (24) hours per event. [District Rules 2201 and 4570]
6. Permittee shall keep records of dates when manure is removed from the facility or permittee shall maintain records to demonstrate that dry manure piles outside the pens are covered with a weatherproof covering from October through May. [District Rules 2201 and 4570]
7. If weatherproof coverings are used, permittee shall maintain records, such as manufacturer warranties or other documentation, demonstrating that the weatherproof covering over dry manure are installed, used, and maintained in accordance with manufacturer recommendations and applicable standards listed in NRCS Field Office Technical Guide Code 313 or 367, or any other applicable standard approved by the APCO, ARB, and EPA. [District Rules 2201 and 4570]
8. Remove separated solids from the facility within seventy-two (72) hours of removal from the drying process. Within seventy two (72) hours of removal from the drying process, 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. [District Rules 2201 and 4570]
9. Within seventy two (72) hours of removal of separated solids from the drying process, permittee shall either 1) remove separated solids from the facility, or 2) cover separated solids outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed twenty-four (24) hours per event. [District Rules 2201 and 4570]
10. 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]
11. 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]
12. Permittee shall incorporate all solid manure within two (2) hours of land application. [District Rules 2201 and 4570]
13. Permittee shall maintain records to demonstrate that all solid manure has been incorporated within two (2) hours of land application. [District Rules 2201 and 4570]
14. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

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San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT

DRAFT

PERMIT NO: N-6951-5-1

LEGAL OWNER OR OPERATOR: TONY MEIRINHO & SONS DAIRY #2

MAILING ADDRESS: 5418 WOODLAND
MODESTO, CA 95358

LOCATION: 4890 HEALY RD
MERCED, CA 95341

EQUIPMENT DESCRIPTION:

MODIFICATION OF FEED STORAGE AND HANDLING CONSISTING OF COVERED FEED STORAGE OR COMMODITY BARN, SILAGE PILES, AG BAGS, DRY GRAIN TANKS AND SILOS AND TMR: ALLOW INCREASE IN THROUGHPUT DUE TO HERD EXPANSION AUTHORIZED BY ATC -2-2

CONDITIONS

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

CONDITIONS CONTINUE ON NEXT PAGE

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

Seyed Sadredin, Executive Director, APCO

Arnaud Marjollet, Director of Permit Services

N-6951-5-1 : May 11 2017 2:32PM - OGDENA : Joint Inspection NOT Required

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

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CONDITIONS CONTINUE ON NEXT PAGE

20. For each silage pile that Option 2 (Bulk Density Determined by Spreadsheet) is chosen as a mitigation measure for building the pile, records of the filling parameters entered into the District-approved spreadsheet to determine the bulk density shall be maintained. [District Rules 2201 and 4570]
21. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall harvest corn used for the pile at an average moisture content of at least 65% and harvest other silage crops for the pile at an average moisture content of at least 60%. [District Rules 2201 and 4570]
22. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records of the average percent moisture of crops harvested for silage shall be maintained. [District Rules 2201 and 4570]
23. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall adjust setting of equipment used to harvest crops for the pile to incorporate the following parameters for Theoretical Length of Chop (TLC) and roller opening, as applicable: 1) Corn with no processing: TLC not exceeding 1/2 inch, 2) Processed Corn: TLC not exceeding 3/4 inch and roller opening of 1-4 mm, 3) Alfalfa/Grass: TLC not exceeding 1.0 inch, 4) Other silage crops: TLC not exceeding 1/2 inch. [District Rules 2201 and 4570]
24. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records that equipment used to harvest crops for the pile was set to the required TLC and roller opening for the type of crop harvested shall be maintained. [District Rules 2201 and 4570]
25. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rules 2201 and 4570]
26. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall maintain a plan that requires that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rules 2201 and 4570]
27. Permittee shall select and implement at least two of the following mitigation measures for management of silage piles at the facility: Option 1) manage silage piles such that only one silage pile has an uncovered face and the total exposed surface area is less than 2,150 square feet, or manage multiple uncovered silage piles such that the total exposed surface area of all uncovered silage piles is less than 4,300 square feet; Option 2) use a shaver/facer to remove silage from the silage pile, or shall use another method to maintain a smooth vertical surface on the working face of the silage pile; or Option 3) inoculate silage with homolactic lactic acid bacteria in accordance with manufacturer recommendations to achieve a concentration of at least 100,000 colony forming units per gram of wet forage, apply propionic acid, benzoic acid, sorbic acid, sodium benzoate, or potassium sorbate at the rate specified by the manufacturer to reduce yeast counts when forming silage piles, or apply other additives at rates that have been demonstrated to reduce alcohol concentrations in silage and/or VOC emissions from silage and have been approved by the District and EPA. Records of the options chosen for managing each silage pile shall be maintained. [District Rules 2201 and 4570]
28. If Option 1 (Limiting Exposed Area of Silage) is chosen as a mitigation measure for managing silage piles, the permittee shall calculate and record the maximum (largest part of pile) total exposed area of each silage pile. Records of the maximum calculated area shall be maintained. [District Rules 2201 and 4570]
29. For each silage pile that Option 2 (Shaver/Facer or Smooth Face) is chosen as a mitigation measure for managing the pile, the permittee shall maintain records that a shaver/facer was used to remove silage from the pile or shall visually inspect the pile at least daily to verify that the working face was smooth and maintain records of the visual inspections. [District Rules 2201 and 4570]
30. For each silage pile that Option 3 (Silage Additives) is chosen as a mitigation measure for managing the pile, records shall be maintained of the type additive (e.g. inoculants, preservative, other District & EPA-approved additive), the quantity of the additive applied to the pile, and a copy of the manufacturers instructions for application of the additive. [District Rules 2201 and 4570]
31. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

Appendix G

Current Permits to Operate (PTOs)

San Joaquin Valley Air Pollution Control District

PERMIT UNIT: N-6951-1-0

EXPIRATION DATE: 12/31/2017

EQUIPMENT DESCRIPTION:

1,040 COW MILKING OPERATION WITH ONE 24 STALL HERRINGBONE MILKING PARLOR AND ONE 30 STALL FLAT BARN MILKING PARLOR

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. 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]

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

San Joaquin Valley Air Pollution Control District

PERMIT UNIT: N-6951-2-1

EXPIRATION DATE: 12/31/2017

EQUIPMENT DESCRIPTION:

COW HOUSING - 1,250 MATURE COWS (MILK COWS AND DRY COWS), 545 LARGE HEIFERS (15-24 MONTHS), 852 MEDIUM HEIFERS (7-14 MONTHS), 500 SMALL HEIFERS (3-6 MONTHS), AND 60 MATURE BULLS HOUSED IN FREESTALL WITH FLUSH SYSTEM; 400 CALVES (UNDER 3 MONTHS) HOUSED IN ABOVEGROUND CALF HUTCHES 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, a certified nutritionist, the California Department of Food and Agriculture (CDFA), or the United States Department of Agriculture (USDA) determines that any VOC mitigation measure (with a Rule 4570 reference) is detrimental to animal health and needs to be suspended, the Permittee 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 2201]
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]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

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

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]
13. Permittee shall demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning or demonstrate that corrals are cleaned at least once between April and July and at least once between September and December. [District Rule 4570]
14. Permittee shall implement at least one of the following corral mitigation measures: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 square feet or less and shall slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 square feet per animal; 2) maintain corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface except during periods of rainy weather. [District Rule 4570]
15. Permittee shall either 1) maintain sufficient records to demonstrate that corrals are maintained to ensure proper drainage preventing water from standing for more than forty-eight hours or 2) maintain records of dates pens are groomed (i.e., harrowed, raked, or scraped, etc.). [District Rule 4570]
16. Permittee shall scrape, vacuum or flush concrete lanes in corrals at least once every day for mature cows and every seven (7) days for support stock. [District Rule 4570]
17. Permittee shall maintain records demonstrating that concrete lanes in corrals are scraped, vacuumed, or flushed at least once every day for mature cows and at least once every seven (7) days for support stock. [District Rule 4570]
18. Shade structures shall be installed in any of the following ways: 1) constructed with a light permeable roofing material; 2) uphill of any slope in the corral; 3) installed so that the structure has a North/South orientation. OR Permittee shall clean manure from under corral shades at least once every fourteen (14) days, when weather permits access into the corral. [District Rule 4570]
19. If permittee has selected to comply using shades constructed with a light permeable roofing material, then permittee shall maintain records, such as design specifications, demonstrating that the shade structures are equipped with such roofing material or if permittee has selected to comply by cleaning the manure from under the corral shades, then permittee shall maintain records demonstrating that manure is cleaned from under the shades at least once every fourteen (14) days, as long as weather permits access to corrals. [District Rule 4570]
20. Permittee shall manage corrals such that the manure depth in the corral does not exceed twelve (12) inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rule 4570]
21. Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rule 4570]
22. Permittee shall maintain a record of the number of animals of each species and production group at the facility and shall maintain quarterly records of any changes to this information. [District Rule 4570]
23. 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]
24. The total number of cattle housed at this dairy at any one time shall not exceed any of the following: 1250 mature cows (milk cows and dry cows); 545 large heifers (15-24 months); 852 medium heifers (7-14 months); 500 small heifers (3-6 months); 400 calves (under 3 months); and 60 mature bulls. [District Rule 2201]
25. Permittee shall maintain daily records of the number of milk cows, dry cows, large heifers (15-24 months), medium heifers (7-14 months), small heifers (3-6 months), small calves (under 3 months), and mature bulls at this dairy. [District Rule 2201]
26. All records shall be kept and maintained for a minimum of five (5) years and shall be made available to the APCO, ARB and EPA upon request. [District Rule 1070 and 2201]

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

San Joaquin Valley Air Pollution Control District

PERMIT UNIT: N-6951-3-0

EXPIRATION DATE: 12/31/2017

EQUIPMENT DESCRIPTION:

LIQUID MANURE HANDLING SYSTEM CONSISTING OF TWO SETTLING BASINS; ONE STORAGE POND; ONE LAGOON; MANURE LAND APPLIED THROUGH FLOOD IRRIGATION AND FURROW IRRIGATION

PERMIT UNIT REQUIREMENTS

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

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

San Joaquin Valley Air Pollution Control District

PERMIT UNIT: N-6951-4-0

EXPIRATION DATE: 12/31/2017

EQUIPMENT DESCRIPTION:

SOLID MANURE HANDLING CONSISTING OF OPEN AND COVERED MANURE STOCK PILES; WINDROW COMPOSTING; SOLID MANURE APPLICATION TO LAND AND HAULED OFFSITE

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. 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 solid manure from housing, permittee shall either 1) remove dry manure from the facility, or 2) cover dry manure outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed twenty-four (24) hours per event. [District Rule 4570]
6. Permittee shall keep records of dates when manure is removed from the facility or permittee shall maintain records to demonstrate that dry manure piles outside the pens are covered with a weatherproof covering from October through May. [District Rule 4570]
7. If weatherproof coverings are used, permittee shall maintain records, such as manufacturer warranties or other documentation, demonstrating that the weatherproof covering over dry manure are installed, used, and maintained in accordance with manufacturer recommendations and applicable standards listed in NRCS Field Office Technical Guide Code 313 or 367, or any other applicable standard approved by the APCO, ARB, and EPA. [District Rule 4570]
8. 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. 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]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

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

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

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

San Joaquin Valley Air Pollution Control District

PERMIT UNIT: N-6951-5-0

EXPIRATION DATE: 12/31/2017

EQUIPMENT DESCRIPTION:

FEED STORAGE AND HANDLING CONSISTING OF COVERED FEED STORAGE OR COMMODITY BARN, SILAGE PILES, AG BAGS, DRY GRAIN TANKS AND SILOS

PERMIT UNIT REQUIREMENTS

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

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

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

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

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

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