



JUL 18 2012

Frank Goni
Lerda Farms Dairy
18797 Avenue 142
Tulare, CA 93274

Re: Notice of Preliminary Decision - Authority to Construct
Project Number: S-1073290

Dear Mr. Goni:

Enclosed for your review and comment is the District's analysis of Lerda Farms Dairy's application for an Authority to Construct for the expansion of an existing dairy operation from a maximum capacity of 650 lactating cows, 300 dry cows and 260 total support stock to a maximum capacity of 1,500 lactating cows, 368 dry cows and 1,564 total support stock, at 18797 Avenue 142 in Tulare.

The notice of preliminary decision for this project will be published approximately three days from the date of this letter. Please submit your written comments on this project within the 30-day public comment period which begins on the date of publication of the public notice.

Thank you for your cooperation in this matter. If you have any questions regarding this matter, please contact Mr. Jonah Aiyabei of Permit Services at (559) 230-5910.

Sincerely,

David Warner
Director of Permit Services

DW:jka

Enclosures

Seyed Sadredin
Executive Director/Air Pollution Control Officer

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

Central Region (Main Office)
1990 E. Gettysburg Avenue
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JUL 18 2012

Mike Tollstrup, Chief
Project Assessment Branch
Stationary Source Division
California Air Resources Board
PO Box 2815
Sacramento, CA 95812-2815

Re: Notice of Preliminary Decision - Authority to Construct
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Visalia Times-Delta
Visalia Times-Delta

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

NOTICE IS HEREBY GIVEN that the San Joaquin Valley Unified Air Pollution Control District solicits public comment on the proposed issuance of Authority to Construct to Lerda Farms Dairy for the expansion of an existing dairy operation from a maximum capacity of 650 lactating cows, 300 dry cows and 260 total support stock to a maximum capacity of 1,500 lactating cows, 368 dry cows and 1,564 total support stock, at 18797 Avenue 142 in Tulare.

The analysis of the regulatory basis for this proposed action, Project #S-1073290, is available for public inspection at http://www.valleyair.org/notices/public_notices_idx.htm and the District office at the address below. Written comments on this project must be submitted within 30 days of the publication date of this notice to **DAVID WARNER, DIRECTOR OF PERMIT SERVICES, SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT, 1990 EAST GETTYSBURG AVENUE, FRESNO, CA 93726.**

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

Facility Name: Lerda Farms Dairy
Mailing Address: 18797 Avenue 142
Tulare, CA 93274
Contact Person: Frank Goni, Owner
Telephone: (559) 688-6484
Application #s: S-6537-6-1, 7-1, 8-1, 9-1, and 10-1
Project #: S-1073290
Deemed Complete: June 8, 2010

Date: July 9, 2012
Engineer: Jonah Aiyabei
Lead Engineer: Martin Keast

I. Proposal

Lerda Farms Dairy has requested Authority to Construct (ATC) permits to expand an existing dairy operation. The existing dairy operation houses a maximum of 650 milk cows, 300 dry cows, 152 large heifers, and 108 medium heifers. The applicant proposes to expand the dairy to a maximum capacity of 1,500 milk cows, 368 dry cows, 612 large heifers, 544 medium heifers, 272 small heifers and 136 calves. The expansion will entail the construction of three new freestall barns, a new loafing barn, and a new milk barn. The existing milk barn and old freestall barns will be replaced by the new structures. The expanded facility will have shade structures for all corrals. The expanded facility will also have three hay barns, and commodity barn and silage storage slab. Renovations of the liquid manure management system will include the installation of a mechanical separator and a treatment lagoon in addition to the existing storage ponds.

The proposed project entails structural modifications of all the emission units related to the dairy operation, which will require a change in equipment descriptions and operating permit conditions. Therefore, pursuant to District Rule 2201 section 3.25, the proposed project constitutes an NSR modification of the milk barn, cow housing, liquid manure management system, solid manure management system and the feed handling and storage. The project will be evaluated under the September 21, 2006 version of Rule 2201, which is the version that was in effect at the time the project was deemed complete.

The project triggers the public notice requirements of District Rule 2201. Therefore, the preliminary decision for the project will be submitted to the California Air Resources Board (CARB), a public notice will be published in a local newspaper of general circulation in the county of the project, and a 30-day public comment period will be completed prior to issuance of the ATCs.

This is a discretionary project subject to the requirements of the California Environmental Quality Act (CEQA). As a responsible agency, the District must decide on the adequacy of the

environmental documents prepared by the Lead Agency, Tulare County, make appropriate findings, and file the required notices. The District has determined that the Environmental Impact Report (EIR) (State Clearinghouse (SCH) No. 2010101036) prepared by Tulare County adequately addresses environmental concerns resulting from the project. The District has also made appropriate findings regarding the project, and will file a Notice of Determination with Tulare County upon issuance of the Authority to Construct (ATC) permits.

II. Applicable Rules

Rule 2010 Permits Required (12/17/92)
Rule 2201 New and Modified Stationary Source Review Rule (9/21/06)
Rule 2520 Federally Mandated Operating Permits (6/21/01)
Rule 2550 Federally Mandated Preconstruction Review for Major Sources of Air Toxics
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
Senate Bill 700 (SB 700)
California Environmental Quality ACT (CEQA)

III. Project Location

The facility is located at 18797 Avenue 142, Tulare, CA. The equipment is not located within 1,000 feet of the outer boundary of any 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 Lerda Farms Dairy 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 are different ages and types of cows at most dairies.

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 freestall barns and the milk barn. 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 - freestalls, open corrals and calf hutches:

The cows in this dairy are housed in freestall barns, open corrals and calf hutches. The milk cows are housed in the freestall barns, while the dry cows and heifers are housed in open corrals. The calves aged less than three months are housed in hutches.

In the freestall barn cows are grouped in large pens with free access to feed bunks, waterers, and stalls for resting. A standard free-stall barn design has a feed alley in the center of the barn separating two feed bunks on each side. A variety of types of bedding materials are used for animal comfort and to prevent animal injury.

Manure from freestall barn feed lanes will be removed by flushing with water at least four times daily.

An open corral is a large open area where cows are confined, also with unlimited access to feed bunks, water, and possibly an open structure to provide shade. Manure from the unpaved surfaces of the corrals will be removed by scraping weekly with a box-type scraper pulled behind a tractor. The scraped manure will be pushed to the center of the corral to await removal from the facility.

Calf hutches are small house-like wood or plastic structures used to provide individual housing for the calves. The hutches are usually placed on the ground in rows, with enough spacing between rows for feed distribution equipment to pass through.

Milk barn:

The milk barn is a separate building, apart from the lactating cow confinement. The milk barn 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 milk barn, which in turn, is located in the immediate vicinity of the cow housing. The milk barn will consist of one double 35-stall parallel milking pits, for a total of 70 stalls. The lactating cows will be milked two times per day in the milk barns. The milk barn will have concrete floors sloped to a drain. Manure that is deposited in the milk barn will be sprayed into the drain using pressurized hoses after each milking. The effluent from the milk barn will be carried through pipes to the liquid manure treatment system.

Solids Separation:

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

Solid separation at Lerda Farms Dairy is accomplished with the use of a mechanical separator.

Manure Stock Piles (Storage):

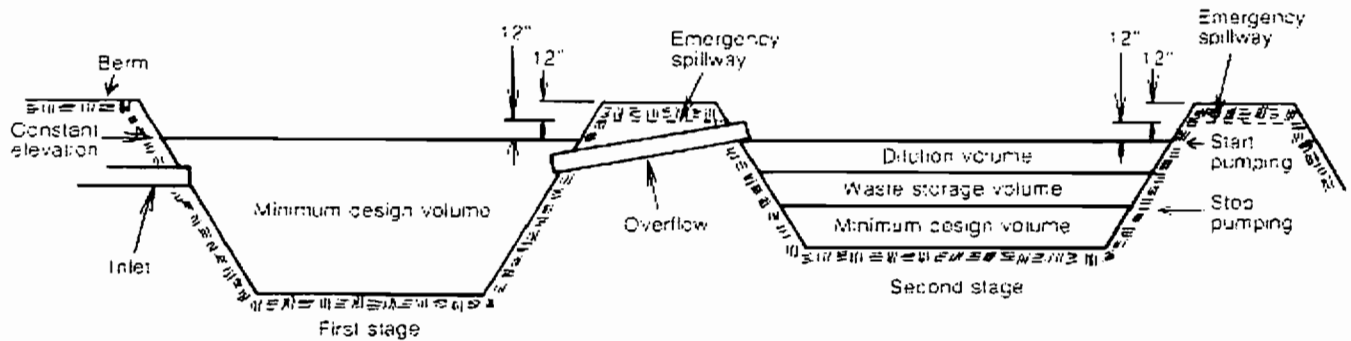
Separated solids will be dried and stockpiled. The stockpiled manure will be used as freestall bedding, with any excess being shipped offsite.

Anaerobic Treatment Lagoons:

An anaerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of manure by microbes in the absence of oxygen. This process of anaerobic decomposition results in the preferential conversion of organic compounds in the manure into methane, carbon dioxide, and water rather than intermediate metabolites (VOCs). The Natural Resources 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 proposed liquid manure handling system for the dairy will have an anaerobic treatment lagoon. The applicant has proposed, at a minimum, to operate the anaerobic lagoon treatment system in accordance with the specifications set forth in NRCS practice standard 359. The anaerobic treatment lagoon system will consist of two stages, a treatment lagoon (primary lagoon) and a storage pond (secondary lagoon). The first lagoon will be designed to maintain a constant liquid level to ensure a stable bacterial population, which will promote more efficient anaerobic digestion. The effluent from the first lagoon overflows into the storage pond/secondary lagoon, which is designed for liquid storage. The liquid level of the storage pond/secondary lagoon fluctuates and can be emptied when necessary. Effluent from the storage ponds is used for the irrigation of cropland. All the manure at the dairy will be pumped to the anaerobic treatment lagoon.



Storage Ponds/Secondary Lagoons:

The proposed dairy will have one storage pond designed for temporary collection and storage of organic waste. The storage pond is designed to have a storage period of about 90 to 180 days and may be completely emptied when pumped. As stated above, the storage pond at this dairy will be part of a two-stage anaerobic treatment lagoon system. The storage pond is designed to have sufficient volume to hold all of the following: all manure and wastewater accumulated at the dairy for a period of 120 days; normal precipitation and any drainage to the lagoon system minus evaporation from the surface of the lagoon; and precipitation during a 25 year, 24 hour storm event.

V. Equipment Listing

Existing Equipment:

- S-6537-6-0: 650 COW MILKING OPERATION WITH ONE 50 STALL PARALLEL MILKING PARLOR.
- S-6537-7-0: COW HOUSING - 650 MILK COWS AND 300 DRY COWS HOUSED IN 1 FREESTALL BARN WITH A FLUSH SYSTEM; 152 LARGE HEIFERS (15-24 MONTHS OLD), AND 108 MEDIUM HEIFERS (7-14 MONTHS OLD) HOUSED IN OPEN CORRALS WITH A FLUSH SYSTEM.
- S-6537-8-0: LIQUID MANURE HANDLING SYSTEM CONSISTING OF TWO STORAGE PONDS (1293'X65'X20' & 1250'X95'X20'). MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION AND FURROW IRRIGATION.
- S-6537-9-0: SOLID MANURE HANDLING CONSISTING OF OPEN MANURE STOCKPILES, WITH SOLID MANURE APPLICATION TO LAND, AND/OR OFFSITE HAULING.

Proposed Modifications:

- S-6537-6-1: MODIFICATION OF 650 COW MILKING OPERATION WITH ONE 50-STALL (PARALLEL) MILKING PARLOR: INCREASE NUMBER OF MILK COWS TO 1,500, AND REPLACE OLD MILKING PARLOR WITH NEW 70-STALL (DOUBLE 35) PARALLEL MILKING PARLOR
- S-6537-7-1: MODIFICATION OF COW HOUSING - 650 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 950 MATURE COWS (MILK AND DRY); 260 TOTAL SUPPORT STOCK (HEIFERS, CALVES AND BULLS) AND 1 FREESTALL BARN AND OPEN CORRALS WITH A FLUSH SYSTEM: INCREASE NUMBER OF COWS TO 1,500 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 1,868 MATURE COWS (MILK AND DRY); AND 1,564 TOTAL SUPPORT STOCK (HEIFERS, CALVES AND BULLS); CONSTRUCT THREE NEW FREESTALL BARNS, ONE NEW LOAFING BARN, 14 NEW CORRALS WITH SHADE STRUCTURES AND FLUSH SYSTEM; AND CALF HUTCHES WITH A FLUSH SYSTEM
- S-6537-8-1: MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF TWO STORAGE PONDS. MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION AND FURROW IRRIGATION: ALLOW INCREASE IN THROUGHPUT DUE TO INCREASE IN NUMBER OF COWS; INSTALL A MECHANICAL SEPARATOR AND AN ANAEROBIC TREATMENT LAGOON (700'X190'X20')
- S-6537-9-1: MODIFICATION OF SOLID MANURE HANDLING CONSISTING OF OPEN MANURE STOCKPILES, WITH SOLID MANURE APPLICATION TO LAND, AND/OR OFFSITE HAULING: ALLOW INCREASE IN THROUGHPUT DUE TO INCREASE IN NUMBER OF COWS
- S-6537-10-1: FEED HANDLING AND STORAGE CONSISTING OF COMMODITY BARNS AND SILAGE PILES

VI. Emission Control Technology Evaluation

PM₁₀, VOC, and NH₃ are the major pollutants of concern from dairy operations. Gaseous pollutant emissions at a dairy result from the ruminant digestive processes (enteric emissions), the decomposition and fermentation of feed, and also the decomposition of organic material in manure. Volatile Organic Compounds (VOCs) are formed as intermediate metabolites when organic matter in manure degrades. Ammonia volatilization is the result of the microbial decomposition of nitrogenous compounds in manure. The quantity of enteric emissions depends directly on the number and types of cows. The quantity of emissions from manure decomposition depends on the amount of manure generated, which also depends on the number and types of cows. Therefore, the total herd size and composition is the critical factor in quantifying emissions from a dairy.

Various management practices are used to control emissions at this dairy. Some of these practices include frequent flushing and removal of manure from paved areas such as the milk parlor, feed lanes, and walkways.

Milk Barn:

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

Cow Housing:

Freestall housing:

All of the milk cows and dry cows will be housed in freestall barns with concrete lanes. Particulate matter emissions from freestall barns are greatly reduced because the cows will be on a paved surface rather than on dry dirt. Additionally, flushing of the freestall lanes creates a moist environment; which further decrease particulate matter emissions.

Frequent flushing:

Manure, which is a source of emissions, will be removed from the freestall and corral lanes by flushing. Because of ammonia's high affinity for and solubility in water, flushing the lanes and walkways will also reduce volatilization of ammonia from the manure deposited in the corral lanes. The lanes and walkways in the freestalls and dry cow corrals will be flushed four times per day and the lanes and walkways in the corrals for the heifers will be flushed twice per day.

Shade structures and corral scraping:

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

Calf hutches:

Calf hutches are small house-like structures used for individual housing of baby calves. The hutches are arranged in rows over slats. Manure is deposited under the hutches through the slats and is subsequently removed by flushing under the slats. Individual housing in the hutches reduces PM₁₀ emissions since the calves' movements are restricted to a small area without much loose dirt or dry manure that can be entrained into the atmosphere. In addition,

frequent flushing can be used to remove manure under the hutches, thereby reducing VOC emissions.

Feeding Animals in Accordance with the NRC Guidelines:

All animals will be fed in accordance with National Research Council (NRC) guidelines using routine nutritional analysis for rations. Feeding the cows in accordance with NRC guidelines minimizes undigested protein and other undigested nutrients in the manure, which would emit NH₃ and VOCs upon decomposition. Refused feed will be removed from the feed lanes on a daily basis to minimize gaseous emissions from decomposition.

Windbreaks/Shelterbelts:

Windbreaks/shelterbelts will be established along the entire Eastern and Southern boundaries of the dairy site. Windbreaks are single or multiple rows of trees in linear configurations planted on the windward or downwind side of a given site. The windbreaks are proposed in accordance with the National Research Conservation Service (NRCS) standard #380. Guidelines from this standard in conjunction with guidelines discussed with the local NRCS office are summarized as follows:

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

Row	Type of tree/shrub	Spacing¹	Height
First Row	Low shrubs Tall shrubs	3' to 5' apart 8' to 12' apart	5' +
Second Row	Tall shrubs or medium size trees	8' to 12' apart	8'-25'
Third Row	Large Evergreens	Varies	35' +

- Spacing between rows should be sufficient to accommodate cultivation equipment.
- Windbreaks should be irrigated to provide the greatest survivability and the most rapid growth of the trees and shrubs.
- Weed control in the windbreak must be completed as well as rapid replacement of any dead trees or shrubs.
- Each row should plant trees that are offset of one another.

¹ These are general spacing requirements and vary depending on type of tree.

The applicant has proposed to establish the windbreaks/shelterbelts in accordance with the NRCS recommendations as summarized above. The following conditions will be placed on the permit:

- Permittee shall establish windbreaks along the entire length of the Eastern and Southern boundaries of the dairy site. The first row (closest to the dairy) shall consist of Arizona Cypress trees spaced ten feet apart. The second row shall consist of Walnut trees spaced twenty feet apart. Each row shall be offset from the adjacent row. Spacing between rows shall be sufficient to accommodate cultivation equipment. This spacing shall not exceed 24 feet. Any alternative windbreak proposal must be approved by the District. [District Rule 2201] N
- Trees/shrubs that are initially planted as part of the windbreak shall have a minimum container size of five gallons. [District Rule 2201] N
- 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] N
- Density shall be determined as 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] N

Liquid Manure Management System:

Solids Separation:

The liquid manure handling system is equipped with a mechanical separator. Solids separation prevents excessive loading of volatile solids in lagoon treatment systems. Excessive loading of volatile solids in lagoons inhibits the activity of the methanogenic bacteria and leads to increased rates of volatile solids production. When the activity of the methanogenic bacteria is not inhibited, most of the VOCs are metabolized to simpler compounds, and the potential for VOC emissions is reduced.

Anaerobic treatment lagoon:

All emissions from the liquid manure handling system are the result of manure decomposition. Lerda Farms has proposed to use an anaerobic treatment lagoon, which consists of a two-stage anaerobic lagoon treatment system designed in accordance with the specifications set forth in NRCS practice standard 359. A properly designed and operated anaerobic treatment lagoon system will reduce VOC emissions because the organic compounds in the manure will be mostly converted into methane, carbon dioxide, and water rather than a significant amount of VOCs. A two-stage anaerobic treatment lagoon system also has an air pollution benefit over

single lagoon systems. Odorous emissions are reduced with a two-stage system since the primary lagoon has a constant treatment volume, which promotes more efficient anaerobic digestion. The proposed anaerobic treatment lagoon meets the design requirements (see design check in Appendix E).

Liquid manure land application:

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

Solid Manure Management System:

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, this dairy will be required to incorporate solid manure applied to cropland immediately (within two hours) after application. Immediate incorporation of the manure into the soil will reduce any volatilization of gaseous pollutants, including ammonia and VOC. Reduction in gaseous emissions is achieved by minimizing the amount of time that the manure is exposed to the atmosphere. Once manure has been incorporated into the soil, VOC is adsorbed onto particles of soil providing the opportunity for the VOC to be oxidized into carbon dioxide and water².

Feed Storage and Handling System:

The proposed emission reduction measures for feed handling and storage include best management practices such as minimizing the surface area of silage exposed to the atmosphere. This can be done by covering the silage pile securely with a tarp and removing feed only from a small area of the pile (face of pile). Leftover feed at the feed bunks will also be cleaned up and disposed of appropriately to avoid decomposition that can result in increased emissions.

In addition, loose feed material such as grain will be stored in commodity barn. Sheltering the feed material from wind reduces the entrainment of particulate matter from the surface of the material into the atmosphere. Keeping the feed dry eliminates the possibility of VOC and NH₃ emissions that may otherwise be generated by microbial activity in wet feed.

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

VII. General Calculations

A. Assumptions

- Potential to Emit for the dairy will be based on the maximum design capacity of the number and types of cows at the dairy.
- Only emissions from the lagoons/storage ponds at the dairy will be used to determine if the facility is a major source since these units are considered to be the only sources of non-fugitive emissions at dairies, as discussed in section VII.C.5.
- The PM₁₀ control efficiencies for the proposed practices and mitigation measures are based on the SJVAPCD memo – *Dairy and Feedlot PM₁₀ Mitigation Practices and their Control Efficiencies*.
- All PM₁₀ emissions from the dairy will be allocated to the cow housing permit.
- All H₂S emissions from the dairy will be allocated to the lagoon/storage of the liquid manure handling permit unit.
- Because of the moisture content of the separated solids, PM₁₀ emissions from solid manure handling are considered negligible.
- The PM₁₀ emission factors for the dairy animals are based on a District document entitled “Dairy and Feedlot PM₁₀ Emissions Factors”, which compiled data from studies performed by Texas A & M ASAE and a USDA/UC Davis report quantifying dairy and feedlot emissions.
- The NH₃ emission factors for milk cows are based on a District document entitled “Breakdown of Dairy VOC Emission Factor into Permit Units”. The NH₃ emission factors for the other cows were developed by taking the ratio of manure generated by the different types of cows to the milk cow and multiplying it by the milk cow emission factor.
- The VOC Emission Factors used in this evaluation are from the “APCO’s Revision to the Dairy VOC Emission Factor”, dated January 2010. These emission factors are controlled Emission Factors and contain mitigation measures from Rule 4570 (as adopted in 2010).
- For BACT analysis purposes, each permit unit at a dairy will also be treated as an emissions unit, except for the liquid manure handling permit unit. For BACT analysis purposes, the liquid manure handling permit unit will contain two emissions units: lagoons/storage ponds and liquid manure land application.
- Feeding animals in accordance with the National Research Council (NRC) guidelines is a feed formulation practice used to improve animal health and productivity. This typically limits the overfeeding of certain feed that have the potential of increasing emissions. This mitigation measure has the potential of reducing a significant amount of emissions, however, since there is not much data available, a conservative control efficiency of 5% will be applied to the overall dairy EF.
- Flushing or hosing down the milking parlor immediately prior to, immediately after, or during each milking has the potential of reducing a significant amount of emissions since many of the compounds emitted from the fresh manure, such as alcohols (ethanol

and methanol) and many Volatile Fatty Acids (VFAs), are highly soluble in water and the fresh excreted manure is almost immediately flushed out of the milk barn. However, a conservative control efficiency estimate of 75% will be applied at this time. This control efficiency does not apply to the enteric emissions generated from the cows themselves. Taking that into account, the overall control efficiency for the milk barn is approximately 16.7%. (EF from milk barn is = 0.9 lb/hd-yr. EF from fresh waste is equal to 0.2 lb/hd-yr. 75% of 0.2 lb/hd-yr = 0.15 lb/hd-yr. $0.15 \text{ lb/hd-yr} / 0.9 \text{ lb/hd-yr} = 16.7\%$ control).

- Lerda Farms will be flushing the feed lanes for all mature cows four times a day. Flushing the feed lanes four times per day is expected to reduce emissions since manure degradation and decomposition in the feed lanes is reduced. Increasing the frequency of the flush will remove manure, which is a source of VOC emissions. Many of the compounds emitted from the fresh manure, such as alcohols (ethanol and methanol) and many Volatile Fatty Acids (VFAs), are highly soluble in water. Based on calculations in the Final Dairy Permitting Advisory Group's (DPAG) Report - "Recommendations to the San Joaquin Valley Air Pollution Control Officer Regarding Best Available Control Technology for Dairies in the San Joaquin Valley" dated January 31, 2006 (http://www.valleyair.org/busind/pto/dpag/dpag_idx.htm), a 47% control will be applied to flushing the corral lanes four times per day, until better data becomes available. This control efficiency only applies to the manure and does not apply to the enteric emissions generated from the cows themselves. However, in order to be conservative, a 10% control efficiency will be applied at this time.
- An anaerobic treatment lagoon designed in accordance with the NRCS Guideline (359) has the potential of reducing significant amount of emissions, since the system is designed to promote the conversion of Volatile Solids (VS) into methane by methanogenic bacteria. Although VOC emission reductions are expected to be high, to be conservative, a control efficiency of 40% will be applied to this mitigation measure for both the lagoon(s) and land application until better data becomes available.
- Many of the mitigation measures required will also have a reduction in ammonia emissions, however, due to limited data, these reductions will not be quantified in this evaluation.

B. Emission Factors

Pre-Project Emission Factors (EF1):

VOC:

EF1 (lb/hd-yr)				
		Milk Cow	Dry Cow	Support Stock*
Milking Parlor	Enteric Emissions in Milking Parlors	0.41	-	-

EF1 (lb/hd-yr)				
		Milk Cow	Dry Cow	Support Stock*
	Milking Parlor Floor	0.03	-	-
	Milking Parlor Total	0.44	-	-
Cow Housing	Enteric Emissions in Cow Housing	3.69	2.23	1.71
	Corrals/Pens	6.6	3.59	2.76
	Bedding	1.0	0.54	0.42
	Lanes	0.8	0.44	0.33
	Cow Housing Total	12.09	6.8	5.22
Liquid Manure Handling	Lagoons/Storage Ponds	1.3	0.71	0.54
	Liquid Manure Land Application	1.4	0.76	0.58
	Liquid Manure Handling Total	2.7	1.47	1.12
Solid Manure Handling	Solid Manure Storage	0.15	0.08	0.06
	Separated Solids Piles	0.06	0.03	0.03
	Solid Manure Land Application	0.33	0.18	0.14
	Solid Manure Handling Total	0.54	0.29	0.23

Silage and TMR (Total Mixed Ration)		
Type of Silage	VOC EF ($\mu\text{g}/\text{m}^2\text{-min}$)	Source
Corn Silage ¹	34,681	SJVAPCD
Alfalfa Silage ¹	17,458	SJVAPCD
Wheat Silage ¹	43,844	SJVAPCD
TMR ²	13,056	SJVAPCD

¹ Assuming pile is completely covered except for the front face

² Assuming rations are fed within 48 hours

PM₁₀:

Cow Housing EF1 (lb/hd-yr)			
Category	Type of Housing	EF	Source
Milk cows	Freestalls	1.37	SJVAPCD ³

³ & ⁴ Based on a Summer 2003 study by Texas A&M ASAE at a West Texas Dairy.

Cow Housing EF1 (lb/hd-yr)			
Category	Type of Housing	EF	Source
Dry cows	Open Corral	5.46	SJVAPCD ⁴
Support stock	Open corrals	10.55	SJVAPCD ⁵

NH₃:

Milking Parlor EF1 (lb/hd-yr)			
Category	Type of Housing	EF	Source
Milk cows	Freestalls	1.2	SJVAPCD

Cow Housing EF1 (lb/hd-yr)			
Category	Type of Housing	EF	Source
Milk cows	Freestalls	28	SJVAPCD
Dry cows	Open Corral	20.6	SJVAPCD
Large heifers	Open corrals	14.4	SJVAPCD
Medium heifers	Open corrals	12.6	SJVAPCD
Small heifers	Open corrals	11.4	SJVAPCD
Calves	Calf hutches	9.3	SJVAPCD

Lagoon/Storage Pond EF1 (lb/hd-yr)			
Category	Type of Housing	EF	Source
Milk cows	Freestalls	15.7	SJVAPCD
Dry cows	Open corral	9.5	SJVAPCD
Large heifers	Open corral	6.7	SJVAPCD
Medium heifers	Open corral	5.8	SJVAPCD
Small heifers	Open corrals	5.3	SJVAPCD
Calves	Calf hutches	5.0	SJVAPCD

Land Application EF1 (lb/hd-yr)			
Category	Type of Housing	EF	Source
Milk cows	Freestalls	29.1	SJVAPCD
Dry cows	Open Corral	15.3	SJVAPCD
Large heifers	Open corral	10.7	SJVAPCD

⁵ Based on a USDA/UC Davis report quantifying dairy and feedlot emissions in Tulare & Kern Counties (April '01).

Land Application EF1 (lb/hd-yr)			
Category	Type of Housing	EF	Source
Medium heifers	Open corral	9.3	SJVAPCD
Small heifers	Open corrals	8.5	SJVAPCD
Calves	Calf hutches	9.3	SJVAPCD

Solid Manure EF1 (lb/hd-yr)			
Category	Type of Housing	EF	Source
Milk cows	Freestalls	3.4	SJVAPCD
Dry cows	Open Corral	1.7	SJVAPCD
Support stock	Open corrals	0.9	SJVAPCD

Post-Project Emission Factors (EF2):

VOC:

Where applicable, the VOC emission factors reflect control efficiencies of the following mitigation measures which have been selected by the applicant:

Milking Parlor

Enteric Emissions Mitigations		
Apply	Mitigation	CE (%)
1	Feed according to National Research Council (NRC) guidelines.	10
Total CE		10

Milking Parlor Floor Mitigations		
Apply	Mitigation	CE (%)
1	Feed according to National Research Council (NRC) guidelines. NOTE: Control efficiency already partially included in EF2	5
1	Flush or hose milk parlor immediately prior to, immediately after, or during each milking NOTE: Control efficiency already included in EF2	0
Total CE		5

Cow Housing

Enteric Emissions Mitigations		
Apply	Mitigation	CE (%)
1	Feed according to National Research Council (NRC) guidelines. NOTE: Control efficiency already partially included in EF2	5
Total CE		5
Corrals/Pens Mitigations		
Apply	Mitigation	CE (%)
1	Feed according to National Research Council (NRC) guidelines.	5
1	BACT: Flush lanes four times per day for mature cows and two times per day for support stock (10%) Rule 4570 equivalent measure: Scrape, vacuum, or flush concrete lanes in corrals at least once every day for mature cows and every seven (7) days for support stock, or clean concrete lanes such that the depth of manure does not exceed twelve (12) inches at any point or time (10%).	10
1	Install shade structure so that the structure has a North/South orientation. NOTE: If selected, for dairies greater than 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.	5
1	Knockdown fence line manure build-up prior to it exceeding a height of twelve (12) inches at any time or point. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. The facility must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible.	10
Total CE		26.9

Bedding Mitigations		
Apply	Mitigation	CE (%)
1	Feed according to National Research Council (NRC) guidelines. NOTE: Control efficiency already partially included in EF2	5
1	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.	10
Total CE		14.5

Lanes Mitigations		
Apply	Mitigation	CE (%)
1	Feed according to National Research Council (NRC) guidelines. NOTE: Control efficiency already partially included in EF2	5
1	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 three (3) times per day.	10
Total CE		14.5

Liquid Manure Handling

Lagoons/Storage Ponds Mitigations		
Apply	Mitigation	CE (%)
1	Feed according to National Research Council (NRC) guidelines. NOTE: Control efficiency already partially included in EF2	5
1	Anaerobic treatment.	40
Total CE		43

Liquid Manure Land Application Mitigations		
Apply	Mitigation	CE (%)
1	Feed according to National Research Council (NRC) guidelines. NOTE: Control efficiency already partially included in EF2	5
Total CE		5

Solid Manure Handling

Solid Manure Storage Mitigations		
Apply	Mitigation	CE (%)
1	Feed according to National Research Council (NRC) guidelines. NOTE: Control efficiency already partially included in EF2	5
1	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
Total CE		14.5

Separated Solids Piles Mitigations		
Apply	Mitigation	CE (%)
1	Feed according to National Research Council (NRC) guidelines. NOTE: Control efficiency already partially included in EF2	5
Total CE		5

Solid Manure Land Application Mitigations		
Apply	Mitigation	CE (%)
1	Feed according to National Research Council (NRC) guidelines. NOTE: Control efficiency already partially included in EF2	5
Total CE		5

Silage & TMR

Corn/Alfalfa/Wheat Silage Mitigations		
Apply	Mitigation	*CE (%)
1	Utilize a sealed feed storage system (e.g. Ag-Bag) for bagged silage. < or >	39

Corn/Alfalfa/Wheat Silage Mitigations		
Apply	Mitigation	*CE (%)
	<p>2. Cover the surface of silage piles, except for the area where feed is being removed from the pile, with a plastic tarp that is at least 5 mils thick (0.005 inches), multiple plastic tarps with a cumulative thickness of at least 5 mils (0.005 inches), or an oxygen barrier film covered with a UV resistant material within 72 hours of last delivery of material to the pile, and</p> <p>Implement one of the following:</p> <p>a) build silage piles such that the average bulk density is at least 44 lb/cu-ft for corn silage and 40 lb/cu-ft for other silage types, as measured in accordance with Section 7.10 of Rule 4570,</p> <p>b) when creating a silage pile, adjust filling parameters to assure a calculated average bulk density of at least 44 lb/cu ft for corn silage and at least 40 lb/cu-ft for other silage types, using a spreadsheet approved by the District;</p> <p>c) harvest silage crop at > or = 65% moisture for corn; and > = 60% moisture for alfalfa/grass and other silage crops; manage silage material delivery such that no more than 6 inches of materials are uncompacted on top of the pile; and incorporate the applicable Theoretical Length of Chop (TLC) and roller opening for the crop being harvested</p> <p>Manage exposed silage</p> <p>Implement two of the following:</p> <p><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.</p> <p><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</p> <p><u>Silage additive.</u> a) inoculate silage with homolactic acid bacteria in accordance with manufacturer recommendations to achieve a concentration of at least</p>	

Corn/Alfalfa/Wheat Silage Mitigations		
Apply	Mitigation	*CE (%)
	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.	
*Total CE		39

*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 (agbag)

TMR Mitigations		
Apply	Mitigation	CE (%)
1	Push feed so that it is within 3 feet of feedlane fence within 2 hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the cows.	10
1	Feed stream-flaked, dry rolled, cracked or ground corn or other ground cereal grains	10
Total CE		19

Emission Factors (lb/hd-yr)				
		Milk Cow	Dry Cow	Support Stock*
Milking Parlor	Enteric Emissions in Milking Parlors	0.37	-	-
	Milking Parlor Floor	0.03	-	-
	Milking Parlor Total	0.40	-	-
Cow Housing	Enteric Emissions in Cow Housing	3.51	2.12	1.62
	Corrals/Pens	4.82	2.62	2.02
	Bedding	0.86	0.46	0.36
	Lanes	0.68	0.38	0.28
	Cow Housing Total	9.87	5.58	4.28
Liquid Manure Handling	Lagoons/Storage Ponds	0.74	0.40	0.31
	Liquid Manure Land Application	1.33	0.72	0.55
	Liquid Manure Handling Total	2.07	1.12	0.86

Emission Factors (lb/hd-yr)				
		Milk Cow	Dry Cow	Support Stock*
		Milk Cow	Dry Cow	Support Stock*
Solid Manure Handling	Solid Manure Storage	0.13	0.07	0.05
	Separated Solids Piles	0.06	0.03	0.03
	Solid Manure Land Application	0.31	0.17	0.13
	Solid Manure Handling Total	0.50	0.27	0.21

*In order to calculate worst case emissions, the emission factor for the large heifers will be used.

Silage and TMR (Total Mixed Ration) EF2		
Type of Silage	VOC EF ($\mu\text{g}/\text{m}^2\text{-min}$)	Source
Corn Silage ¹	21,155	SJVAPCD
Alfalfa Silage ¹	10,649	SJVAPCD
Wheat Silage ¹	26,745	SJVAPCD
TMR ²	10,575	SJVAPCD

¹ Assuming pile is completely covered except for the front face

² Assuming rations are fed within 48 hours

PM₁₀:

Cow Housing EF2 (lb/hd-yr)				
Category	Uncontrolled EF (lb-PM ₁₀ /hd-yr)	Control(s)	Controlled EF Calculation	Controlled EF (lb-PM ₁₀ /hd-yr)
Milk cows in freestalls	1.37	Downwind Shelterbelts (12.5%) Weekly Scraping using Pull-Type Equipment in morning (15%)	$1.37 \times (1 - 0.125)(1 - 0.15) =$	1.02
Dry cows in open corrals	5.46	Downwind Shelterbelts (12.5%) Weekly Scraping using Pull-Type Equipment in morning (15%) Shade Structures (16.7%)	$5.46 \times (1 - 0.125)(1 - 0.15)(1 - 0.167) =$	3.38
Heifers in open corrals (15-24 months)	10.55	Downwind Shelterbelts (12.5%) Shade Structures (8.3%) Weekly Scraping using Pull-Type Equipment in morning (15%) Feeding Heifers Near Dusk (10%)	$10.55 \times (1 - 0.125)(1 - 0.083)(1 - 0.15)(1 - 0.10) =$	6.47

Cow Housing EF2 (lb/hd-yr)				
Category	Uncontrolled EF (lb-PM ₁₀ /hd-yr)	Control(s)	Controlled EF Calculation	Controlled EF (lb-PM ₁₀ /hd-yr)
Heifers in open corrals (7-14 months)	10.55	Downwind Shelterbelts (12.5%) Shade Structures (8.3%) Weekly Scraping using Pull-Type Equipment in morning (15%) Feeding Heifers Near Dusk (10%)	$10.55 \times (1-0.125)(1-0.083)(1-0.15)(1-0.10)=$	6.47
Heifers in open corrals (4-6 months)	10.55	Downwind Shelterbelts (12.5%) Shade Structures (8.3%) Weekly Scraping using Pull-Type Equipment in morning (15%) Feeding Heifers Near Dusk (10%)	$10.55 \times (1-0.125)(1-0.083)(1-0.15)(1-0.10)=$	6.47
Calves	1.37	Above-Ground Flushed Calf Hutches (95%) Downwind Shelterbelts (12.5%)	$1.37 \times (1-0.95)(1-0.125)=$	0.06

NH3:

For NH3, EF2 = EF1.

C. Calculations

1. Pre-Project Potential to Emit (PE1)

Pre-Project Potential to Emit (PE1) for the dairy will be calculated below based on the maximum design capacity for each category of cows and pre-project emission factors.

Milking Operation (S-6537-6-0):

VOC:

PE1 = 650 x 0.44 = **286 lb/yr**

PE1 = 286 lb/yr ÷ 365 days/yr = **0.8 lb/day**

NH₃:

PE1 = 650 x 1.2 = **780 lb/yr**

PE1 = 780 lb/yr ÷ 365 days/yr = **2.1 lb/day**

Cow Housing (S-6537-7-0):

VOC:

$$\text{PE1} = (650 \times 12.09) + (300 \times 6.8) + (260 \times 5.22) = \mathbf{11,256 \text{ lb/yr}}$$
$$\text{PE1} = 11,256 \text{ lb/yr} \div 365 \text{ days/yr} = \mathbf{30.8 \text{ lb/day}}$$

PM₁₀:

$$\text{PE1} = (650 \times 1.37) + (300 \times 5.46) + (260 \times 10.55) = \mathbf{5,272 \text{ lb/yr}}$$
$$\text{PE1} = 5,272 \text{ lb/yr} \div 365 \text{ days/yr} = \mathbf{14.4 \text{ lb/day}}$$

NH₃:

$$\text{PE1} = (650 \times 28) + (300 \times 20.6) + (152 \times 14.4) + (108 \times 12.6) = \mathbf{27,930 \text{ lb/yr}}$$
$$\text{PE1} = 27,930 \text{ lb/yr} \div 365 \text{ days/yr} = \mathbf{76.5 \text{ lb/day}}$$

Liquid Manure Handling (S-6537-8-0):

Lagoon/Storage:

VOC:

$$\text{PE1} = (650 \times 1.3) + (300 \times 0.71) + (260 \times 0.54) = \mathbf{1,198 \text{ lb/yr}}$$
$$\text{PE1} = 1,198 \text{ lb/yr} \div 365 \text{ day/yr} = \mathbf{3.3 \text{ lb/day}}$$

NH₃:

$$\text{PE1} = (650 \times 15.7) + (300 \times 9.5) + (152 \times 6.7) + (108 \times 5.8) = \mathbf{14,700 \text{ lb/yr}}$$
$$\text{PE1} = 14,700 \text{ lb/yr} \div 365 \text{ days/yr} = \mathbf{40.3 \text{ lb/day}}$$

H₂S:

$$\text{Annual H}_2\text{S PE} = 10\% \text{ of the NH}_3 \text{ lagoon PE}$$
$$= 10\% \times 14,700$$
$$= \mathbf{1,470 \text{ lb/yr}}$$

$$\text{Daily H}_2\text{S PE} = 5 \text{ times the average daily H}_2\text{S emissions}$$
$$= 5 \times (1,470 \text{ lb/yr}/365 \text{ days/yr})$$
$$= \mathbf{20.1 \text{ lb/day}}$$

Land Application:

VOC:

$$\text{PE1} = (650 \times 1.4) + (300 \times 0.76) + (260 \times 0.58) = \mathbf{1,289 \text{ lb/yr}}$$
$$\text{PE1} = 1,289 \text{ lb/yr} \div 365 \text{ day/yr} = \mathbf{3.5 \text{ lb/day}}$$

NH₃:

$$PE1 = (650 \times 29.1) + (300 \times 15.3) + (152 \times 10.7) + (108 \times 9.3) = 26,136 \text{ lb/yr}$$

$$PE1 = 26,136 \text{ lb/yr} \div 365 \text{ days/yr} = 71.6 \text{ lb/day}$$

Liquid Manure Handling Summary:

Source	VOC (lb/day)	NH ₃ (lb/day)	VOC (lb/yr)	NH ₃ (lb/yr)
Lagoon/Storage	3.3	40.3	1,198	14,700
Land Application	3.5	71.6	1,289	26,139
Total	6.8	111.9	2,487	40,839

Solid Manure Handling (S-6537-9-0):

VOC:

$$PE1 = (650 \times 0.54) + (300 \times 0.29) + (260 \times 0.23) = 498 \text{ lb/yr}$$

$$PE1 = 498 \text{ lb/yr} \div 365 \text{ day/yr} = 1.4 \text{ lb/day}$$

NH₃:

$$PE1 = (650 \times 3.4) + (300 \times 1.7) + (260 \times 0.9) = 2,954 \text{ lb/yr}$$

$$PE1 = 2,954 \text{ lb/yr} \div 365 \text{ days/yr} = 8.1 \text{ lb/day}$$

Feed Storage and Handling (S-6537-10-0):

Silage Open Face Area:

$$= [\text{\#open face piles}] \times [\text{height}] \times$$

$$(((\text{width}] + (\text{width}) / (0.1667 \times (\text{width}) / [\text{height}]) + 1.111))) / 2)$$

Corn Area

$$= 1 \times 20 \text{ ft} \times ((75 \text{ ft} + (75 \text{ ft} / (0.1667 \times (75 \text{ ft} / 20 \text{ ft}) + 1.111 \text{ ft}))) / 2)$$

$$= 1,182 \text{ ft}^2$$

Wheat Area

$$= 1 \times 20 \text{ ft} \times ((75 \text{ ft} + (75 \text{ ft} / (0.1667 \times 75 \text{ ft} / 20 \text{ ft}) + 1.111 \text{ ft})) / 2)$$

$$= 1181.9965 \text{ ft}^2$$

Silage Annual PE:

Corn Emissions

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

$$= 34,681 \times 1,182 \times 0.0929 \times 8,760 \times 60 \times 2.20\text{E-}9 \text{ lb}/\mu\text{g}$$

$$= 4,404 \text{ lb-VOC/yr}$$

Wheat Emissions

$$\begin{aligned} &= \text{emission factor} \times \text{area} \times 0.0929 \text{ m}^2/\text{ft}^2 \times 8,760 \text{ hr/yr} \times 60 \text{ min/hr} \times 2.20\text{E-}9 \text{ lb}/\mu\text{g} \\ &= 43,844 \times 1181.9965 \times 0.0929 \times 8,760 \times 60 \times 2.20\text{E-}9 \text{ lb}/\mu\text{g} \\ &= \mathbf{5,567 \text{ lb-VOC/yr}} \end{aligned}$$

TMR Annual PE:

TMR emissions should not include calves. However, the number of calves will be included in the total cow count as a worst-case scenario since the number of calves can vary.

$$\begin{aligned} &= [\text{\# of cows}] \times [\text{emission factor}] \times [\text{area}] \times [\text{min/yr}] \times [\text{lb}/\mu\text{g}] \\ &= 1,210 \times 13,056 \mu\text{g}/\text{m}^2\text{-min} \times 0.658 \text{ m}^2 \times 525,600 \text{ min/yr} \times 2.20\text{E-}9 \text{ lb}/\mu\text{g} \\ &= \mathbf{12,020 \text{ lb-VOC/yr}} \end{aligned}$$

$$\text{PE1} = 4,404 \text{ lb-VOC/yr} + 5,567 \text{ lb-VOC/yr} + 12,020 \text{ lb-VOC/yr} = \mathbf{21,991 \text{ lb-VOC/yr}}$$

$$\text{PE1} = 21,991 \text{ lb-VOC/yr} \div 365 \text{ days/yr} = \mathbf{60.2 \text{ lb-VOC/day}}$$

2. Post Project Potential to Emit (PE2)

Post-Project Potential to Emit (PE2) will be calculated based on the maximum design capacity for each category of cows and the controls required and proposed by the dairy. The calculations for each emission unit are as follows:

Milking Operation (S-6537-6-1):

VOC:

$$\begin{aligned} \text{PE2} &= 1,500 \times 0.4 = \mathbf{600 \text{ lb/yr}} \\ \text{PE2} &= 600 \text{ lb/yr} \div 365 \text{ days/yr} = \mathbf{1.6 \text{ lb/day}} \end{aligned}$$

NH₃:

$$\begin{aligned} \text{PE2} &= 1,500 \times 1.2 = \mathbf{1,800 \text{ lb/yr}} \\ \text{PE2} &= 1,800 \text{ lb/yr} \div 365 \text{ days/yr} = \mathbf{4.9 \text{ lb/day}} \end{aligned}$$

Cow Housing (S-6537-7-1):

VOC:

$$\begin{aligned} \text{PE2} &= (1,500 \times 9.87) + (368 \times 5.58) + (1,564 \times 4.28) = \mathbf{23,552 \text{ lb/yr}} \\ \text{PE2} &= 23,552 \text{ lb-VOC/yr} \div 365 \text{ days/yr} = \mathbf{64.5 \text{ lb/day}} \end{aligned}$$

PM₁₀:

$$\text{PE2} = (1,500 \times 1.02) + (368 \times 3.38) + (1,428 \times 6.47) + (136 \times 0.06) = \mathbf{12,021 \text{ lb/yr}}$$
$$\text{PE2} = 12,021 \text{ lb/yr} \div 365 \text{ days/yr} = \mathbf{32.9 \text{ lb/day}}$$

NH₃:

$$\text{PE2} = (1,500 \times 28) + (368 \times 20.6) + (612 \times 14.4) + (544 \times 12.6) + (272 \times 11.4) + (136 \times 9.3) = \mathbf{69,614 \text{ lb/yr}}$$

$$\text{PE2} = 69,614 \text{ lb/yr} \div 365 \text{ days/yr} = \mathbf{190.7 \text{ lb/day}}$$

Liquid Manure Handling (S-6537-8-1):

Lagoon/Storage:

VOC:

$$\text{PE2} = (1,500 \times 0.74) + (368 \times 0.40) + (1,564 \times 0.31) = \mathbf{1,742 \text{ lb/yr}}$$
$$\text{PE2} = 1,742 \text{ lb/yr} \div 365 \text{ day/yr} = \mathbf{4.8 \text{ lb/day}}$$

NH₃:

$$\text{PE2} = (1,500 \times 15.7) + (368 \times 9.5) + (612 \times 6.7) + (544 \times 5.8) + (272 \times 5.3) + (136 \times 5.0) = \mathbf{36,423 \text{ lb/yr}}$$

$$\text{PE2} = 36,423 \text{ lb/yr} \div 365 \text{ days/yr} = \mathbf{99.8 \text{ lb/day}}$$

H₂S:

$$\begin{aligned} \text{Annual H}_2\text{S PE} &= 10\% \text{ of the NH}_3 \text{ lagoon PE} \\ &= 10\% \times 36,423 \\ &= \mathbf{3,642 \text{ lb/yr}} \end{aligned}$$

$$\begin{aligned} \text{Daily H}_2\text{S PE} &= 5 \text{ times the average daily H}_2\text{S emissions} \\ &= 5 \times (3,642 \text{ lb/yr}/365 \text{ days/yr}) \\ &= \mathbf{49.9 \text{ lb/day}} \end{aligned}$$

Land Application:

VOC:

$$\text{PE2} = (1,500 \times 1.33) + (368 \times 0.72) + (1,564 \times 0.55) = \mathbf{3,120 \text{ lb/yr}}$$
$$\text{PE2} = 3,120 \text{ lb/yr} \div 365 \text{ day/yr} = \mathbf{8.5 \text{ lb/day}}$$

NH₃:

$$PE2 = (1,500 \times 29.1) + (368 \times 15.3) + (612 \times 10.7) + (544 \times 9.3) + (272 \times 8.5) + (136 \times 9.3) = \mathbf{64,465 \text{ lb/yr}}$$

$$PE2 = 64,465 \text{ lb/yr} \div 365 \text{ days/yr} = \mathbf{176.6 \text{ lb/day}}$$

Liquid Manure Handling Summary:

Source	VOC (lb/day)	NH ₃ (lb/day)	VOC (lb/yr)	NH ₃ (lb/yr)
Lagoon/Storage	4.8	99.8	1,742	36,423
Land Application	8.5	176.6	3,120	64,465
Total	13.3	276.4	4,862	100,888

Solid Manure Handling (S-6537-9-1):

VOC:

$$PE2 = (1,500 \times 0.50) + (368 \times 0.27) + (1,564 \times 0.21) = \mathbf{1,178 \text{ lb/yr}}$$

$$PE2 = 1,178 \text{ lb/yr} \div 365 \text{ day/yr} = \mathbf{3.2 \text{ lb/day}}$$

NH₃:

$$PE2 = (1,500 \times 3.4) + (368 \times 1.7) + (1,564 \times 0.9) = \mathbf{7,133 \text{ lb/yr}}$$

$$PE2 = 7,133 \text{ lb/yr} \div 365 \text{ days/yr} = \mathbf{19.5 \text{ lb/day}}$$

Feed Storage and Handling (S-6537-10-1):

Silage Open Face Area:

$$= [\text{\#open face piles}] \times [\text{height}] \times (([\text{width}] + ([\text{width}]/(0.1667 \times ([\text{width}]/[\text{height}]) + 1.111)))/2)$$

Corn Area

$$= 1 \times 20 \text{ ft} \times ((75 \text{ ft} + (75 \text{ ft} / (0.1667 \times (75 \text{ ft} / 20 \text{ ft}) + 1.111 \text{ ft}))) / 2)$$

$$= \mathbf{1,182 \text{ ft}^2}$$

Wheat Area

$$= 1 \times 20 \text{ ft} \times ((75 \text{ ft} + (75 \text{ ft} / (0.1667 \times 75 \text{ ft} / 20 \text{ ft}) + 1.111 \text{ ft}))) / 2)$$

$$= \mathbf{1181.9965 \text{ ft}^2}$$

Silage Annual PE:

Corn Emissions

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

$$= 21,155 \times 1,182 \times 0.0929 \times 8760 \times 60 \times 2.20\text{E-}9 \text{ lb}/\mu\text{g}$$

$$= \mathbf{2,686 \text{ lb-VOC/yr}}$$

Wheat Emissions

$$\begin{aligned}
 &= \text{emission factor} \times \text{area} \times 0.0929 \text{ m}^2/\text{ft}^2 \times 8,760 \text{ hr/yr} \times 60 \text{ min/hr} \times 2.20\text{E-}9 \text{ lb}/\mu\text{g} \\
 &= 26,745 \times 1181.9965 \times 0.0929 \times 8760 \times 60 \times 2.20\text{E-}9 \text{ lb}/\mu\text{g} \\
 &= \mathbf{3,396 \text{ lb-VOC/yr}}
 \end{aligned}$$

TMR Annual PE:

TMR emissions should not include calves. However, the number of calves will be included in the total cow count as a worst-case scenario since the number of calves can vary.

$$\begin{aligned}
 &= [\text{\# of cows}] \times [\text{emission factor}] \times [\text{area}] \times [\text{min/yr}] \times [\text{lb}/\mu\text{g}] \\
 &= 3,432 \times 10,575 \mu\text{g}/\text{m}^2\text{-min} \times 0.658 \text{ m}^2 \times 525,600 \text{ min/yr} \times 2.20\text{E-}9 \text{ lb}/\mu\text{g} \\
 &= \mathbf{27,614 \text{ lb-VOC/yr}}
 \end{aligned}$$

$$\begin{aligned}
 \text{PE1} &= 2,686 \text{ lb-VOC/yr} + 3,396 \text{ lb-VOC/yr} + 27,614 \text{ lb-VOC/yr} = \mathbf{33,696 \text{ lb-VOC/yr}} \\
 \text{PE1} &= 33,696 \text{ lb-VOC/yr} \div 365 \text{ days/yr} = \mathbf{92.3 \text{ lb-VOC/day}}
 \end{aligned}$$

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

Pursuant to Section 4.10 of 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. This facility does not have any banked ERCs. The SSPE1 is therefore the sum of the PE1 for all valid emission units, as shown in the following table:

Pre-Project Stationary Source Potential to Emit (lb/year)							
	NO _x	SO _x	PM ₁₀	CO	VOC	NH ₃	H ₂ S
S-6537-1-0 NG IC engine	11,122	9	27	1,518	322	0	0
S-6537-2-0 NG IC engine	9,774	7	24	1,334	283	0	0
S-6537-3-0 NG IC engine	9,639	7	23	1,316	279	0	0
S-6537-4-0 NG IC engine	9,639	7	23	1,316	279	0	0
S-6537-5-0 NG IC engine	8,471	6	21	1,156	245	0	0
S-6537-6-0 Milking operation	0	0	0	0	286	780	0
S-6537-7-0 Cow Housing	0	0	5,272	0	11,256	27,930	0
S-6537-8-0 Liquid manure	0	0	0	0	2,487	40,839	1,470

Pre-Project Stationary Source Potential to Emit (lb/year)							
	NO _x	SO _x	PM ₁₀	CO	VOC	NH ₃	H ₂ S
S-6537-9-0 Solid Manure	0	0	0	0	498	2,954	0
S-6537-10-0 Feed	0	0	0	0	21,991	0	0
S-6537-11-0 Diesel IC engine	732	1	12	75	48	0	0
SSPE1	49,377	37	5,402	6,715	37,974	72,503	1,470

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

Pursuant to Section 4.10 of 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. This facility does not have any banked ERCs.

The SSPE2 is therefore the sum of the PE2 for all valid emission units, as shown in the following table:

Post-Project Stationary Source Potential to Emit (lb/year)							
	NO _x	SO _x	PM ₁₀	CO	VOC	NH ₃	H ₂ S
S-6537-1-0 NG IC engine	11,122	9	27	1,518	322	0	0
S-6537-2-0 NG IC engine	9,774	7	24	1,334	283	0	0
S-6537-3-0 NG IC engine	9,639	7	23	1,316	279	0	0
S-6537-4-0 NG IC engine	9,639	7	23	1,316	279	0	0
S-6537-5-0 NG IC engine	8,471	6	21	1,156	245	0	0
S-6537-6-1 Milking operation	0	0	0	0	600	1,800	0
S-6537-7-1 Cow Housing	0	0	12,021	0	23,552	69,614	0
S-6537-8-1 Liquid manure	0	0	0	0	4,862	100,888	3,642
S-6537-9-1 Solid Manure	0	0	0	0	1,178	7,133	0
S-6537-10-1 Feed	0	0	0	0	33,696	0	0
S-6537-11-0 Diesel IC engine	732	1	12	75	48	0	0
SSPE2	49,377	37	12,151	6,715	65,344	179,435	3,642

5. Major Source Determination

Pursuant to Section 3.25 of District Rule 2201, a major source is a stationary source with post-project emissions or a Post Project Stationary Source Potential to Emit (SSPE2), equal to or exceeding one or more of the threshold values.

In determining whether a facility is a major source, fugitive emissions are not counted unless the facility belongs to certain specified source categories. 40 CFR 71.2 (Definitions, Major Source (2)) states the following:

(2) A major stationary source of air pollutants or any group of stationary sources as defined in section 302 of the Act, that directly emits, or has the potential to emit, 100 tpy or more of any air pollutant (including any major source of fugitive emissions of any such pollutant, as determined by rule by the Administrator). The fugitive emissions of a stationary source shall not be considered in determining whether it is a major stationary source for the purposes of section 302(j) of the Act, unless the source belongs to one of the following categories of stationary source: (i) Coal cleaning plants (with thermal dryers); (ii) Kraft pulp mills; (iii) Portland cement plants; (iv) Primary zinc smelters; (v) Iron and steel mills; (vi) Primary aluminum ore reduction plants; (vii) Primary copper smelters; (viii) Municipal incinerators capable of charging more than 250 tons of refuse per day; (ix) Hydrofluoric, sulfuric, or nitric acid plants; (x) Petroleum refineries; (xi) Lime plants; (xii) Phosphate rock processing plants; (xiii) Coke oven batteries; (xiv) Sulfur recovery plants; (xv) Carbon black plants (furnace process); (xvi) Primary lead smelters; (xvii) Fuel conversion plants; (xviii) Sintering plants; (xix) Secondary metal production plants; (xx) Chemical process plants; (xxi) Fossil-fuel boilers (or combination thereof) totaling more than 250 million British thermal units per hour heat input; (xxii) Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels; (xxiii) Taconite ore processing plants; (xxiv) Glass fiber processing plants; (xxv) Charcoal production plants; (xxvi) Fossil-fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input; or (xxvii) Any other stationary source category which, as of August 7, 1980, is being regulated under section 111 or 112 of the Act.

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

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

VOC emissions from waste lagoons and storage ponds are considered non-fugitive." The District has researched this issue and concurs with the CAPCOA assessment, as discussed in more detail below.

Milking Center

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

Cow Housing

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

Manure storage Areas

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

Land Application

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

Feed Handling and Storage

The majority of dairies store the silage piles underneath a tarp or in an agbag. The entire pile is covered except for the face of the pile. The face of the pile is kept open due to the continual need to extract the silage for feed purposes. The silage pile is disturbed 2-3 times per day. Because of the ongoing disturbance to these piles, it makes it extremely difficult to design a system to capture the emissions from these piles. In fact, as far as the District is aware, no system has been designed to successfully extract the gases from the face of the pile to capture them, and, as important, no study has assessed the potential impacts on silage quality

of a continuous air flow across the silage pile, as would be required by such a collection system. Therefore, the District cannot demonstrate that these emissions can be reasonably expected to pass through a stack, chimney, vent, or other functionally equivalent opening.

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

The post-project emissions from the lagoons/storage ponds at this dairy were calculated in Section VII.C.2 above. The following table shows the non-fugitive Post-Project Stationary Source Potential to Emit for the dairy:

Non-Fugitive Post-Project Stationary Source Potential to Emit [SSPE2] (lb/year)					
	NO _x	SO _x	PM ₁₀	CO	VOC
S-6537-1-0 NG IC engine	11,122	9	27	1,518	322
S-6537-2-0 NG IC engine	9,774	7	24	1,334	283
S-6537-3-0 NG IC engine	9,639	7	23	1,316	279
S-6537-4-0 NG IC engine	9,639	7	23	1,316	279
S-6537-5-0 NG IC engine	8,471	6	21	1,156	245
S-6537-6-1 Milking operation	0	0	0	0	0
S-6537-7-1 Cow housing	0	0	0	0	0
S-6537-8-1 Liquid manure	0	0	0	0	1,742
S-6537-9-1 Solid manure	0	0	0	0	0
S-6537-10-1 Feed	0	0	0	0	0
S-6537-11-0 Diesel IC engine	732	1	12	75	48
Non Fugitive SSPE	49,377	37	130	6,715	3,198

Major Source Determination (lb/year)					
	NO _x	SO _x	PM ₁₀	CO	VOC
Post Project SSPE (SSPE2)	49,377	37	130	6,715	3,198
Major Source Threshold	50,000	140,000	140,000	200,000	50,000
Major Source?	No	No	No	No	No

As seen in the table above, the facility is not an existing major source for any pollutants and is not becoming a major source as a result of this project.

6. Baseline Emissions (BE)

BE = Pre-project Potential to Emit 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 Section 3.23

As shown in Section VII.C.5 above, the facility is not a major source for any pollutants, hence BE = PE1 for all pollutants.

7. 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."

As discussed in Section VII.C.5 above, the facility is not a Major Source for any criteria pollutant; therefore, the project does not constitute a Major Modification.

8. Federal Major Modification

As shown above, this project does not constitute a Major Modification. Therefore, in accordance with District Rule 2201, Section 3.17, this project does not constitute a Federal Major Modification and no further discussion is required.

9. 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 B.

VIII. Compliance

Rule 1070 Inspections

This rule applies to any source operation, which emits or may emit air contaminants. The rule allows the District to perform inspections for the purpose of obtaining information necessary to determine whether air pollution sources are in compliance with applicable rules and regulations. The rule also allows the District to require record keeping, to make inspections and to conduct tests of air pollution sources.

The following conditions will be listed on the permit to ensure compliance:

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

Rule 2010 Permits Required

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

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

Rule 2201 New and Modified Stationary Source Review Rule

A. Best Available Control Technology (BACT)

1. BACT Applicability

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

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

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

a. New emission units – PE > 2 lb/day

The proposed project involves the modification of existing emission units. Since there are no new emission unit, BACT is not triggered under this category.

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

As discussed in Section I above, there are no emission units being relocated from one stationary source to another; therefore BACT is not triggered due to relocation of an emission unit.

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

$$\text{AIPE} = \text{PE2} - \text{HAPE}$$

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)

$$\text{HAPE} = \text{PE1} \times (\text{EF2}/\text{EF1})$$

Where,

PE1 = The emissions unit's Potential to Emit 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

$$\text{AIPE} = \text{PE2} - (\text{PE1} * (\text{EF2} / \text{EF1}))$$

AIPE calculations for each for each emission unit are shown in the following sections:

Milk Barn:

VOC emissions:

$$\begin{aligned} \text{AIPE} &= 1.6 \text{ lb/day} - (0.8 \text{ lb/day} \times 0.4/0.44) \\ &= 1.6 \text{ lb/day} - 0.7 \text{ lb/day} \\ &= 0.9 \text{ lb/day} \end{aligned}$$

Since AIPE for VOC emissions is less than 2.0 lb/day, BACT for VOC emissions is not triggered.

NH3 emissions:

$$\begin{aligned} \text{AIPE} &= 4.9 \text{ lb/day} - (2.1 \text{ lb/day} \times 1.2/1.2) \\ &= 4.9 \text{ lb/day} - 2.1 \text{ lb/day} \\ &= 2.8 \text{ lb/day} \end{aligned}$$

Since AIPE for NH3 emissions is greater than 2.0 lb/day, BACT for NH3 emissions is triggered.

Cow Housing:

PM10 emissions:

AIPE for PM10 emissions from the cow housing is summarized in the following table:

Cow Housing PM10 Emissions AIPE						
Cow Category	PE2 (lb/day)	PE1 (lb/day)	EF2 (lb/hd-yr)	EF1 (lb/hd-yr)	HAPE (PE1 x EF2/EF1) (lb/day)	AIPE (PE2 -HAPE) (lb/day)
Milk cows	4.2	2.4	1.02	1.37	1.8	2.4
Dry cows	3.4	4.5	3.38	5.46	2.8	0.6
Heifers	25.3	7.5	6.47	10.55	4.6	20.7
Calves	0.0	0.0	0.06	1.37	0.0	0.0
Total						23.7

Since AIPE is greater than 2.0 lb/day for PM10 emissions for both freestall barns (milk cows) and corrals (heifers), BACT is triggered for PM10 emissions from the cow housing freestall barns and corrals.

VOC emissions:

AIPE for VOC emissions from the cow housing is summarized in the following table:

Cow Housing VOC Emissions AIPE						
Cow Category	PE2 (lb/day)	PE1 (lb/day)	EF2 (lb/hd-yr)	EF1 (lb/hd-yr)	HAPE (PE1 x EF2/EF1) (lb/day)	AIPE (PE2 -HAPE) (lb/day)
Milk cows	40.6	21.5	9.87	12.09	17.6	23.0
Dry cows	5.6	5.6	5.58	6.8	4.6	1.0
Support stock	18.3	3.7	4.28	5.22	3.0	15.3
Total						39.3

Since AIPE is greater than 2.0 lb/day for VOC emissions, BACT is triggered for VOC emissions from the cow housing.

NH3 emissions:

AIPE for NH3 emissions from the cow housing is summarized in the following table:

Cow Housing NH3 Emissions AIPE						
Cow Category	PE2 (lb/day)	PE1 (lb/day)	EF2 (lb/hd- yr)	EF1 (lb/hd- yr)	HAPE (PE1 x EF2/EF1) (lb/day)	AIPE (PE2 -HAPE) (lb/day)
Milk cows	115.1	49.9	28.0	28.0	49.9	65.2
Dry cows	20.8	16.9	20.6	20.6	16.9	3.9
L. heifers	24.1	6.0	14.4	14.4	6.0	18.1
M. heifers	18.8	3.7	12.6	12.6	3.7	15.1
S. heifers	8.5	0.0	11.4	11.4	0.0	8.5
Calves	3.5	0.0	9.3	9.3	0.0	3.5
Total						114.3

Since AIPE is greater than 2.0 lb/day for NH3 emissions, BACT is triggered for NH3 emissions from the cow housing.

Liquid Manure Management System – Lagoons:

VOC emissions:

AIPE for VOC emissions from the lagoons is summarized in the following table:

Lagoons VOC Emissions AIPE						
Cow Category	PE2 (lb/day)	PE1 (lb/day)	EF2 (lb/hd- yr)	EF1 (lb/hd- yr)	HAPE (PE1 x EF2/EF1) (lb/day)	AIPE (PE2 -HAPE) (lb/day)
Milk cows	3.0	2.3	0.74	1.3	1.3	1.7
Dry cows	0.4	0.6	0.40	0.71	0.3	0.1
Support stock	1.3	0.4	0.31	0.54	0.2	1.1
Total						2.9

Since AIPE is greater than 2.0 lb/day for VOC emissions, BACT is triggered for VOC emissions from the lagoons.

NH3 emissions:

AIPE for NH3 emissions from the lagoons is summarized in the following table:

Lagoons NH3 Emissions AIPE						
Cow Category	PE2 (lb/day)	PE1 (lb/day)	EF2 (lb/hd- yr)	EF1 (lb/hd- yr)	HAPE (PE1 x EF2/EF1) (lb/day)	AIPE (PE2 -HAPE) (lb/day)
Milk cows	64.5	28.0	15.7	15.7	28.0	36.5
Dry cows	9.6	7.8	9.5	9.5	7.8	1.8

Lagoons NH3 Emissions AIPE						
Cow Category	PE2 (lb/day)	PE1 (lb/day)	EF2 (lb/hd-yr)	EF1 (lb/hd-yr)	HAPE (PE1 x EF2/EF1) (lb/day)	AIPE (PE2 -HAPE) (lb/day)
L. heifers	11.2	2.8	6.7	6.7	2.8	8.4
M. heifers	8.6	1.7	5.8	5.8	1.7	6.9
S. heifers	3.9	0.0	5.3	5.3	0.0	3.9
Calves	1.9	0.0	5.0	5.0	0.0	1.9
Total						59.4

Since AIPE is greater than 2.0 lb/day for NH3 emissions, BACT is triggered for NH3 emissions from the lagoons.

H2S emissions:

$$\begin{aligned}
 \text{AIPE} &= 49.9 \text{ lb/day} - (20.1 \text{ lb/day} \times 1.061/1.215) \\
 &= 49.9 \text{ lb/day} - 17.6 \text{ lb/day} \\
 &= 32.3 \text{ lb/day}
 \end{aligned}$$

Since AIPE for H2S emissions is greater than 2.0 lb/day, BACT for H2S emissions is triggered.

Liquid Manure Management System – Land application:

VOC emissions:

AIPE for VOC emissions from land application of liquid manure is summarized in the following table:

Land Application VOC Emissions AIPE						
Cow Category	PE2 (lb/day)	PE1 (lb/day)	EF2 (lb/hd-yr)	EF1 (lb/hd-yr)	HAPE (PE1 x EF2/EF1) (lb/day)	AIPE (PE2 -HAPE) (lb/day)
Milk cows	5.5	2.5	1.33	1.4	2.4	3.1
Dry cows	0.7	0.6	0.72	0.76	0.6	0.1
Support stock	2.4	0.4	0.55	0.58	0.4	2.0
Total						5.2

Since AIPE is greater than 2.0 lb/day for VOC emissions, BACT is triggered for VOC emissions from land application of liquid manure.

NH3 emissions:

AIPE for NH3 emissions from land application of liquid manure is summarized in the following table:

Land Application NH3 Emissions AIPE						
Cow Category	PE2 (lb/day)	PE1 (lb/day)	EF2 (lb/hd-yr)	EF1 (lb/hd-yr)	HAPE (PE1 x EF2/EF1) (lb/day)	AIPE (PE2 -HAPE) (lb/day)
Milk cows	119.6	51.8	29.1	29.1	51.8	67.8
Dry cows	15.4	12.6	15.3	15.3	12.6	2.8
L. heifers	17.9	4.5	10.7	10.7	4.5	13.4
M. heifers	13.9	2.8	9.3	9.3	2.8	11.1
S. heifers	6.3	0.0	8.5	8.5	0.0	6.3
Calves	3.5	0.0	9.3	9.3	0.0	3.5
Total						104.9

Since AIPE is greater than 2.0 lb/day for NH3 emissions, BACT is triggered for NH3 emissions from land application of liquid manure.

Solid Manure:

VOC emissions:

AIPE for VOC emissions from land application of liquid manure is summarized in the following table:

Solid Manure VOC Emissions AIPE						
Cow Category	PE2 (lb/day)	PE1 (lb/day)	EF2 (lb/hd-yr)	EF1 (lb/hd-yr)	HAPE (PE1 x EF2/EF1) (lb/day)	AIPE (PE2 -HAPE) (lb/day)
Milk cows	2.1	1.0	0.50	0.54	0.9	1.2
Dry cows	0.3	0.2	0.27	0.29	0.2	0.1
Support stock	0.9	0.2	0.21	0.23	0.2	0.7
Total						2.0

Since AIPE is not greater than 2.0 lb/day for VOC emissions, BACT is not triggered for VOC emissions from solid manure.

NH3 emissions:

AIPE for NH3 emissions from land application of liquid manure is summarized in the following table:

Solid Manure NH3 Emissions AIPE						
Cow Category	PE2 (lb/day)	PE1 (lb/day)	EF2 (lb/hd-yr)	EF1 (lb/hd-yr)	HAPE (PE1 x EF2/EF1) (lb/day)	AIPE (PE2 -HAPE) (lb/day)
Milk cows	14.0	6.1	3.4	3.4	6.1	7.9
Dry cows	1.7	1.4	1.7	1.7	1.4	0.3
Support stock	3.9	0.6	0.9	0.9	0.6	3.3
Total						11.5

Since AIPE is greater than 2.0 lb/day for NH3 emissions, BACT is triggered for NH3 emissions from solid manure.

Feed:

AIPE for VOC emissions from feed is summarized in the following table:

Feed VOC Emissions AIPE						
Cow Category	PE2 (lb/day)	PE1 (lb/day)	EF2 (lb/hd-yr)	EF1 (lb/hd-yr)	HAPE (PE1 x EF2/EF1) (lb/day)	AIPE (PE2 -HAPE) (lb/day)
Corn silage	7.4	12.1	21,155	34,681	7.4	0.0
Wheat silage	9.3	15.3	26,745	43,844	9.3	0.0
TMR	75.7	32.9	10,575	13,056	26.6	49.1
Total						49.1

Since AIPE is greater than 2.0 lb/day for VOC emissions from TMR, BACT is triggered for VOC emissions from TMR.

d. Major Modification

As discussed in Section VII.C above, this project does not constitute a major modification; hence BACT is not triggered for under this criterion.

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 in Appendix C, BACT has been satisfied with the following:

Milk Barn:

NH₃: Flush/Spray down milking parlor after each group of cows is milked

Cow Housing and TMR:

- VOC:
- 1) Feed lanes and walkways constructed of concrete.
 - 2) Feed lanes and walkways flushed, scraped or vacuumed four times per day for milk and dry cows; and two times per day for bulls and heifers.
 - 3) All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.
 - 4) Refused feed refeed or removed from feed lanes on a daily basis to prevent decomposition.
 - 3) Weekly scraping and/or manure removal using pull type manure harvesting equipment, except during periods of rainy weather.
 - 4) Dry lots sloped to facilitate runoff and drying in accordance with Title 3, Food and Agriculture, Division 2, Animal Industry of the California Code of Regulations, Section 646.1.
 - 5) VOC mitigation measures required by District Rule 4570.
- NH₃:
- 1) Concrete feed lanes and walkways.
 - 2) Feed lanes and walkways flushed, scraped or vacuumed four times per day for milk and dry cows; and two times per day for bulls and heifers.
 - 3) Weekly scraping and/or manure removal using pull type manure harvesting equipment, except during periods of rainy weather.
 - 4) All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.
 - 5) Dry lots sloped to facilitate runoff and drying in accordance with Title 3, Food and Agriculture, Division 2, Animal Industry of the California Code of Regulations, Section 646.1.
- PM₁₀:
- 1) Concrete freestall and dry lot feed lanes and walkways.
 - 2) Open corrals equipped with shade structures.
 - 3) Heifers fed (at least one feeding) at or near (within one hour of) dusk.
 - 4) Weekly scraping and/or manure removal using pull type manure harvesting equipment, except during periods of rainy weather.
 - 4) Establishment of a downwind windbreak meeting NRCS guidelines.
 - 5) Flushed calf hutches.

Liquid Manure Handling System:

Lagoon/Storage Pond:

- VOC: 1) Two-stage anaerobic treatment lagoon designed according to NRCS guidelines.
2) Installation of an anaerobic digester contingent upon the final dairy BACT guideline.
- NH₃: 1) Two-stage anaerobic treatment lagoon designed according to NRCS guidelines.
2) Installation of an anaerobic digester contingent upon the final dairy BACT guideline.
- H₂S: 1) All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.
2) Separation of solids from liquid manure stream prior to treatment in the lagoons.

Land Application:

- VOC: 1) Irrigation of crops using liquid and slurry manure from a holding/storage pond after an Anaerobic Treatment Lagoon.
- NH₃: 1) Irrigation of crops using liquid and slurry manure from a holding/storage pond after an Anaerobic Treatment Lagoon.

Solid Manure:

- NH₃: 1) All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.

B. Offsets

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

For certain agricultural operations, it is difficult to demonstrate that emission reductions are real, permanent, quantifiable, enforceable, and surplus – *as those terms are defined*

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

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

C. Public Notification

1. Applicability

Public noticing is required for:

- a. Any new Major Source, which is a new facility that is also a Major Source,
- b. Major Modifications,
- c. Any new emissions unit with a Potential to Emit greater than 100 pounds during any one day for any one pollutant,
- d. Any project which results in the offset thresholds being surpassed, and/or
- e. Any project with an SSIPE of greater than 20,000 lb/year for any pollutant.

a. New Major Source

New major sources are new facilities, which are also major sources. Since this facility is not new, public noticing for new major source purposes is not applicable.

b. Major modification

As demonstrated in VII.C.7, this project does not constitute a major modification; therefore, public noticing for major modification purposes is not applicable.

c. PE > 100 lb/day

Applications which include a new emissions unit with a Potential to Emit greater than 100 pounds during any one day for any pollutant will trigger public noticing

requirements. Since this project does not include any new emission units, public notice is not triggered under this category.

d. Offset Threshold

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

Offsets Thresholds				
Pollutant	SSPE1 (lb/year)	SSPE2 (lb/year)	Offset Threshold	Public Notice Required?
NO _x	49,377	49,377	20,000 lb/year	No
SO _x	37	37	54,750 lb/year	No
PM ₁₀	5,402	12,151	29,200 lb/year	No
CO	6,715	6,715	200,000 lb/year	No
VOC	37,974	65,344	20,000 lb/year	No
NH ₃	72,503	179,435	N/A	No
H ₂ S	1,470	3,642	N/A	No

As shown above, no offsets thresholds have been surpassed due to this project; therefore public noticing is not required under this category.

e. SSIPE > 20,000 lb/year

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

The SSIPE is compared to the SSIPE Public Notice thresholds in the following table:

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	49,377	49,377	0	20,000 lb/year	No
SO _x	37	37	0	20,000 lb/year	No
PM ₁₀	12,151	5,402	6,749	20,000 lb/year	No
CO	6,715	6,715	0	20,000 lb/year	No
VOC	65,344	37,974	27,370	20,000 lb/year	Yes
NH ₃	179,435	72,503	106,932	20,000 lb/year	Yes
H ₂ S	3,642	1,470	2,172	20,000 lb/year	No

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

2. Public Notice Action

As discussed above, public noticing is required for this. 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 Tulare County prior to the issuance of the ATCs for the dairy expansion.

D. Daily Emission Limits (DELs)

Daily Emissions Limitations (DELs) and other enforceable conditions are required by Section 3.17 to restrict a unit's maximum daily emissions, to a level at or below the emissions associated with the maximum design capacity. Per Sections 3.17.1 and 3.17.2, 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. The number and types of cows are listed in the permit equipment description for the Cow Housing (Permit S-6537-7-1).

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

Milking Operation (S-6537-6-1)

- The milking parlor shall be flushed or sprayed down immediately prior to, immediately after, or during the milking of each group of cows. [District Rules 2201 and 4570]

Cow Housing (S-6537-7-1)

The following condition will be added to limit the total number of cows housed at the dairy:

- The total number of cows housed at this dairy at any one time shall not exceed any of the following limits: 1,868 mature cows (milk and dry) and 1,564 support stock (heifers, calves and bulls). [District Rule 2201]

The following conditions will be placed on the ATC to ensure that the DEL requirements for PM₁₀ are met:

- Open corrals shall be scraped weekly using a pull-type scraper in the morning hours, except when this is prevented by wet conditions. [District Rule 2201]
- Permittee shall establish windbreaks along the entire length of the Eastern and Southern boundaries of the dairy site. The first row (closest to the dairy) shall consist of Arizona Cypress trees spaced ten feet apart. The second row shall consist of Walnut

trees spaced twenty feet apart. Each row shall be offset from the adjacent row. Spacing between rows shall be sufficient to accommodate cultivation equipment. This spacing shall not exceed 24 feet. Any alternative windbreak proposal must be approved by the District. [District Rule 2201] N

- All open corrals shall be equipped with shade structures. [District Rule 2201]
- At least one of the feedings of the heifers at this dairy shall be near (within one hour of) dusk. [District Rule 2201]

The following conditions will be placed on the ATC to ensure that the DEL requirements for VOC are met:

- The concrete feed lanes and walkways for milk cows shall be flushed at least four times per day. [District Rules 2201 and 4570]
- The concrete feed lanes and walkways for all dry cows, heifers, and calves shall be flushed at least two times per day. [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]

Liquid Manure Handling System (S-6537-8-1)

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

- The liquid manure handling system shall handle flush manure from no more than 1,868 mature cows (milk and dry) and 1,564 support stock (heifers, calves and bulls). [District Rule 2201]
- The liquid manure handling system shall include an anaerobic treatment lagoon designed, constructed and operated according to NCRCS Guideline No. 359. [District Rule 2201]

E. Compliance Assurance

1. Source Testing

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

2. Monitoring

Cow Housing:

Based on guidelines from the University of Idaho in a document entitled "*Dairy Odor Management and Control Practices*"⁶ and the requirements of District Rule 4570, the following conditions will be placed on the permit to ensure that emissions from the dairy are minimized:

- Inspection for potholes or other sources of emissions shall be performed on a monthly basis. [District Rule 2201]
- Firm, stable, and not easily eroded soils shall be used for the exercise pens. [District Rule 2201]
- A supply of fill soil shall be kept on site in order to fill areas where erosion and gouging occurs. This will help fill areas where puddles may form. This fill soil shall be covered with a tarp. [District Rule 2201]
- Clean rainfall runoff shall be diverted around exercise pens to reduce the amount of water that is potentially detained on the corral surface. [District Rule 2201]

3. Recordkeeping

Recordkeeping is required to demonstrate compliance with the public notification and daily emission limit requirements of Rule 2201. In general, recordkeeping for the Milking Parlor and the Liquid Manure Handling System are satisfied with the records that must be kept to demonstrate compliance with the numbers and types of cows listed in the permit equipment description for the Cow Housing. The following conditions will be placed on the ATC permits:

Cow Housing (S-6537-7)

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. Such records may include DHIA monthly records, milk production invoices, ration sheets or periodic inventory records. [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; and (3) a log of pothole inspections performed at the dairy. [District Rules 2201 and 4570]

Additional recordkeeping conditions are included under the Rule 4570 compliance section.

⁶ <http://courses.ag.uidaho.edu/bae/bae404/Dairy%20Odor%20Mgmt.pdf>

Liquid Manure Handling System (S-6537-8)

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

- Permittee shall maintain records of design specifications and calculations for the Anaerobic Treatment Lagoon system in order to demonstrate that the system has been designed and is operating in accordance with the applicable National Resource Conservation Service (NRCS) technical guide. [District Rules 2201 and 4570]

Additional recordkeeping conditions are included under the Rule 4570 compliance section.

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 D of this document for the AAQA summary sheet.

The proposed location is in an attainment area for NO_x, CO, and SO_x. As shown by the AAQA summary sheet the proposed project 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 State standards. The increase in the ambient PM₁₀ concentration due to the proposed project is shown on the table titled Calculated Contribution. The levels of significance, from 40 CFR Part 51.165 (b)(2), as well as the District's Interim Significance Level for the State's AAQS, are shown in the tables titled Significance Levels.

Significance Levels					
Pollutant	Significance Levels (µg/m ³) - 40 CFR Part 51.165 (b)(2)				
	Annual Avg.	24 hr Avg.	8 hr Avg.	3 hr Avg.	1 hr Avg.
PM ₁₀	1.0	5	N/A	N/A	N/A

Significance Levels					
Pollutant	Significance Levels (µg/m ³) – District's Interim Significance Level for the State's AAQS				
	Annual Avg.	24 hr Avg.	8 hr Avg.	3 hr Avg.	1 hr Avg.
PM ₁₀	N/A	10.4	N/A	N/A	N/A

Calculated Contribution				
Pollutant	Calculated Contributions ($\mu\text{g}/\text{m}^3$)			
	24 hr Avg.	8 hr Avg.	3 hr Avg.	1 hr Avg.
PM ₁₀	10.3	N/A	N/A	N/A

As shown in the preceding tables, modeling results indicated that the calculated increase in the ambient PM₁₀ concentration due to the proposed dairy project did not exceed the District significance level. The project is therefore approvable.

The proposed location is in a non-attainment area for H₂S. Modeling results indicated that the calculated increase in the ambient H₂S concentration due to the proposed equipment will not exceed the state standard.

The following conditions will be added to the permit to ensure continued compliance with the AAQS:

- The average concentration of undissociated hydrogen sulfide (H₂S) at the surface of the lagoon(s) and storage pond(s) shall not exceed 2.78 mg/L during the 1st calendar quarter (Jan – March), 3.30 mg/L during the 2nd calendar quarter (Apr – June), 4.25 mg/L during the 3rd calendar quarter (Jul – Sept), and 3.42 mg/L during the 4th calendar quarter (Oct – Dec). The concentration of undissociated H₂S at the surface of each lagoon and storage pond shall be calculated using the monitored values for the total sulfide concentration, pH, and temperature. The fraction of total sulfide that is undissociated H₂S shall be calculated using the formula $(10^{-\text{pH}})/(10^{-\text{pH}} + \text{Ka}_1)$, where Ka₁ is the temperature-adjusted dissociation constant for H₂S; or the procedures outlined in Standard Methods 4500-S₂-H; or using other procedures approved by the District. [District Rules 2201 and 4102]
- The total sulfide concentration, pH, and temperature at the surface of each lagoon and storage pond shall be monitored and recorded at least once every calendar quarter and at other times requested by the District. If the average calculated undissociated H₂S concentration from monitoring the lagoon(s) and pond(s) exceeds the maximum allowed concentration, the permittee shall monitor and record the total sulfide concentration, pH, and temperature at the surface of at least two other locations in each lagoon and pond as soon as possible, but no longer than 24 hours after results were available from the initial monitoring indicating a potential exceedance. The undissociated H₂S concentration calculated from the initial monitoring locations and the secondary monitoring locations for the lagoons and ponds shall be averaged. If the calculated average concentration of undissociated H₂S continues to exceed the maximum allowed limit, then the total sulfide concentration, pH, and temperature at the surface of each lagoon and storage pond shall be monitored and recorded monthly until three consecutive months of monitoring show compliance, after which the monitoring frequency may return to quarterly. For each secondary storage pond that has a liquid depth of no greater than 5 feet during the monitoring period, the concentration of undissociated H₂S may be considered negligible and monitoring shall not be required. Records of the results of monitoring of the sulfide concentration, pH, and temperature at the surface of each lagoon and storage pond and the maximum depth of storage ponds

during periods that they are not monitored shall be maintained. The District may also approve alternative monitoring frequencies and/or parameters. [District Rules 2201 and 4102]

- Monitoring of the total sulfide concentration of lagoons and ponds shall be performed using a sulfide test kit, a sulfide meter, procedures of an accredited lab, Standard Methods 4500-S2; ASTM D4658; USGS Method I-3840; EPA Method 376.2; Marine Pollution Studies Laboratory (MPSL) Standard Operating Procedure for measurement of sulfide; or an alternative method approved by the District. [District Rules 2201 and 4102]

Rule 2520 Federally Mandated Operating Permits

As previously stated, this project is being evaluated under the September 21, 2006 version of Rule 2201, in which case this facility is not a major source, and Rule 2520 does not apply under the current project.

However, the facility has subsequently become an existing major source for NOx emissions due to the lowering of the NOx major source threshold from 50,000 lb/yr to 20,000 lb/yr beginning with the December 18, 2008 version of Rule 2201, which became effective on June 10, 2010. Compliance with the requirements of District Rule 2520 will be addressed under a separate Initial Title V permit project.

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 Section 112(g) of the Clean Air Act (administered locally through SJVAPCD Rule 2550, *Federally Mandated Preconstruction Review for Major Sources of Air Toxics*), newly constructed facilities or reconstructed units or sources 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. A conclusion that MACT requirements are triggered would necessarily involve consideration of controlled emissions levels:

Dairy Hazardous Air Pollutant Emissions		
HAP	lb/milk cow-yr	Source
Methanol	1.35	UC Davis - VOC Emission from Dairy Cows and their Excreta, 2005

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

The emission calculations for HAPs from the proposed dairy expansion are shown below:

HAP Emissions			
Category	Number of cows	Emission Factor * lbs/hd-yr	lbs/yr (tons/yr)
Milking cows	1,500	x 1.828	= 2,742 (1.4)
Dry cows	368	x 1.123	= 413 (0.2)
Heifers (15-24 mo)	612	x 0.786	= 481 (0.2)
Heifers (7-14 mo)	544	x 0.686	= 373 (0.2)
Heifers (4-6 mo)	272	x 0.621	= 169 (0.1)
Calves (0-3 mo)	136	x 0.584	= 79 (0.0)
Total:			= 4,258 (2.1)

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

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. 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 will be considered in future revisions of the current emission factors for dairies. These studies have not been fully vetted or reviewed in the context of establishing standardized emission factors. For instance, although some studies indicate a high methanol emissions rate from fresh, the same studies also indicate 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 not until the scientific review process is complete and the District has had opportunity to consider public comment on any proposed changes.

Rule 4101 Visible Emissions

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

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

Pursuant to District Rule 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.

This project 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 & 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 1.0. According to the Technical Services Memo for this project (Appendix D), the total facility prioritization score including this project was greater than 1.0. Therefore, a health risk assessment was required to determine the short-term acute and long-term chronic exposure from this project. The health risk indices for this project are as shown in the following table:

RMR Summary					
Category	Milk Barn	Cow Housing	Liquid Manure	Project Totals	Facility Totals
Prioritization Score	0.00	0.56	0.48	1.04	1.04
Acute Hazard Index	0.00	0.14	0.10	0.24	0.24
Chronic Hazard Index	0.00	0.06	0.01	0.07	0.07
Maximum Individual Cancer Risk (10⁻⁶)	0.01	0.94	0.68	1.63	1.84
T-BACT Required?	No	No	No		
Special Conditions?	No	No	Yes		

T-BACT:

BACT for toxic emission control (T-BACT) is required if the cancer risk exceeds 1.0 in one million. As demonstrated above, T-BACT is not required for this project because the HRA indicates that the risk is not above the District's thresholds for triggering T-BACT requirements; therefore, compliance with the District's Risk Management Policy is expected.

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. The facility currently has a valid CMP Plan (S-6537-CMPP-1). Compliance with District Rule 4550 is therefore 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. Since public noticing is required for this project, a public notice will be published in a local newspaper of general circulation prior to the issuance of these ATC's.

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] N

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 Rule 4570] N

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:

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

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

Feed Mitigation Measures Required

Required

Feed according to National Research Council (NRC) guidelines.

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

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

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

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

Optional

Feed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains

- {4462} Permittee shall feed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. [District Rule 4570] N
- {4463} Permittee shall maintain records to demonstrate animals are fed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rule 4570] N

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 Rule 4570] N

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

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	$\leq 1/2$ in	N/A
Processed Corn <35% dry matter	$\leq 3/4$ in	1 – 4 mm
Alfalfa/Grass	≤ 1.0 in	N/A
Wheat/Cereal Grains/Other	$\leq 1/2$ 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 Rule 4570] N

- {4472} For each silage pile that Option 1 (Measured Bulk Density) is chosen as a mitigation measure for building the pile, records of the measured bulk density shall be maintained. [District Rule 4570] N
- {4473} For each silage pile that Option 2 (Bulk Density Determined by Spreadsheet) is chosen as a mitigation measure for building the pile, records of the filling parameters entered into the District-approved spreadsheet to determine the bulk density shall be maintained. [District Rule 4570] N
- {4474} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall harvest corn used for the pile at an average moisture content of at least 65% and harvest other silage crops for the pile at an average moisture content of at least 60%. [District Rule 4570] N
- {4475} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records of the average percent moisture of crops harvested for silage shall be maintained. [District Rule 4570] N
- {4476} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall adjust setting of equipment used to harvest crops for the pile to incorporate the following parameters for Theoretical Length of Chop (TLC) and roller opening, as applicable: 1) Corn with no processing: TLC not exceeding 1/2 inch, 2) Processed Corn: TLC not exceeding 3/4 inch and roller opening of 1-4 mm, 3) Alfalfa/Grass: TLC not exceeding 1.0 inch, 4) Other silage crops: TLC not exceeding 1/2 inch. [District Rule 4570] N
- {4477} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records that equipment used to harvest crops for the pile was set to the required TLC and roller opening for the type of crop harvested shall be maintained. [District Rule 4570] N
- {4478} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rule 4570] N
- {4479} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall

maintain a plan that requires that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rule 4570] N

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 Rule 4570] N
- {4481} If Option 1 (Limiting Exposed Area of Silage) is chosen as a mitigation measure for managing silage piles, the permittee shall calculate and record the maximum (largest part of pile) total exposed area of each silage pile. Records of the maximum calculated area shall be maintained. [District Rule 4570] N
- {4482} For each silage pile that Option 2 (Shaver/Facer or Smooth Face) is chosen as a mitigation measure for building the pile, the permittee shall maintain records that a

shaver/facer was used to remove silage from the pile or shall visually inspect the pile at least daily to verify that the working face was smooth and maintain records of the visual inspections. [District Rule 4570] N

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

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

Freestall Barn

Required

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 Rule 4570] N

Optional

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 Rule 4570] N
- {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] N

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 Rule 4570] N
- {4493} Permittee shall record the date that manure that is not dry is removed from individual cow freestall beds or raked, harrowed, scraped, or freestall bedding is graded at least once every seven (7) days. [District Rule 4570] N

Corral

Required

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 Rule 4570] N

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

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 Rule 4570] N
- {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 Rule 4570] N

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 Rule 4570] N
- {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 Rule 4570] N

Optional

Clean concreted lanes such that the depth of manure does not exceed twelve (12) inches at any point or time.

- {4509} Permittee shall clean concreted lanes such that the depth of manure does not exceed twelve (12) inches at any point or time. [District Rule 4570] N
- {4510} Permittee shall measure and document the depth of manure on the concrete lanes at least once every ninety (90) days. [District Rule 4570] N

Install shade structure so that the structure has a North/South orientation.

- {4517} Permittee shall install all shade structures so that the structure has a North/South orientation. [District Rule 4570] N

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

- {4520} Permittee shall knockdown fence line manure build-up prior to it exceeding a height of twelve (12) inches at any time or point. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rule 4570] N
- {4521} Permittee shall measure and document the depth of manure at the fence line at least once every ninety (90) days. [District Rule 4570] N

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 Rule 4570] N
- {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 Rule 4570] N
- {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 Rule 4570] N

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 Rule 4570] N

Land Application

Solid

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

- {4541} Permittee shall incorporate all solid manure within seventy-two (72) hours of land application. [District Rule 4570] N
- {4542} Permittee shall maintain records to demonstrate that all solid manure has been incorporated within seventy-two (72) hours of land application. [District Rule 4570] N

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 Rule 4570] N

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

Therefore this facility is expected to be in compliance with this Rule.

California Health & Safety Code 42301.6 (School Notice)

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 Senate Bill 700 (SB 700)

Lerda Farms Dairy is an agricultural operation that raises dairy cows for the production of milk for human consumption. Pursuant to Senate Bill (SB) 700, all agriculture operations, including Confined Animal Facilities (CAF), with emissions greater than ½ the major source emissions threshold levels (12.5 ton/year of NO_x or VOC), are required to obtain a District permit.

The post-project emissions from the dairy exceed the 12.5 ton-VOC/year threshold and the dairy is classified as a large CAF by the California Air Resources Board (ARB). The dairy is currently under District permit requirements, as required by SB 700.

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.

Tulare County (County) is the Agency which has principal responsibility for approving this dairy project. The County determined that the Project would have a significant adverse environmental impact and prepared an Environmental Impact Report (EIR) for the Project. In certifying the Final EIR, the County determined that after implementing all feasible mitigation measures emissions 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 S-6537-6-1, 7-1, 8-1, 9-1 and 10-1 subject to the permit conditions on the attached draft Authorities to Construct in Appendix F and file a Notice of Determination with Tulare County.

X. Billing Information

Annual Permit Fees			
Permit Number	Fee Schedule	Fee Description	Annual Fee
S-6537-6-1	3020-06	Milk Barn	\$89.00
S-6537-7-1	3020-06	Cow Housing	\$89.00
S-6537-8-1	3020-06	Liquid Manure Handling System	\$89.00
S-6537-9-1	3020-06	Solid Manure Handling System	\$89.00
S-6537-10-1	3020-06	Feed Storage and Handling	\$89.00

XI. Appendices

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

APPENDIX A
Current Permit to Operate

San Joaquin Valley Air Pollution Control District

PERMIT UNIT: S-6537-6-0

EXPIRATION DATE: 12/31/2009

EQUIPMENT DESCRIPTION:

650 COW MILKING OPERATION WITH ONE 50 STALL PARALLEL MILKING BARN

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]

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

San Joaquin Valley Air Pollution Control District

PERMIT UNIT: S-6537-7-0

EXPIRATION DATE: 12/31/2009

EQUIPMENT DESCRIPTION:

COW HOUSING - 650 MILK COWS, 300 DRY COWS HOUSED IN 1 FREESTALLS WITH SHADE AND WITHOUT SHADE STRUCTURES WITH A FLUSH SYSTEM, 152 LARGE HEIFERS (15-24 MONTHS OLD), AND 108 MEDIUM HEIFERS HOUSED IN OPEN CORRALS WITH SHADE AND WITHOUT SHADE STRUCTURES WITH A 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]

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

San Joaquin Valley Air Pollution Control District

PERMIT UNIT: S-6537-8-0

EXPIRATION DATE: 12/31/2009

EQUIPMENT DESCRIPTION:

LIQUID MANURE HANDLING SYSTEM CONSISTING OF ONE 1250X95X20 STORAGE POND, ONE 1293X65X20 LAGOON MANURE IS 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]

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

San Joaquin Valley Air Pollution Control District

PERMIT UNIT: S-6537-9-0

EXPIRATION DATE: 12/31/2009

EQUIPMENT DESCRIPTION:

SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILED IN UNCOVERED PILES, WITH SOLID MANURE APPLICATION TO LAND, AND/OR HAULED OFFSITE

PERMIT UNIT REQUIREMENTS

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

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

APPENDIX B
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 - BE, where:

- QNEC = Quarterly Net Emissions Change for each emissions unit, lb/qtr.
- PE2 = Post Project Potential to Emit for each emissions unit, lb/qtr.
- BE = Baseline Emissions (per Rule 2201) for each emissions unit, lb/qtr.

As discussed in Section VII.C.6, BE = PE1 for this facility. QNEC calculations are as summarized in the following tables:

Milk Barn (S-6537-6):

Quarterly BE					
Pollutant	BE (lb/year)	÷	4 qtr/year	=	BE (lb/qtr)
NO _x	0	÷	4 qtr/year	=	0
SO _x	0	÷	4 qtr/year	=	0
PM ₁₀	0	÷	4 qtr/year	=	0
CO	0	÷	4 qtr/year	=	0
VOC	286	÷	4 qtr/year	=	71.5
NH ₃	780	÷	4 qtr/year	=	195

Quarterly PE2					
Pollutant	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO _x	0	÷	4 qtr/year	=	0
SO _x	0	÷	4 qtr/year	=	0
PM ₁₀	0	÷	4 qtr/year	=	0
CO	0	÷	4 qtr/year	=	0
VOC	600	÷	4 qtr/year	=	150
NH ₃	1,800	÷	4 qtr/year	=	450

QNEC					
Pollutant	PE2 (lb/qtr)	-	BE (lb/qtr)	=	QNEC (lb/qtr)
NO _x	0	-	0	=	0
SO _x	0	-	0	=	0
PM ₁₀	0	-	0	=	0
CO	0	-	0	=	0
VOC	150	-	71.5	=	78.5
NH ₃	450	-	195	=	255

Cow Housing (S-6537-7):

Quarterly BE					
Pollutant	BE (lb/year)	÷	4 qtr/year	=	BE (lb/qtr)
NO _x	0	÷	4 qtr/year	=	0
SO _x	0	÷	4 qtr/year	=	0
PM ₁₀	5,272	÷	4 qtr/year	=	1,318
CO	0	÷	4 qtr/year	=	0
VOC	11,256	÷	4 qtr/year	=	2,814
NH ₃	27,930	÷	4 qtr/year	=	6,982.5

Quarterly PE2					
Pollutant	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO _x	0	÷	4 qtr/year	=	0
SO _x	0	÷	4 qtr/year	=	0
PM ₁₀	12,021	÷	4 qtr/year	=	3,005.25
CO	0	÷	4 qtr/year	=	0
VOC	23,552	÷	4 qtr/year	=	5,888
NH ₃	69,614	÷	4 qtr/year	=	17,403.5

QNEC					
Pollutant	PE2 (lb/qtr)	-	BE (lb/qtr)	=	QNEC (lb/qtr)
NO _x	0	-	0	=	0
SO _x	0	-	0	=	0
PM ₁₀	3,005.25	-	1,318	=	1,687.25
CO	0	-	0	=	0
VOC	5,888	-	2,814	=	3,074
NH ₃	17,403.5	-	6,982.5	=	10,421

Liquid Manure Handling System (S-6537-8):

Quarterly BE					
Pollutant	BE (lb/year)	÷	4 qtr/year	=	BE (lb/qtr)
NO _x	0	÷	4 qtr/year	=	0
SO _x	0	÷	4 qtr/year	=	0
PM ₁₀	0	÷	4 qtr/year	=	0
CO	0	÷	4 qtr/year	=	0
VOC	2,487	÷	4 qtr/year	=	621.75
NH ₃	40,839	÷	4 qtr/year	=	10,209.75
H ₂ S	1,470	÷	4 qtr/year	=	367.5

Quarterly PE2					
Pollutant	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO _x	0	÷	4 qtr/year	=	0
SO _x	0	÷	4 qtr/year	=	0
PM ₁₀	0	÷	4 qtr/year	=	0
CO	0	÷	4 qtr/year	=	0
VOC	4,862	÷	4 qtr/year	=	1,215.5
NH ₃	100,888	÷	4 qtr/year	=	25,222
H2S	3,642	÷	4 qtr/year	=	910.5

Quarterly NEC [QNEC] S-6537-3-0					
Pollutant	PE2 (lb/qtr)	-	BE (lb/qtr)	=	QNEC (lb/qtr)
NO _x	0	-	0	=	0
SO _x	0	-	0	=	0
PM ₁₀	0	-	0	=	0
CO	0	-	0	=	0
VOC	1,215.5	-	621.75	=	593.75
NH ₃	25,222	-	10,209.75	=	15,012.25
H2S	910.5	-	367.5	=	543

Solid Manure (S-6537-9):

Quarterly BE					
Pollutant	BE (lb/year)	÷	4 qtr/year	=	BE (lb/qtr)
NO _x	0	÷	4 qtr/year	=	0
SO _x	0	÷	4 qtr/year	=	0
PM ₁₀	0	÷	4 qtr/year	=	0
CO	0	÷	4 qtr/year	=	0
VOC	498	÷	4 qtr/year	=	124.5
NH ₃	2,954	÷	4 qtr/year	=	738.5

Quarterly PE2					
Pollutant	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO _x	0	÷	4 qtr/year	=	0
SO _x	0	÷	4 qtr/year	=	0
PM ₁₀	0	÷	4 qtr/year	=	0
CO	0	÷	4 qtr/year	=	0
VOC	1,178	÷	4 qtr/year	=	294.5
NH ₃	7,133	÷	4 qtr/year	=	1,783.25

QNEC					
Pollutant	PE2 (lb/qtr)	-	BE (lb/qtr)	=	QNEC (lb/qtr)
NO _x	0	-	0	=	0
SO _x	0	-	0	=	0
PM ₁₀	0	-	0	=	0
CO	0	-	0	=	0
VOC	294.5	-	124.5	=	170
NH ₃	1,783.25	-	738.5	=	1,044.75

Feed Handling and Storage (S-6537-10):

Quarterly BE					
Pollutant	BE (lb/year)	÷	4 qtr/year	=	BE (lb/qtr)
NO _x	0	÷	4 qtr/year	=	0
SO _x	0	÷	4 qtr/year	=	0
PM ₁₀	0	÷	4 qtr/year	=	0
CO	0	÷	4 qtr/year	=	0
VOC	21,991	÷	4 qtr/year	=	5,497.75
NH ₃	0	÷	4 qtr/year	=	0

Quarterly PE2					
Pollutant	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO _x	0	÷	4 qtr/year	=	0
SO _x	0	÷	4 qtr/year	=	0
PM ₁₀	0	÷	4 qtr/year	=	0
CO	0	÷	4 qtr/year	=	0
VOC	33,696	÷	4 qtr/year	=	8,424
NH ₃	0	÷	4 qtr/year	=	0

QNEC					
Pollutant	PE2 (lb/qtr)	-	BE (lb/qtr)	=	QNEC (lb/qtr)
NO _x	0	-	0	=	0
SO _x	0	-	0	=	0
PM ₁₀	0	-	0	=	0
CO	0	-	0	=	0
VOC	8,424	-	5,497.75	=	2,926.25
NH ₃	0	-	0	=	0

APPENDIX C

Top-Down BACT Analysis

Lerda Farms Dairy (S-6537, Project # 1073290)

Top-Down BACT Analysis

Pursuant to Section 5.2 of the Settlement Agreement between the District and the Western United Dairyman and the Alliance of Western Milk Producers Inc., signed September 20, 2004, "... the District will not make any Achieved in Practice BACT determinations for individual dairy permits or for the dairy BACT guidance until the final BACT guidance has been adopted by the APCO...."¹ Therefore, a cost effectiveness analysis will be performed for all the technologies, which have not been proposed by the applicant.

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

I. Pollutants Emitted from Dairies

1. PM₁₀ Emissions

The National Ambient Air Quality Standards currently regulate concentrations of particulate matter with a mass median diameter of 10 micrometers or less (PM₁₀). Studies have shown that particles in the smaller size fractions contribute most to human health effects. A PM_{2.5} standard was published in 1997, but has not been implemented pending the results of ongoing litigation.

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

The mass of particulate matter emitted from totally or partially enclosed confinement facilities, as well as the particle size distribution, depend on type of ventilation and ventilation rate. Particulate matter emissions from naturally ventilated buildings will be lower than those from mechanically ventilated buildings. Mechanically ventilated buildings will emit more PM at higher ventilation rates. Therefore, confinement facilities located in warmer climates will tend to emit more PM because of the higher ventilation rates needed for cooling.

Open feedlots and storage facilities for dry manure from dairy open corrals also are potential sources of particulate matter emissions. The rate of emission depends on whether or not the manure is covered. Open sites are intermittent sources of particulate matter emissions, because of the variable nature of wind direction and speed and precipitation.

Thus, the moisture content of the manure and the resulting emissions will be highly variable. The PM emissions from covered manure storage facilities depend on the degree of exposure to wind⁷.

2. VOC Formation and Emissions from Manure:

Volatile Organic Compounds (VOCs) result from ruminant digestive processes and are formed as intermediate metabolites when organic matter manure decomposes. Under aerobic conditions, any VOCs formed in the manure are rapidly oxidized to carbon dioxide and water. Under anaerobic conditions, complex organic compounds are microbially decomposed to volatile organic acids and other volatile organic compounds, which in turn are mostly converted to methane and carbon dioxide by methanogenic bacteria. When the activity of the methanogenic bacteria is not inhibited, virtually all of the VOCs are metabolized to simpler compounds, and the potential for VOC emissions is minimized. However, the inhibition of methane formation results in a buildup of VOCs in the manure and ultimately to volatilization to the air. Inhibition of methane formation typically is caused by low temperatures or excessive loading rates, which both create an imbalance between the populations of microorganisms responsible for the formation of VOC and methane. VOC emissions will vary with temperature because the rate of VOC formation, reduction to methane, and volatilization and the solubility of individual compounds vary with temperature.⁸ VOC emissions from manure and the associated field application site can be minimized by a properly designed and operated stabilization process (such as an anaerobic treatment lagoon). In contrast, VOC emissions will be higher from storage tanks, ponds, overloaded anaerobic lagoons, and the land application sites associated with these systems.

3. Ammonia Emissions

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

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

⁷ Emissions From Animal Feeding Operations – Draft, pgs. 2-11 to 2-13

⁸ EPA Document "Emissions from Animal Feeding Operations" (Draft, August 15, 2001), pg. 2-10

⁹ Workshop Review Draft for EPA Regional Priority AFO Science Question Synthesis Document - Air Emission Characterization and Management, pg. 2

The potential for ammonia volatilization exists wherever manure is present, and ammonia will be emitted from confinement buildings, open lots, stockpiles, anaerobic lagoons, and land application from both wet and dry handling systems. The rate of ammonia volatilization is influenced by a number of factors including the concentrations of nitrogenous compounds in the manure, temperature, air velocity, surface area, moisture, and pH. Because of its high solubility in water, the loss of ammonia to the atmosphere will be more rapid when drying of manure occurs. However, there may be little difference in total ammonia emissions between solid and liquid manure handling systems if liquid manure is stored over extended periods of time prior to land application¹⁰.

4. Hydrogen Sulfide Emissions

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

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

II. Top Down BACT Analysis for the Milk Barn

BACT Analysis for NH₃ Emissions from the Milk Barn:

a. Step 1 - Identify all control technologies

A cost effectiveness threshold has not been established for ammonia. Therefore, only options that meet the District's definition of Achieved-in-Practice controls will be considered for ammonia at this time. (Although these options must meet the District definition of Achieved-in-Practice, pursuant to Section 5.2 of the Settlement Agreement (9/20/2004) between the District and Western United Dairyman and Alliance of Western Milk Producers Inc¹, the District will not deem any control options Achieved-in-Practice until after the Dairy BACT Guideline has been established.)

Flushing or spraying down the milk parlor after milking each group of cows has been identified as a possible control for the NH₃ emissions from the milking parlor. No other control technologies that meet the definition of Achieved-in-Practice have been identified for NH₃ emissions from the milking parlors.

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

- 1) Flush/spray after each group of cows is milked.

Description of Control Technology

1) Milking Parlor Flushed/Sprayed down after each Group of Cows is milked

Almost all dairy operations utilize some type of flush or spray system to wash out the manure that dairy cows deposit in the milking parlors. The primary purpose of the flush or spray system is to maintain the minimum level of sanitation required in the milking parlors. 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 NH₃ emissions, is removed from the milking parlor many times a day by flushing after each milking. Ammonia has a high affinity for water and is highly soluble in water. Therefore, a large proportion of ammonia will dissolve in the flush water and will not be emitted from the milking parlors.

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

- 1) Flush/spray down milking parlor after each group of cows is milked

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The facility is proposing to flush or spray down the milking parlor after each group of cows is milked, which satisfies the BACT requirements.

Additionally, District Rule 2201 defines BACT as including the most stringent emission limitation or control technique, including process and equipment changes, that has been found by the APCO to be cost effective and technologically feasible for such class or category of sources or for a specific source. The District has found that the mitigation measures required by District Rule 4570 are technologically feasible for confined animal facilities and the applicant has proposed these options. Although District Rule 4570 is only intended to reduce VOC emissions, many of these measures also reduce ammonia emissions. Therefore, in addition to the BACT requirements determined in the Top-Down BACT Analysis above, implementation of the mitigation measures that the applicant has selected to comply with Rule 4570 will also be required as part of BACT for NH₃ emissions from the milk parlor.

III. Top Down BACT Analysis for the Cow Housing

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

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

a. Step 1 - Identify all control technologies

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

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

- 1) Enclosed freestalls vented to an incinerator - Entire herd ($\approx 93\%$; 95% Capture, 98% Control of 100% of cow housing emissions)
- 2) Enclosed freestalls vented to an incinerator - Mature cows only ($\approx 66.7\%$ overall; 95% capture, 98% control of 71.6 % of cow housing emissions¹¹)
- 3) Enclosed freestalls vented to a biofilter - Entire herd ($\approx 76\%$; 95% Capture, 80% Control of 100% of cow housing emissions)
- 4) Enclosed freestalls vented to a biofilter - Mature cows only ($\approx 54.4\%$ overall; 95% capture, 80% control of 71.6 % of cow housing emissions¹²)
- 5) Feed and Manure Management Practices ($\approx 22\%$)
 - Concrete feed lanes and walkways in freestall barns for milk and dry cows
 - Freestall feed lanes and walkways for milk cows and dry cows flushed four times per day ($\approx 18\%$ for total emissions from cow housing; 47% for emissions from manure) and feed lanes and walkways in the corrals for the remaining animals flushed at least two times per day
 - All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations. (5% of total emissions from dairy cows)
 - Uneaten feed re-fed to the animals or removed from feed lanes on a daily basis to prevent decomposition.

¹¹ Emissions from cow housing = 23,552 lb/yr for all cows, while emissions from mature cows = 16,858 lb/yr. Therefore, mature cows represent 71.6% of the emissions from the cow housing (16,858 lb/yr/23,552 lb/yr). The overall control efficiency can then be calculated as follows: 95% Capture x 98% Control x 71.6 % of emissions = 66.7% overall control efficiency.

¹²The overall control efficiency can be calculated as follows: 95% Capture x 80% Control x 71.6 % of emissions = 54.4% overall control efficiency.

- All open corrals adequately sloped to promote drainage (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal).
- Weekly scraping of freestall exercise pens and open corrals using pull-type scraper in the morning hours except when prevented by wet conditions
- Rule 4570 mitigation measures.

Description of Control Technologies

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

In a freestall barn, cows are grouped in large pens with free access to feed bunks, water, and stalls for resting. In the mild climate of the San Joaquin Valley, the typical freestall barn is an open structure (roof but no sides). The primary freestall design consists of a roof that provides shade with all sides open to allow air to flow through, which in turn keeps the cows cool. No enclosed freestall barns that were installed at a California dairy could be identified. However, partially enclosed freestall barns are available. These include tunnel-ventilated freestall barns, which are fairly common in the southern and eastern parts of the United States, and greenhouse barns. Greenhouse barns use a lightweight, galvanized steel tube frame to support one or two layers of a commercial-grade plastic film as covering. The most common use for these structures is as heated chambers for growing plants. Although the potential to enclose cows in a barn exist, the feasibility of reasonably collecting the biogas through a stack, chimney, or vent remains in question considering the extremely large amounts of airflow going through the barns needed to keep the cows cool. The airflow requirements will be even higher in the San Joaquin valley, where temperatures reach in excess of 110 degrees in the dry summer. Although the feasibility of such a technology is in question, it will be considered in this analysis. If the gases can be properly captured and sent to a control device, then those gases may be either incinerated or treated in a biofilter (see biofilter discussed in the option below). It is assumed that 95% of the gasses emitted from the freestall barns will be captured by the mechanical ventilation system and that 98% of the captured VOCs will be eliminated by thermal incineration²⁶; therefore the total control for VOCs from the freestall barns = $0.95 \times 0.98 = 93.1\%$.

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

As stated above, the mechanical ventilation system of a completely enclosed freestall barn may be utilized to capture the gases emitted from the cow housing permit unit. The captured VOC emissions may then be sent to a biofilter. A biofilter is a device for removing contaminants from a gas in which the gas is passed through a media that supports microbial activity by which the pollutants are degraded by biological oxidation. In the biofiltration process, live bacteria biodegrade organic contaminants and ammonia into carbon dioxide, nitrogen and water. Bacterial cultures (microorganisms that typically consist of several species coexisting in a colony) that use oxygen to biodegrade

organics are called aerobic cultures. These bacteria are found in soil, peat, compost and natural water bodies including ponds, lakes, rivers and oceans. They are environmentally friendly and non-harmful to humans unless ingested.

Since biofilters rely on living organisms to function, the temperature, moisture content, and pH of the filter media should be monitored to ensure optimum operating conditions. The filter media also needs to be replaced periodically because of deterioration. It is assumed that 95% of the gasses emitted from the cow housing area will be captured by the mechanical ventilation system and that a properly functioning biofilter will eliminate 80% of the captured VOCs²⁷; therefore, the total control for VOCs from the cow housing permit unit = $0.95 \times 0.80 = 76\%$.

3) Feed and Manure Management Practices

Concrete Feed Lanes and Walkways

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

Increased Flushing for feed lanes and walkways

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

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

It must be noted that the flush system will only control the VOCs emitted from the manure it will have little or no effect on enteric emissions produced from the cows'

digestive processes. As stated above, the feed lanes and walkways in the cow housing areas are typically flushed twice per day. Flushing the lanes four times per day will increase the frequency that manure is removed from the cow housing permit unit and should result in a higher percentage of soluble volatile compounds being dissolved in the flush. Based on calculations given in the final DPAG report¹³, flushing the freestall lanes four times per day will be assumed to have a control efficiency of 47% for VOCs emitted from manure until better data becomes available. Enteric emissions compose approximately 61% of the VOC emissions from the cow housing permit unit and VOC emissions from the manure make up the remaining 39%; therefore the total VOC control for flushing the feed lanes and walkways in the cow housing areas four times per day is calculated as follows: $0.47 \times 0.39 = 18\%$.

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

Nutritional management of dairy feed is routinely practiced to improve milk production and herd health. The potential for VOC emissions can be reduced by reducing the quantity of undigested nutrients in the manure. Many of the VOCs emitted from Confined Animal Facilities, including dairies, originate from the decomposition of undigested protein in animal waste¹⁴. This undigested protein also produces ammonia emissions. The level of microbial action in the manure corresponds to the level of organic nitrogen content in the manure; the lower the level of nitrogen the lower the level of microbial action and the lower the production of ammonia and VOCs.

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

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

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

Removing or re-feeding refused feed from the feed lanes on a daily basis will minimize gaseous emissions from decomposition. The feed that is removed must be properly

¹³ "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.

¹⁴ "Emissions of Volatile Organic Compounds Originating from UK Livestock Agriculture", Hobbs, P.J. 2004 – Journal of the Science of Food and Agriculture.

disposed of to ensure that the emissions are not just relocated to another area of the dairy. Although this practice is expected to reduce emissions from the cow housing permit unit, there is not sufficient research to estimate the emissions reductions and no VOC control efficiency will be assigned for this practice.

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

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

After eliminating the technologically infeasible options, the remaining options are ranked according to their control efficiency, as follows:

- 1) Enclosed freestalls vented to an incinerator (\approx 93%; 95% Capture, 98% Control)
- 2) Enclosed freestalls vented to a biofilter (\approx 76%; 95% Capture, 80% Control)
- 3) Enclosed freestalls vented to an incinerator - Mature cows only (\approx 66.7%; 95% capture, 98% Control of 71.6% of cow housing emissions)
- 4) Enclosed freestalls vented to a biofilter - Mature cows only (\approx 54.4%; 95% Capture, 80% Control of 71.6% of cow housing emissions)
- 5) Feed and Manure Management Practices (\approx 22%)
 - Concrete feed lanes and walkways in freestall barns for milk and dry cows
 - Freestall feed lanes and walkways for milk cows and dry cows flushed four times per day (\approx 18% for total emissions from cow housing; 47% for emissions from manure) and feed lanes and walkways in the corrals for the remaining animals flushed at least two times per day
 - All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations. (5% of total emissions from dairy cows)
 - Uneaten feed re-fed or removed from feed lanes on a daily basis to prevent decomposition.
 - All open corrals adequately sloped to promote drainage (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal).

- Weekly scraping of freestall exercise pens and open corrals using pull-type scraper in the morning hours except when prevented by wet conditions.
- Rule 4570 mitigation measures.

d. Step 4 - Cost Effectiveness Analysis

Thermal & Catalytic Incineration:

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

Required Airflow Rate of the Freestall Barns

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

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

The minimum summer ventilation rate listed for mature cows is 500 cfm per cow. However, according to the University of Minnesota publication and Cornell University's publication "Natural or Tunnel Ventilation of Freestall Structures: What is Right for Your Dairy Facility?", the required airflow rate in the summer increases to 1,000 cfm per cow if tunnel ventilation is used to provide additional cooling.¹⁵

The climate in the San Joaquin Valley is characterized by relatively mild winters and hot summers. Because of the warmer climate, it is expected that tunnel ventilation or a similar system would need to be employed in an enclosed freestall barn to prevent excessive heat stress. Additionally, tunnel ventilation systems, which operate with negative pressure inside the freestall barns, are more representative of the types of systems that would be required to capture and control emissions. Although the summer

¹⁵ Improving Mechanical Ventilation in Dairy Barns, J.P. Chastain, <http://www.bae.umn.edu/extens/aeu/aeu3.html> and Natural or Tunnel Ventilation of Freestall Structures: What is Right for Your Dairy Facility?, C.A. Gooch, <http://www.ansci.cornell.edu/tmplobs/doc225.pdf>

air requirement of 1,000 cfm per cow for tunnel ventilation is more representative of the airflow requirements in a completely enclosed freestall barn located in the San Joaquin Valley, for calculation purposes the following average year round airflow requirement will be assumed: mature cows – 335 cfm/cow (average of 170 and 500 cfm per cow); large heifers – 130 cfm/cow (average of 80 and 180 cfm per cow); small and medium heifers - 95 cfm/cow (average of 60 and 130 cfm per cow); baby calves – 75 cfm (average of 50 and 100 cfm per cow).

The analysis below is for the entire herd:

As discussed in the evaluation, after completion of the project, the dairy will have 1,500 Holstein milk cows; 368 dry cows; 612 heifers (15-24 months); 544 heifers (7-14 months); 272 heifers (3-6 months), and 136 calves (0-3 months). Enclosed freestalls will be evaluated as a housing alternative for all animals at this dairy.

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

Category	# of cows	cfm/cow	min/hr	ft ³ /hr
Milk cow	1,500	335	60	30,150,000
Dry cow	368	335	60	7,396,800
Heifer (15-24 mo)	612	130	60	4,773,600
Heifer (7-14 mo)	544	95	60	3,100,800
Heifer (3-6 mo)	272	95	60	1,550,400
Calves (0-3 mo)	136	75	60	612,000
Total				47,583,600

Fuel Requirement for Thermal Incineration

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

$$\text{Natural Gas Requirement} = (\text{flow})(C_{p\text{Air}})(\Delta T)(1-\text{HEF})$$

Where:

Flow (Q) = exhaust flow rate of VOC the freestall barns

C_{pAir} = specific heat of air: 0.0194 Btu/scf - °F

ΔT = increase in the temperature of the contaminated air stream required for catalytic oxidation to occur (It will be assumed that the air stream would increase in temperature from 100 °F to 600 °F.)

HEF = heat exchanger factor: 0.7

Natural Gas Requirement for Thermal Incineration:

$$= (47,583,600 \text{ scf/hr})(0.0194 \text{ Btu/scf} - \text{°F})(600 \text{ °F} - 100 \text{ °F})(1-0.7)$$

$$= \mathbf{138,468,276 \text{ Btu/hr}}$$

Fuel Cost for Thermal Incineration:

The cost for natural gas shall be based upon the average industrial price reported by the Energy Information Administration (EIA), taken from the EIA website at http://tonto.eia.doe.gov/dnav/ng/ng_sum_lsum_dcu_SCA_m.htm. The most recent average price reported is for September 2011.

Average cost for natural gas = \$6.83/MMBtu

The oxidizer is assumed to operate 24 hours per day and 365 days per year.

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

Fuel cost for an incinerator for each new full-sized freestall barn:

$$138,468,276 \text{ Btu/hr} \times 1 \text{ MMBtu}/10^6 \text{ Btu} \times 24 \text{ hr/day} \times 365 \text{ day/year} \times \$6.83/\text{MMBtu} \\ = \mathbf{\$8,284,668/\text{year}}$$

VOC Emission Reductions for Thermal Incineration:

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

$$[\text{Number of cows}] \times [\text{Uncontrolled Cow Housing VOC EF (lb/cow-year)}] \times [\text{Capture Efficiency}] \times [\text{Thermal Incinerator Control Efficiency}]$$

Category	# of cows	EF- lb/hd-yr	CE	lbs-VOC/yr
Milk cows	1,500	9.9	93%	13,769
Dry cows	368	5.6	93%	1,910
Support stock	1,564	4.3	93%	6,225
TMR	3,432	9.8	93%	31,337
Total				53,241

Cost of VOC Emission Reductions:

$$\text{Cost of reductions} = (\$8,284,668/\text{year}) / ((53,241 \text{ lb-VOC}/\text{year})(1 \text{ ton}/2000 \text{ lb})) \\ = \mathbf{\$311,214/\text{ton of VOC reduced}}$$

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

The analysis below is for Mature Cows only:

As discussed in the evaluation, after completion of the project, the dairy will have a total of 1,868 mature cows (1,500 Holstein milk cows and 368 dry cows). The milk cows will be housed in freestalls with the remaining animals all housed in open corrals. Enclosed freestalls will be evaluated as a housing alternative for all animals at this dairy.

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

Category	# of cows	cfm/cow	min/hr	ft ³ /hr
Milk cow	1,500	335	60	30,150,000
Dry cow	368	335	60	7,396,800
Total				37,546,800

Fuel Requirement for Thermal Incineration:

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

$$\text{Natural Gas Requirement} = (\text{flow})(C_{p\text{Air}})(\Delta T)(1-\text{HEF})$$

Where:

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

Natural Gas Requirement for Thermal Incineration:

$$= (37,546,800 \text{ scf/hr})(0.0194 \text{ Btu/scf} - \text{°F})(600 \text{ °F} - 100 \text{ °F})(1-0.7)$$

$$= \mathbf{109,546,800 \text{ Btu/hr}}$$

Fuel Cost for Thermal Incineration:

The cost for natural gas shall be based upon the average industrial price reported by the Energy Information Administration (EIA), taken from the EIA website at http://tonto.eia.doe.gov/dnav/ng/ng_sum_lsum_dcu_SCA_m.htm. The most recent average price reported is for September 2011.

$$\text{Average cost for natural gas} = \$6.83/\text{MMBtu}$$

The oxidizer is assumed to operate 24 hours per day and 365 days per year.

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

$$109,546,800 \text{ Btu/hr} \times 1 \text{ MMBtu}/10^6 \text{ Btu} \times 24 \text{ hr/day} \times 365 \text{ day/year} \times \$6.83/\text{MMBtu}$$

$$= \mathbf{\$6,554,272/\text{year}}$$

VOC Emission Reductions for Thermal Incineration:

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

$$[\text{Number of cows}] \times [\text{Uncontrolled Cow Housing VOC EF (lb/cow-year)}] \times [\text{Capture Efficiency}] \times [\text{Thermal Incinerator Control Efficiency}]$$

Category	# of cows	EF- lbs/hd-yr	CE	lbs-VOC/yr
Milk cow	1,500	12.4	93%	17,298
Dry cow	368	8.2	93%	2,806
TMR	1,868	9.8	93%	17,057
Total				37,161

Cost of VOC Emission Reductions:

$$\begin{aligned} \text{Cost of reductions} &= (\$6,554,272/\text{year})/((37,161 \text{ lb-VOC}/\text{year})(1 \text{ ton}/2000 \text{ lb})) \\ &= \mathbf{\$352,750/\text{ton of VOC reduced}} \end{aligned}$$

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

Biofiltration:

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

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

Cost of Biofiltration:

The cost estimate for a biofiltration system is taken from the United States EPA Report "Using Bioreactors to Control Air Pollution"¹⁶. The cost is largely dependent on the airflow rate that the filter must handle. According to University of Minnesota, Biofilters used to treat ventilating air exhausted from a livestock building should be sized to treat the maximum ventilation rate, which is typically the warm weather rate. The EPA report gives a range of \$2.35 - \$37.06 per cfm for the initial construction of a biofilter. As shown above, the University of Minnesota's publication "Improving Mechanical Ventilation in Dairy Barns" gives the following summer ventilation rates for dairy cattle¹⁶: mature cow - 1,000 cfm; heifer (12-24 mo.) – 180 cfm; heifer (2-12 mo.) – 130 cfm; and baby calves – 100 cfm.

The analysis below is for the entire herd:

As discussed in the evaluation, after completion of the project, the dairy will have 1,500 Holstein milk cows; 368 dry cows; 612 heifers (15-24 months); 544 heifers (7-14

¹⁶ "Using Bioreactors to Control Air Pollution" EPA-456/R-03-003, The Clean Air Technology Center (CATC), U.S. Environmental Protection Agency (E143-03) (September 2003) <http://www.epa.gov/ttn/catc/dir1/fbiorect.pdf>

months); 272 heifers (3-6 months) and 136 calves (0-3 months). Enclosed freestalls vented to a biofilter will be evaluated as a housing alternative for all animals at this dairy.

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

Category	# of cows	cfm/cow	cfm
Milk cow	1,500	1,000	1,500,000
Dry cow	368	1,000	368,000
Heifer (15-24 mo)	612	180	110,160
Heifer (7-14 mo)	544	130	70,720
Heifer (3-6 mo)	272	130	35,360
Calf (0-3 mo)	136	130	17,680
Total			2,101,920

Capital Cost:

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

The capital cost of the biofilter is calculated as follows:

$$\$2.35 \text{ cfm} \times 2,101,920 \text{ cfm} = \$4,939,512$$

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

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

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

$$A = [\$4,939,512 \times 0.1(1.1)^{10}] / [(1.1)^{10} - 1]$$

$$= \mathbf{\$803,883/\text{year}}$$

VOC Emission Reductions for Biofiltration:

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

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

Category	# of cows	EF- lb/hd-yr	CE	lbs-VOC/yr
Milk cows	1,500	9.9	76%	11,252
Dry cows	368	5.6	76%	1,561
Support stock	1,564	4.3	76%	5,087
TMR	3,432	9.8	76%	25,609
Total				43,509

Cost of VOC Emission Reductions:

$$\begin{aligned} \text{Cost of reductions} &= (\$803,883/\text{year}) / ((43,509 \text{ lb-VOC}/\text{year})(1 \text{ ton}/2000 \text{ lb})) \\ &= \mathbf{\$36,952/\text{ton of VOC reduced}} \end{aligned}$$

As shown above, the capital cost alone for a biofilter not including the cost of enclosing freestalls would cause the cost of the VOC reductions to be greater than the \$17,500/ton cost effectiveness threshold of the District BACT policy. Therefore, this option is not cost effective and is being removed from consideration at this time.

The analysis below is for Mature Cows only:

As discussed in the evaluation, after completion of the project, the dairy will have a total of 4,066 mature cows (3,404 Holstein milk cows and 662 dry cows). Enclosed freestalls vented to a biofilter will be evaluated as the housing for both the milk and dry cows.

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

Category	# of cows	cfm/cow	cfm
Milk cow	1,500	1,000	1,500,000
Dry cow	368	1,000	368,000
Total			1,868,000

Capital Cost:

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

The capital cost of the biofilter is calculated as follows:

$$\$2.35/\text{cfm} \times 1,868,000 \text{ cfm} = \$4,389,800$$

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

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

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

$$A = [\$4,389,800 \times 0.1(1.1)^{10}] / [(1.1)^{10} - 1]$$

$$= \mathbf{\$714,420/\text{year}}$$

VOC Emission Reductions for Biofiltration:

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

$$[\text{Number of cows}] \times [\text{Uncontrolled Cow Housing VOC EF (lb/cow-year)}] \times [\text{Capture Efficiency}] \times [\text{Biofilter Control Efficiency}]$$

Category	# of cows	EF- lbs/hd-yr	CE	lbs-VOC/yr
Milk cow	1,500	12.4	76%	14,136
Dry cow	368	8.2	76%	2,293
TMR	1,868	9.8	76%	13,939
Total				30,368

Cost of VOC Emission Reductions:

$$\text{Cost of reductions} = (\$714,420/\text{year}) / ((30,368 \text{ lb-VOC/year})(1 \text{ ton}/2000 \text{ lb}))$$

$$= \mathbf{\$47,051/\text{ton of VOC reduced}}$$

As shown above, the capital cost alone for a biofilter not including the cost of constructing (for dry cows) and enclosing freestalls would cause the cost of the VOC reductions to be greater than the \$17,500/ton cost effectiveness threshold of the District BACT policy. Therefore, this option is not cost effective and is being removed from consideration at this time.

Feed and Manure Management Practices:

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

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

e. Step 5 - Select BACT

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

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

2. BACT Analysis for NH₃ Emissions:

a. Step 1 - Identify all control technologies

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

The following management practices have been identified as possible control options for the NH₃ emissions from the cow housing permit unit and have been proposed by the applicant:

1) Feed and Manure Management Practices

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

Description of Control Technologies:

1) Feed and Manure Management Practices

Concrete Feed Lanes and Walkways:

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

Increased Flushing (or scraping/vacuuming) for feed lanes and walkways:

Many dairy operations use a flush system to remove manure from the corral and freestall feed lanes and walkways. The flush system introduces a large volume of water at the head of the paved area of the corrals or freestalls, and the cascading water

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

In addition to cleaning the corral and freestall feed lanes and walkways, the flush system also serves as an emission control for reducing PM₁₀, VOC, and ammonia emissions. The manure deposited in the lanes, which is also a source of NH₃ emissions, is removed from the cow housing area by the flush system. Ammonia has a high affinity for water and is highly soluble in water. Therefore, a large portion of ammonia will be flushed away with the flush water and will not be emitted from the cow housing permit unit.

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

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

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

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

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) Feed and Manure Management Practices:

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

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

Additionally, District Rule 2201 defines BACT as including the most stringent emission limitation or control technique, including process and equipment changes, that has been found by the APCO to be cost effective and technologically feasible for such class or category of sources or for a specific source. The District has found that the mitigation measures required by District Rule 4570 are technologically feasible for confined animal facilities and the applicant has proposed these options. Although District Rule 4570 is only intended to reduce VOC emissions, many of these measures also reduce ammonia emissions. Therefore, in addition to the BACT requirements determined in the Top-Down BACT Analysis above, implementation of the mitigation measures that the applicant has selected to comply with Rule 4570 will also be required as part of BACT for NH₃ emissions from the cow housing permit.

3. BACT Analysis for PM₁₀ Emissions:

a. Step 1 - Identify all control technologies

The following options were identified as controls for PM₁₀ emissions from the cow housing permit.

- 1) Freestall Barns for milk cows and loafing barns for dry cows
- 2) Design and Management Practices
 - Weekly scraping of open corrals using a pull-type scraper in the morning hours except when prevented by wet conditions
 - Concrete feed lanes and walkways for all cows
 - Shade structures in open corrals
 - Feeding heifers near (within 1 hour of) dusk
 - Windbreaks/Shelterbelts
 - Above-ground calf hutches for calves
 - Application of water (sprinklers) in heifer corrals

Description of Control Technologies:

Weekly scraping of corrals

Dairy animals are typically housed in freestall barns or open corrals. In a freestall barn, the milk cows are grouped in large pens with free access to feed bunks, water, and stalls for resting, and exercise corral areas. An open corral is a large open area where cows are confined with unlimited access to feed and water. The corral surface is composed of earth and deposited manure, both of which have the potential for particulate matter emissions either as a result of wind or animal movement. Frequent scraping of corral surfaces will reduce the amount of dry manure on the corral surfaces that may be pulverized by the cows' hooves and emitted as PM₁₀.

Concrete all feedlanes

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.

Shade Structures in 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 near (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

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 NRCS requires that a 3-row shelterbelt 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/shelterbelt will reduce the amount of particulate matter entrained into the atmosphere.

Above-ground Calf Hutches

Above-ground calf hutches will reduce PM₁₀ emissions because the calves will be confined within the hutches, significantly limiting their movement. In addition, the calves will have no contact with the ground, resulting in additional emission reductions.

Water Application

A sprinkler system can be installed to reduce PM₁₀ emissions. The sprinkler system reduces dust by maintaining adequate moisture in the layer of manure and earth on the corral surface. Studies have shown that increasing the moisture of the corral surface greatly reduces the entrainment of PM₁₀ into the atmosphere as a result of animal movement. Installation of a sprinkler system for dust control is an effective mitigation measure that reduces PM₁₀ emissions. However, because of concerns for animal health and welfare, water application is not commonly used. Excess moisture from sprinkling systems can potentially accumulate in shaded areas where the cows lie down, which will lead to a breeding ground for pathogens and vermin, which will increase nuisance conditions and instances of disease. For this reason, sprinkler systems are not used.

b. Step 2 - Eliminate technologically infeasible options

Application of Water in Corrals

Mastitis is a common and costly disease of dairy cattle. Mastitis is the inflammation of the mammary gland caused by microorganisms, usually bacteria that invade the udder, multiply, and produce toxins that are harmful to the mammary gland. Mastitis is commonly considered to be more prevalent in mature, lactating cows. However, investigations have identified significant problems with mastitis in unbred, and bred

heifers¹⁷. Environmental Mastitis is contracted from bacteria that may breed in the environment of the cow. Bacteria breeds in the bedding depending on the available nutrients, amount of contamination, moisture and temperature. Water sprinkling systems can potentially cause excess moisture in bedding areas where the heifers lie down. The moist resting areas create a breeding ground for the environmental mastitis bacteria which infect the teats of the resting heifers. Due to concerns for animal health and welfare, this mitigation measure/control will be removed from consideration at this time.

c. Step 3 - Rank remaining options by control effectiveness

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

1) Design and Management Practices

- Weekly scraping of open corrals using a pull-type scraper in the morning hours except when prevented by wet conditions.
- Concrete all feed lanes and walkways for all cows
- Shade structures in open corrals
- Feeding heifers near (within 1 hour of) dusk
- Windbreaks/Shelterbelts
- Above-ground calf hutches for calves

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The facility is proposing to scrape open corrals in the morning hours except when prevented by wet conditions; concrete all feed lanes and walkways; install shade structures in open corrals; feed heifers near dusk; install windbreaks; and house the calves in above-ground calf hutches, which satisfy the BACT requirements.

¹⁷ Heifer Mastitis, Fact Sheet, Sheila M. Andrew, Department of Animal Science, University of Connecticut

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

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

a. Step 1 - Identify all control technologies

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

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

- 1) Aerobic Treatment Lagoon – mechanical aeration to achieve a dissolved oxygen concentration of 2.0 mg/L (\approx 95%; based information provided by Dr. Ruihong Zhang of UC Davis)
- 2) Covered Lagoon Anaerobic Digester with biogas collected and vented to a destruction device such as an internal combustion engine or flare, and treated waste discharged into a secondary lagoon or storage pond. (\approx 75%) (Note: not required unless required by the final Dairy BACT Guideline)
- 3) Anaerobic Treatment Lagoon designed to meet Natural Resources Conservation Service (NRCS) standards (\approx 40%)

Description of Control Technologies

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

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

Sufficient oxygen must be provided to sustain the aerobic microorganisms in completely aerated lagoons. Lagoons can be considered completely aerobic if sufficient oxygen is provided to achieve a dissolved oxygen (DO) content of 2.0 mg/L or more. Oxygen is typically provided by mechanical aerators. These aerators may float on the lagoon surface or be submerged in the lagoon. Aeration can also be performed by injection of tiny air bubbles into the lagoon water, mixing of the lagoon water, or spraying of the water into the air. According to Dr. Ruihong Zhang, a researcher at the University of

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

2) Covered Lagoon Anaerobic Digester

Pursuant to Section 5.3 of the Settlement Agreement (9/20/2004) between the District and the Western United Dairyman and the Alliance of Western Milk Producers Inc., installation of an anaerobic digester will only be required if this technology is proven effective in reducing emissions and is required by the final Dairy BACT Guideline¹.

Covered treatment lagoons are one type of anaerobic digester. An anaerobic digester is an enclosed basin or tank that is designed to facilitate the decomposition of wastewater by microbes in the absence of oxygen. The process of anaerobic decomposition results in the preferential conversion of organic compounds in the wastewater into methane (CH₄), carbon dioxide (CO₂), and water rather than intermediate metabolites (VOCs). The gas generated by this process is known as biogas, waste gas or digester gas. In addition to methane and carbon dioxide, biogas also contains small amounts of Nitrogen (N₂), Oxygen (O₂), Hydrogen Sulfide (H₂S), and Ammonia (NH₃). Biogas will also include trace amounts of various Volatile Organic Compounds (VOCs) that remain from incomplete digestion of the volatile solids in the incoming wastewater. The small amounts of undigested solids that remain after digestion are removed from the digester as sludge. Because biogas is mostly composed of methane, the main component of natural gas, the gas produced in the digester can be cleaned to remove H₂S and other impurities and used as fuel. The captured biogas can be combusted in a flare or may be sent to a boiler or internal combustion engine, where the gas can be used to generate useful heat or electrical energy.

As stated above, the gas generated in the covered lagoon can be captured and then sent to a suitable combustion device. Combustion (thermal incineration) is a generally accepted, well-established VOC control technique. During combustion, gaseous hydrocarbons are oxidized to form CO₂ and water. The VOCs emitted from the liquid manure in the covered lagoon can be reduced by 95% with the use of an appropriate combustion device. Therefore, installation of the digester will lower the total VOCs emitted from the liquid manure from the liquid manure handling system. Although the control efficiency of the gas captured from the primary lagoon is expected to be 95% or more, the overall control efficiency is expected to be less since VOCs will also be emitted from the storage pond and as fugitive emissions. The overall control efficiency is assumed to be 75% of the emissions that would have been emitted from the lagoon and storage pond.

3) Anaerobic Treatment Lagoon

An anaerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of manure by microbes in the absence of oxygen. The process of anaerobic decomposition results in the preferential conversion of organic compounds in the wastewater into methane (CH₄), carbon dioxide (CO₂), and water rather than

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

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

d. Step 4 - Cost Effectiveness Analysis

Aerobic Treatment Lagoon:

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

Energy Requirement for Complete Aeration

In order to effectively calculate the costs of this control option, the energy requirement for complete aeration must be determined. 1.5 to 2.5 pounds of oxygen is required to digest 1 pound of Biological Oxygen Demand (BOD₅) with additional oxygen required for conversion of ammonia to nitrate (nitrification).¹⁸ It is generally accepted that at least twice the BOD should be provided for complete aeration.¹⁹ According to Dr. Ruihong Zhang of the University of California, Davis, 2.4 lb (1.1 kg) of oxygen (O₂) per cow must

¹⁸ An Assessment of Technologies for Management and Treatment of Dairy Manure in California's San Joaquin Valley, December 2005, page 34 (<http://www.arb.ca.gov/aq/caf/dairy/pnl/dmtfaprppt.pdf>)

¹⁹ See <http://www.extension.org/faq/27574> and <http://www.omafr.gov.on.ca/english/engineer/facts/04-033.htm>

be provided each day for removal of BOD and an additional 3 lb (1.4 kg) for oxidation of 70% of the nitrogen.²⁰ Based on the data gathered in a UC Davis study on aerator performance for wastewater lagoons, aeration efficiencies for mechanical aerators range from 0.10 to 0.68 kg of oxygen provided per kW-hr of energy utilized.²¹ For this analysis it will be assumed that twice the BOD is required for complete aeration and that mechanical aerators will provide 1.0 kg of oxygen per kW-hr. This efficiency is very conservative since it is greater than the efficiency of the most efficient aerator tested in the UC Davis study (0.68 kg-O₂/kW-hr) and more than twice the efficiency of the most efficient aerator tested that had been installed in dairy lagoons (0.49 kg-O₂/kW-hr). Additionally, the efficiency tests were performed in clean water and lower aeration efficiencies are expected in liquid dairy manure that contains a significant amount of solids. The yearly energy requirement per cow is calculated as follows:

$$2 \times (1.1 \text{ kg/cow-day}) \div (1.0 \text{ kg/kW-hr}) \times (365 \text{ day/year}) = 803 \text{ kW/cow-year}$$

The total yearly energy requirement is calculated below. Based on animal units (AU), it is assumed that the BOD loading (and the energy requirement) for the dry cows will be 80% of that of the milk cows, the BOD loading from the large heifers will be 73% of milk cows; the BOD loading from the small and medium heifers will be 35% of milk cows and the BOD loading from the baby calves will be 21% of milk cows.²²

As discussed in the evaluation, after completion of the project, the dairy will house 1,500 Holstein milk cows; 368 dry cows; 612 heifers (15-24 months); 544 heifers (7-14 months); 272 heifers (3-6 months) and 136 calves (0-3 months). The amount of electricity required for complete aeration of the lagoon system is calculated below:

$$(1,500 \text{ milk cows} \times 803 \text{ kW/cow-year}) + (368 \text{ dry cows} \times 0.8 \times 803 \text{ kW/cow-year}) + (612 \text{ large heifers} \times 0.73 \times 803 \text{ kW/cow-year}) + (544 \text{ medium heifers} \times 0.35 \times 803 \text{ kW/cow-year}) + (272 \text{ small heifers} \times 0.35 \times 803 \text{ kW/cow-year}) + (136 \text{ calves} \times 0.21 \times 803 \text{ kW/cow-year})$$

$$= 2,051,922 \text{ kW-hr/year}$$

Cost of Electricity for Complete Aeration:

The cost for electricity is based on an average retail price of industrial electricity in California for the year 2010 taken from the Energy Information Administration (EIA) Website²³.

$$\text{Average Cost for electricity} = \$0.0980/\text{kW-hr}$$

²⁰ An Assessment of Technologies for Management and Treatment of Dairy Manure in California's San Joaquin Valley, December 2005, page 35 (<http://www.arb.ca.gov/qa/caf/dairypl/dmtfaprprt.pdf>)

²¹ Aerator Performance for Wastewater Lagoon Application, September 2007, UC Davis, R.H. Zhang (<http://asae.frymulti.com/abstract.asp?aid=23832&t=2>)

²² Animal Unit (AU) factors are taken from the California Regional Water Quality Control Board Central Valley Region Annual Report for Dairies Subject to Monitoring and Reporting (http://www.waterboards.ca.gov/centralvalley/available_documents/dairies/genorderwdrform.pdf)

²³ http://www.eia.gov/electricity/sales_revenue_price/xls/table5_c.xls

The electricity costs for complete aeration are calculated as follows:

$$2,051,922 \text{ kW-hr/year} \times \$0.0980/\text{kW-hr} \\ = \mathbf{\$201,088/\text{year}}$$

VOC Emission Reductions for Complete Aeration:

In addition to controlling 95% of the emissions from the lagoon and storage pond, complete aeration will also control 95% of the emissions from liquid manure land application as well. Therefore, these emissions reductions will also be included in the analysis. The annual VOC Emission Reductions for the lagoon, storage pond, and liquid manure land application unit are calculated as follows:

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

$$[(1,500 \text{ milk cows} \times 0.74 \text{ lb-VOC/milk cow-year}) + (368 \text{ dry cows} \times 0.40 \text{ lb-VOC/milk cow-year}) + (1,564 \text{ support stock} \times 0.31 \text{ lb-VOC/cow-year})] \times 0.95 + [(1,500 \text{ milk cows} \times 1.33 \text{ lb-VOC/milk cow-year}) + (368 \text{ dry cows} \times 0.72 \text{ lb-VOC/milk cow-year}) + (1,564 \text{ support stock} \times 0.55 \text{ lb-VOC/cow-year})] \times 0.95 \\ = [1,742 \text{ lb-VOC/year} \times 0.95] + [3,120 \text{ lb-VOC/year} \times 0.95] \\ = \mathbf{4,619 \text{ lb-VOC/year}}$$

Cost of VOC Emission Reductions:

$$\text{Cost of reductions} = (\$201,088/\text{year}) / ((4,619 \text{ lb-VOC/year}) / (1 \text{ ton}/2000 \text{ lb})) \\ = \mathbf{\$87,070/\text{ton of VOC reduced}}$$

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

Covered Lagoon Anaerobic Digester:

Pursuant to Section 5.3 of the Settlement Agreement (9/20/2004) between the District and the Western United Dairyman and the Alliance of Western Milk Producers Inc., installation of an anaerobic digester will only be required if this technology is proven effective in reducing emissions and is required by the final Dairy BACT Guideline¹.

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

Anaerobic Treatment Lagoon:

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

e. Step 5 - Select BACT

The facility is proposing a two-stage Anaerobic Treatment Lagoon designed according to Natural Resources Conservation Service (NRCS) Guidelines. Additionally, the facility is proposing to install an anaerobic digester if determined to be an effective emissions control in the final Dairy BACT guideline. Therefore, the BACT requirements are satisfied.

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

2. BACT Analysis for NH₃ Emissions from the Lagoon & Storage Ponds

a. Step 1 - Identify all control technologies

A cost effectiveness threshold has not been established for ammonia. Therefore, only options that meet the District's definition of Achieved-in-Practice controls will be considered for ammonia at this time. (Although these options must meet the District definition of Achieved-in-Practice, pursuant to the Settlement Agreement (9/20/2004) between the District and Western United Dairyman and Alliance of Western Milk Producers Inc¹, the District will not deem any control options Achieved-in-Practice until after the Dairy BACT Guideline has been established.)

The following practice has been identified as a possible control option for the NH₃ emissions from the lagoon and storage pond. No other control technologies that meet the definition of Achieved-in-Practice have been identified for the lagoon or storage pond.

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

Description of Control Technologies:

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

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

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

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

Additionally, District Rule 2201 defines BACT as including the most stringent emission limitation or control technique, including process and equipment changes, that has been found by the APCO to be cost effective and technologically feasible for such class or category of sources or for a specific source. The District has found that the mitigation measures required by District Rule 4570 are technologically feasible for confined animal

facilities and the applicant has proposed these options. Although District Rule 4570 is only intended to reduce VOC emissions, many of these measures also reduce ammonia emissions. Therefore, in addition to the BACT requirements determined in the Top-Down BACT Analysis above, implementation of the mitigation measures that the applicant has selected to comply with Rule 4570 will also be required as part of BACT for NH₃ emissions from the lagoons/storage ponds.

3. BACT Analysis for H₂S Emissions from the Lagoon & Storage Ponds

A cost effectiveness threshold has not been established for H₂S. Therefore, only options that meet the District's definition of Achieved-in-Practice controls will be considered for H at this time.

a. Step 1 - Identify all control technologies

The following options were identified as possible controls for H₂S emissions from the Lagoon/Storage Pond:

- a. Lagoon PH maintained at a minimum of 7.8, with monitoring and recordkeeping, and adjustment with lime (or similar base) as needed
- b. Feeding per NRC Guidelines
- c. Solids Separation
- d. Reduce or Eliminate the Use of Copper Sulfate as a Footbath Disinfectants

Description of Control Technologies

1) Lagoon pH Maintained at a Minimum of 7.8

Hydrogen Sulfide in the lagoon exists in both aqueous and vapor phases. The aqueous phase is represented by hydrogen sulfide (HS⁻) and sulfide (S²⁻) ions, whereas the vapor phase is represented by Hydrogen Sulfide gas. The determining factor of the proportion of each phase is pH. If the pH is low enough, virtually all Hydrogen Sulfide will exist in the vapor phase, and Hydrogen Sulfide gas emissions from the surface of the lagoon will be maximized. On the other hand, if the pH is high enough, virtually all the Hydrogen Sulfide will exist in the aqueous phase, and Hydrogen Sulfide gas emissions will be virtually non-existent.

While a pH high enough to eliminate emissions completely is probably not feasible in a large body of liquid such as a dairy manure lagoon, emissions may still be significantly reduced by maintaining the pH of the lagoon in the basic range. Modeling results indicate that significant reductions can be achieved cost effectively at a minimum pH of 7.8. This pH will be achieved by the addition of lime (or similar salts) to the lagoon. Monitoring and record keeping will be required to ensure that the pH is maintained above the recommended value.

2) Feeding per NRC Guidelines

H₂S is produced as a result of the decomposition of sulfur compounds in the manure under anaerobic conditions. The presence of these Sulfur compounds in the manure is primarily due to excretion of excess Sulfur from the digestive tract, as well as other inorganic sources²⁴.

Because both organic Nitrogen and Sulfur compounds are primarily components of amino acids, they tend to occur in set ratios and strategies to reduce the excretion of undigested protein and Nitrogen will also reduce the amount of Sulfur in the manure. A diet that is formulated to feed proper amounts of ruminantly-degradable protein will result in improved protein utilization by the animal and corresponding reduction in sulfur content of the manure, which will reduce the potential for production of H₂S.

3) Solids Separation

Solids separation will reduce loading and the amount of organic Sulfur compounds that are stored under anaerobic conditions, thereby reducing the potential for production of H₂S.

Reducing the loading of lagoons also creates conditions that are more favorable to the growth of sulfur-reducing phototrophic bacteria. Phototrophic or red water treatment lagoons have a characteristic purple, pink, or rose color. Purple sulfur bacteria utilize hydrogen sulfide and volatile organic acids as an electron source for anoxygenic photosynthesis and utilize volatile organic acids and alcohols as a carbon source for growth. This reduces the concentration of these compounds at the surface of the lagoons and reduces the rate of volatilization of these compounds to the atmosphere.

In addition to mechanical separators, settling basins can also be used to remove solids; however, they must be frequently emptied so the removed solids do not remain in an anaerobic.

4) Reduce or Eliminate the Use of Copper Sulfate as a Footbath Disinfectant

Some researchers recommended reducing or eliminating the use of Copper Sulfate as a means of reducing H₂S emissions from lagoons. This will reduce the amount of inorganic sulfur compounds that are stored under anaerobic conditions, thereby reducing the potential for production of H₂S. Copper Sulfate can also be detrimental to purple sulfur bacteria and other anaerobic microbes that reduce VOC and H₂S²⁵.

Copper Sulfate is one of the main disinfectants used in dairy footbaths to prevent the occurrence and spread digital dermatitis (aka hairy foot warts) on the hooves of dairy cattle. Digital dermatitis is a health concern that can result in lameness in dairy cattle.

²⁴ <http://www.epa.gov/ttnchie1/ap42/ch09/draft/draftanimalfeed.pdf>

²⁵ <http://www.cals.uidaho.edu/edComm/pdf/CIS/CIS1148.pdf>;
<http://courses.cals.uidaho.edu/bae/bae404/Dairy%20Odor%20Mgmt.pdf>; and
http://www.deq.idaho.gov/media/635665-58_0101_0502_scientific_basis_final.pdf

b. Step 2 - Eliminate technologically infeasible options

There are no technologically infeasible options to eliminate from step 1, but the following control options should not be considered further:

1) Lagoon pH Maintained at a Minimum of 7.8

This measure should not be considered because it would result in increased Ammonia emissions. Under pH conditions close to neutral or acidic (pH 7 or lower) Ammonia exists primarily as the soluble Ammonium ion, which is retained in the lagoon²⁶. When the pH increases toward the basic range, the Ammonium ion is increasingly converted into the insoluble Ammonia phase and emitted into the atmosphere. Since under normal circumstances lagoon pH is close to neutral or is slightly acidic, it is reasonable to assume that the balance between H₂S and NH₃ emissions is somewhat optimal. Further, since NH₃ is generally present in significantly larger quantities than H₂S, leaving the pH in a natural range that may slightly favor H₂S emission is more beneficial than influencing it into the basic range that will favor NH₃ emissions.

2) Reduce or Eliminate the Use of Copper Sulfate as a Footbath Disinfectant

Copper Sulfate is one of the main disinfectants used in dairy footbaths to prevent the occurrence and spread digital dermatitis (aka hairy foot warts) on the hooves of dairy cattle. Digital dermatitis is a health concern that can result in lameness in dairy cattle. Further research is needed to better quantify the effect that the use of copper sulfate has on H₂S emissions and to additional research is needed regarding the effectiveness and practicality of the use of alternative disinfectants for the prevention of digital dermatitis. Therefore, this practice will not be required at this time but may be reevaluated later.

c. Step 3 - Rank remaining options by control effectiveness

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

- 1) Feeding per NRC Guidelines
- 2) Solids Separation

d. Step 4 - Cost Effectiveness Analysis

Since the remaining control measures are achieved in practice, a cost effectiveness analysis is not required.

e. Step 5 - Select BACT

The facility is proposing to feed all animals per NRC guidelines and separate solids from the manure stream prior to treatment in the lagoon. Therefore, the BACT requirements

²⁶ <http://pubs.ext.vt.edu/442/442-110/442-110.html>

are satisfied.

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

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

a. Step 1 - Identify all control technologies

Since specific control efficiencies have not been identified in the literature for VOC emissions from land application of liquid manure, the control efficiencies listed are based on the control efficiencies of similar processes and engineering judgment.

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

- 1) Aerobic Treatment Lagoon – mechanical aeration to achieve a dissolved oxygen concentration of 2.0 mg/L (\approx 95%)
- 2) Covered Lagoon Anaerobic Digester with treated waste discharged into a secondary lagoon or storage pond. (\approx 60%) (Note: not required unless required by the final Dairy BACT Guideline)
- 3) Anaerobic Treatment Lagoon designed to meet Natural Resources Conservation Service (NRCS) standards (\approx 40%)
- 4) Injection of Liquid and Slurry Manure (\approx 50%)

Description of Control Technologies:

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

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

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

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

2) Covered Lagoon Anaerobic Digester

Pursuant to Section 5.3 of the Settlement Agreement (9/20/2004) between the District and the Western United Dairyman and the Alliance of Western Milk Producers Inc., installation of an anaerobic digester will only be required if this technology is proven effective in reducing emissions and is required by the final Dairy BACT Guideline¹.

Covered treatment lagoons are one type of anaerobic digester. An anaerobic digester is an enclosed basin or tank that is designed to facilitate the decomposition of wastewater by microbes in the absence of oxygen. The process of anaerobic decomposition results in the preferential conversion of organic compounds in the wastewater into methane (CH₄), carbon dioxide (CO₂), and water rather than intermediate metabolites (VOCs). The gas generated by this process is known as biogas, waste gas or digester gas. In addition to methane and carbon dioxide, biogas also contains small amounts of Nitrogen (N₂), Oxygen (O₂), Hydrogen Sulfide (H₂S), and Ammonia (NH₃). Biogas will also include trace amounts of various Volatile Organic Compounds (VOCs) that remain from incomplete digestion of the volatile solids in the incoming wastewater. The small amounts of undigested solids that remain after digestion are removed from the digester as sludge. A properly designed and operated anaerobic digester will result in Volatile Solids (VS) reductions of at least 60%. Since 60% of the Volatile Solids in the liquid manure will have been digested, there will be less Volatile Solids remaining in the effluent to decompose into VOCs. Since at least 60% of the Volatile Solids in the liquid manure will be digested, a 60% control will be applied to liquid manure land application after an anaerobic digester.

3) Anaerobic Treatment Lagoon

An anaerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of manure by microbes in the absence of oxygen. The process of anaerobic decomposition results in the preferential conversion of organic compounds in the wastewater into methane (CH₄), carbon dioxide (CO₂), and water rather than intermediate metabolites (VOCs). The Natural Resources Conservation Service (NRCS) California Field Office Technical Guide Code 359 - Waste Treatment Lagoon specifies criteria for the design of anaerobic treatment lagoons. A properly designed anaerobic treatment lagoon will reduce the Volatile Solids (VS) by at least 50% and will reduce the biological oxygen demand (BOD), which will result in greater efficiency in degrading compounds that contain carbon into methane and carbon dioxide rather than VOCs. Since 50% of the Volatile Solids in the liquid manure will have been removed or digested in the lagoon, there will be less Volatile Solids remaining in the effluent to decompose into VOCs. Although, the Volatile Solids reduction will be at least 50%, to be conservative a 40% control will be applied to irrigation from a storage pond after an anaerobic treatment lagoon.

4) Injection of Liquid and Slurry Manure

Liquid and slurry manure is used to irrigate crops on land farmed by dairies. Manure can either be injected into the soil or left on the surface of the soil and allowed to soak in. Because the liquid and slurry manure is high in Nitrogen, Phosphorus, and Potassium (N-P-K), it supplies nutrients needed by crops. Dairies have nutrient management programs to regulate the amount of liquid and slurry manure applied to cropland. This program is used to balance the specific nutrients applied to the crops, such as nitrogen, with the amount of nutrients that the crops can utilize. Balancing the needs of the crop with what is supplied helps to minimize contamination of ground water. During the process of liquid and slurry manure application to the crops VOC and NH₃ are emitted. Injecting manure hinders volatilization and speeds the uptake of nutrients that would degrade into gaseous pollutants. It is estimated that injection of manure will reduce VOC emissions from land application of manure by 50%.

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

b. Step 2 - Eliminate technologically infeasible options

Option 4 - Injection of Liquid and Slurry Manure:

The Dairy Permitting Advisory Group (DPAG) found that injection of flushed manure was not a feasible BACT option in their report of BACT options for dairies in the San Joaquin Valley²⁷. Injection is typically restricted to slurry manure that has been vacuumed from the cow housing or that has been removed from settling basins and/or weeping walls. Because the liquid manure handling system at Lerda Farms Dairy primarily uses mechanical separation, there are no significant sources of slurry manure at this dairy.

Injection of flushed liquid manure from the lagoons is not considered feasible because the additional water from flushing increases the amount of liquid that must be transported by the trucks or honeywagons, which will generate more emissions. Because of the added time and expense, injection is not used for flushed liquid manure. This option will therefore be removed from consideration at this time.

c. Step 3 - Rank remaining options by control effectiveness

After eliminating the technologically infeasible options, the remaining options are ranked

²⁷ Page 150 of the Final DPAG Report - "Recommendations to the San Joaquin Valley Air Pollution Control Officer Regarding Best Available Control Technology for Dairies in the San Joaquin Valley" January 31, 2006 (http://www.valleyair.org/busind/pto/dpag/dpaq_idx.htm)

according to their control efficiency.

- 1) Aerobic Treatment Lagoon – mechanical aeration to achieve a dissolved oxygen concentration of 2.0 mg/L (\approx 95%)
- 2) Covered Lagoon Anaerobic Digester with treated waste discharged into a secondary lagoon or storage pond. (\approx 60%) (Note: not required unless required by the Dairy BACT Guideline)
- 3) Anaerobic Treatment Lagoon designed to meet Natural Resources Conservation Service (NRCS) standards (\approx 40%)

d. Step 4 - Cost Effectiveness Analysis

Aerobic Treatment Lagoon:

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

Covered Lagoon Anaerobic Digester:

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

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

Anaerobic Treatment Lagoon:

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

e. Step 5 - Select BACT

The facility is proposing a two-stage Anaerobic Treatment Lagoon designed according

to Natural Resources Conservation Service (NRCS) Guidelines. Additionally, the facility is proposing to install an anaerobic digester if determined to be an effective emissions control in the final Dairy BACT guideline. Therefore, the BACT requirements are satisfied.

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

2. BACT Analysis for NH₃ Emissions from the Liquid Manure Land Application

a. Step 1 - Identify all control technologies

A cost effectiveness threshold has not been established for ammonia. Therefore, only options that meet the District's definition of Achieved-in-Practice controls will be considered for ammonia at this time. Although these options must meet the District definition of Achieved-in-Practice, pursuant to the Settlement Agreement (9/20/2004) between the District and Western United Dairyman and Alliance of Western Milk Producers¹, the District will not deem any control options Achieved-in-Practice until after the Dairy BACT Guideline has been established.

The following practice has been identified as a possible control option for the NH₃ emissions from the liquid manure land application. No other control technologies that meet the definition of Achieved-in-Practice have been identified for liquid manure land application.

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

Description of Control Technologies:

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

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

A diet that is formulated to feed proper amounts of ruminantly degradable protein will

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

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

Additionally, District Rule 2201 defines BACT as including the most stringent emission limitation or control technique, including process and equipment changes, that has been found by the APCO to be cost effective and technologically feasible for such class or category of sources or for a specific source. The District has found that the mitigation measures required by District Rule 4570 are technologically feasible for confined animal facilities and the applicant has proposed these options. Although District Rule 4570 is only intended to reduce VOC emissions, many of these measures also reduce ammonia emissions. Therefore, in addition to the BACT requirements determined in the Top-Down BACT Analysis above, implementation of the mitigation measures that the applicant has selected to comply with Rule 4570 will also be required as part of BACT for NH₃ emissions from liquid manure land application.

VI. Top Down BACT Analysis for the Solid Manure

BACT Analysis for NH₃ Emissions from Solid Manure Handling & Land Application:

a. Step 1 - Identify all control technologies

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

The following practice has been identified as a possible control option for the increase of NH₃ emissions from solid manure handling and land application.

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

Description of Control Technologies

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

Nutritional management of dairy feed is routinely practiced to improve milk production and herd health. The potential for ammonia emissions can be reduced by reducing the protein by the animal and the minimum carryover of nitrogen into the manure, which will reduce ammonia emissions from solid manure.

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The facility is proposing to feed all animals at the dairy in accordance with National

Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.

Additionally, District Rule 2201 defines BACT as including the most stringent emission limitation or control technique, including process and equipment changes; that has been found by the APCO to be cost effective and technologically feasible for such class or category of sources or for a specific source. The District has found that the mitigation measures required by District Rule 4570 are technologically feasible for confined animal facilities and the applicant has proposed these options. Although District Rule 4570 is only intended to reduce VOC emissions, many of these measures also reduce ammonia emissions. Therefore, in addition to the BACT requirements determined in the Top-Down BACT Analysis above, implementation of the mitigation measures that the applicant has selected to comply with Rule 4570 will also be required as part of BACT for NH₃ emissions from solid manure handling and land application.

APPENDIX D

Summary of Health Risk Assessment (HRA) & Ambient Air Quality Analysis (AAQA)

San Joaquin Valley Air Pollution Control District Risk Management Review

To: Jonah Aiyabei – Permit Services
 From: Yu Vu – Technical Services
 Date: December 15, 2011
 Facility Name: Lerda Farms Dairy
 Location: 18797 Avenue 142, Tulare, CA 93274
 Application #(s): S-6537-6-1 through 10-1
 Project #: S-1073290

A. RMR SUMMARY

RMR Summary					
Categories	Milking Barn (Unit 6-1)	Cow Housing (Unit 7-1)	Liquid Manure Handling (Unit 8-1)	Project Totals	Facility Totals
Prioritization Score	0.00	0.56	0.48	1.04	1.04
Acute Hazard Index	0.00	0.14	0.10	0.24	0.24
Chronic Hazard Index	0.00	0.06	0.01	0.07	0.07
Maximum Individual Cancer Risk (10⁻⁶)	0.01	0.94	0.68	1.63	1.84
T-BACT Required?	No	No	No		
Special Permit Conditions?	No	No	Yes		

Proposed Permit Conditions

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

Unit # 8-1

1. The pH value cannot be any lower than 7.5.
2. The quarterly H₂S concentration for the first quarter (January-March) cannot exceed 2.78 mg/l.
3. The quarterly H₂S concentration for the second quarter (April-June) cannot exceed 3.30 mg/l.
4. The quarterly H₂S concentration for the third quarter (July-September) cannot exceed 4.25 mg/l.
5. The quarterly H₂S concentration for the fourth quarter (October-December) cannot exceed 3.42 mg/l.

B. RMR REPORT

I. Project Description

Technical Services received a request on November 30, 2011 to perform an Ambient Air Quality Analysis and a Risk Management Review for a dairy proposing to increase the total number of cows by 2,222 cows (increase of 850 milk cows, 68 dry cows, 460 large heifers, 436 medium heifers, 272 small heifers, and 136 calves).

II. Analysis

Technical Services performed a health risk assessment using the "Dairy All District use only CP" spreadsheet. The cumulative prioritization scores were greater than 1.0, thus modeling was conducted using the AERMOD model, with the parameters outlined below and meteorological data for 2006-2009 from Visalia 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 Hot Spots Analysis and Reporting Program (HARP) risk assessment module to calculate the chronic and acute hazard indices and the carcinogenic risk for the project.

The following parameters were used for the review:

Analysis Parameters Unit 6-1			
Source Type	Area	Location Type	Rural
Size of Area Source (m ²)	1444.8	Closest Receptor (m)	820
Release Height (m)	1	Type of Receptor	Business
Emission Rate (g/sec-m ²)	6.92 E-04	Pollutant Type	VOC

Analysis Parameters Unit 7-1			
Source Type	Area	Location Type	Rural
Size of Area Source (m ²)	150,289.8	Closest Receptor (m)	740
Release Height (m)	1	Type of Receptor	Business
Emission Rate (g/sec-m ²)	6.5 E-06	Pollutant Type	PM10/VOC

Analysis Parameters Unit 8-1			
Source Type	Area	Location Type	Rural
Size of Area Source (m ²)	74,855.8	Closest Receptor (m)	380
Release Height (m)	0	Type of Receptor	Business
Emission Rate (g/sec-m ²)	1.34 E-05	Pollutant Type	VOC

AAQA. In addition to the RMR, Technical Services performed modeling for the criteria pollutant PM₁₀ using AERMOD. The emission rate used was 6,749 lb PM₁₀/year (0.77 lb PM₁₀/hr). The results from the Criteria Pollutant Modeling are as follows:

PM₁₀ Pollutant Modeling Results*
Values are in µg/m³

Category	24 Hours
Proposed Dairy	10.3
Interim Significance Level	10.4 ¹
Result	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.

III. Conclusion

The acute and chronic indices are below 1.0 and the cancer risk associated with the project is greater than 1.0 in a million, but less than 10 in a million. **In accordance with the District's Risk Management Policy, the project is approved with Toxic Best Available Control Technology (T-BACT).**

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

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

IV. Attachments

- A. RMR request from the project engineer
- B. Additional information from the applicant/project engineer
- C. Toxic emissions summary
- D. Prioritization score
- E. Facility Summary

APPENDIX E

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	700	ft
Width	190	ft
Depth	20	ft
Slope	3	ft

Primary Lagoon Volume 1,688,000 ft³

Lagoon Design Check in Accordance with NRCS Guideline #359

Net Volatile Solids loading Calculation

Net Volatile Solids (VS) Loading of Treatment Lagoons									
Breed: Holstein type or cow	Number of Animals	x	VS Excreted[1] (lb/day)	x	% Manure in Flush[2]	x	(1 - % VS Removed in Separation[3])	=	Net VS Loading (lb/day)
Milk Cows	1,500	x	17	x	71%	x	(1 - 50%)	=	9,053
Dry Cow	368	x	9.2	x	48%	x	(1 - 50%)	=	813
Heifer (15 to 24 months)	612	x	7.1	x	48%	x	(1 - 50%)	=	1,043
Heifer (7 to 14 months)	544	x	4.9	x	48%	x	(1 - 50%)	=	640
Heifer (3 to 6 months)	272	x	2.7	x	48%	x	(1 - 50%)	=	176
Calf (under 3 months)	136	x	1.0	x	0%	x	(1 - 50%)	=	0
Bulls	0	x	9.2	x	48%	x	(1 - 50%)	=	0
Total for Dairy									11,724

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

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

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

Lagoon Design Check in Accordance with NRCS Guideline #359

Minimum Treatment Volume Calculation

$$MTV = TVS/VSLR$$

Where:

MTV = Minimum Treatment Volume (ft³)

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

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

Minimum Treatment Volume in Primary Lagoon					
Breed: Holstein	Net VS Loading (lb/day)		VSLR (lb/ft ³ -day)[1]		MTV (ft ³)
Type of Cow					
Milk Cows	9,053	÷	0.011	=	822,955
Dry Cow	813	÷	0.011	=	73,868
Heifer (15 to 24 months)	1,043	÷	0.011	=	94,804
Heifer (7 to 14 months)	640	÷	0.011	=	58,159
Heifer (3 to 6 months)	176	÷	0.011	=	16,023
Calf (under 3 months)	0	÷	0.011	=	0
Bulls	0	÷	0.011	=	0
Total for Dairy					1,065,808

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

Lagoon Design Check in Accordance with NRCS Guideline #359

Sludge Accumulation Volume

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

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

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

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

Where:

SAV = Sludge Accumulation Volume (ft³)

VPL = total Volume of Primary Lagoon (ft³)

MTV = Minimum Treatment Volume (ft³)

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

$\text{SAV} = 1,688,000 - 1,065,808 = 622,192 \text{ (ft}^3\text{)}$
--

Lagoon Design Check in Accordance with NRCS Guideline #359

Hydraulic Retention Time (HRT) Calculation

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

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

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

where:

HFR = Hydraulic flow rate (1000ft³/day)

HRT = Hydraulic Retention Time (day)

The Hydraulic Flow Rate is Calculated below

Type	# of cows		Amount of Manure*		HFR
Milk Cows	1,500	x	2.40	ft ³ =	3,600 ft ³ /day
Dry Cows	368	x	1.30	ft ³ =	478 ft ³ /day
Heifers (15-24 mo)	612	x	0.78	ft ³ =	477 ft ³ /day
Heifers (7-14 mo)	544	x	0.78	ft ³ =	424 ft ³ /day
Heifers (3-6 mo)	272	x	0.30	ft ³ =	82 ft ³ /day
Calves	136	x	0.15	ft ³ =	20 ft ³ /day
Bulls	0	x	1.30	ft ³ =	- ft ³ /day
Total	3,432				5,082 ft³/day
Fresh water per milk cow used in flush at milk parlor			50	gal/day	

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

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

Formula:

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

Total HFR:



50 gal	1500 milk-cows	x	ft3	+	5,082	ft3
milk-cow*day			7.48 gal			day
						= 15,108.8 ft3/day

Formula:

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

HRT:



1,065,808 ft3	day	=		=	70.5421407	days
	15,108.8 ft3					

APPENDIX F

Draft ATCs

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT

PERMIT NO: S-6537-6-1

LEGAL OWNER OR OPERATOR: LERDA FARMS/LUCE TOM

MAILING ADDRESS: 18797 ROAD 142
TULARE, CA 93274

LOCATION: 18797 ROAD 142
TULARE, CA 93274

EQUIPMENT DESCRIPTION:

MODIFICATION OF 680 COW MILKING OPERATION WITH ONE 50-STALL (PARALLEL) MILK PARLOR: INCREASE NUMBER OF MILK COWS TO 1,500, AND REPLACE OLD MILKING PARLOR WITH NEW 70-STALL (DOUBLE 35) PARALLEL MILKING PARLOR

CONDITIONS

1. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
4. Permittee shall flush or hose down the milk parlor immediately prior to, immediately after, or during each milking. [District Rules 2201 and 4570]
5. {4485} Permittee shall provide verification that milk parlors are flushed or hosed prior to, immediately after, or during each milking. [District Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (661) 392-5500 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT. This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Seyed Sadredin, Executive Director, APCO

DRAFT

DAVID WARNER, Director of Permit Services

S-6537-6-1: Feb 17 2012 9:07AM - AIYABEU : Joint Inspection NOT Required

6. {4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]
7. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [District Rules 2070 and 2080, and Public Resources Code 21000-21177: California Environmental Quality Act]

DRAFT

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT
ISSUANCE DATE: DRAFT

PERMIT NO: S-6537-7-1

LEGAL OWNER OR OPERATOR: LERDA FARMS/LUCE TOM

MAILING ADDRESS: 18797 ROAD 142
TULARE, CA 93274

LOCATION: 18797 ROAD 142
TULARE, CA 93274

EQUIPMENT DESCRIPTION:

MODIFICATION OF COW HOUSING - 680 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 980 MATURE COWS (MILK AND DRY); 260 TOTAL SUPPORT STOCK (HEIFERS, CALVES AND BULLS) AND 1 FREESTALL BARN AND OPEN CORRALS WITH A FLUSH SYSTEM; INCREASE NUMBER OF COWS TO 1,500 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 1,868 MATURE COWS (MILK AND DRY); AND 1,564 TOTAL SUPPORT STOCK (HEIFERS, CALVES AND BULLS); CONSTRUCT THREE NEW FREESTALL BARN, ONE NEW LOAFING BARN, 14 NEW CORRALS WITH SHADE STRUCTURES AND FLUSH SYSTEM; AND CALF HUTCHES WITH A FLUSH SYSTEM

CONDITIONS

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

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (661) 392-5500 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT. This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Seyed Sadredin, Executive Director, APCO

DRAFT

DAVID WARNER, Director of Permit Services

S-6537-7-1 : May 29 2012 2:32PM - AJYABEU : Joint Inspection NOT Required

4. The total number of cows housed at this dairy at any one time shall not exceed any of the following limits: 1,500 milk cows; not to exceed a combined total of 1,868 mature cows (milk and dry); and 1,564 support stock (heifers, calves and bulls). [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 Rules 2201 and 4570]
6. The concrete feed lanes and walkways for milk cows shall be flushed at least four times per day. [District Rule 2201 and 4570]
7. The concrete feed lanes and walkways for all other cows shall be flushed at least two times per day. [District Rule 2201 and 4570]
8. Permittee shall maintain records sufficient to demonstrate that feed lanes and walkways are flushed at least four times per day for milk cows and at least two times per day for all other cows. [District Rules 2201 and 4570]
9. 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]
10. At least one of the feedings of the heifers at this dairy shall be near (within one hour of) dusk. [District Rule 2201]
11. Inspection for potholes or other sources of emissions shall be performed on a monthly basis. [District Rule 2201]
12. Firm, stable, and not easily eroded soils shall be used for the exercise pens. [District Rule 2201]
13. A supply of fill soil shall be kept on site in order to fill areas where erosion and gouging occurs. This will help fill areas where puddles may form. This fill soil shall be covered with a tarp. [District Rule 2201]
14. Clean rainfall runoff shall be diverted around exercise pens to reduce the amount of water that is potentially detained on the corral surface. [District Rule 2201]
15. {4492} Permittee shall remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every seven (7) days. [District Rule 4570]
16. {4493} Permittee shall record the date that manure that is not dry is removed from individual cow freestall beds or raked, harrowed, scraped, or freestall bedding is graded at least once every seven (7) days. [District Rule 4570]
17. {4499} Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rule 4570]
18. {4500} Permittee shall maintain records demonstrating that water pipes and troughs are inspected and leaks are repaired at least once every seven (7) days. [District Rule 4570]
19. {4501} Permittee shall clean manure from corrals at least four (4) times per year with at least sixty (60) days between each cleaning, or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rule 4570]
20. {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 Rule 4570]
21. Open corrals shall be scraped weekly using a pull-type scraper in the morning hours, except when this is prevented by wet conditions. [District Rule 2201]
22. Open corrals shall be equipped with shade structures. The shade structures shall be installed in a North/South orientation. [District Rules 2201 and 4570]
23. 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]

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CONDITIONS CONTINUE ON NEXT PAGE

24. {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 Rule 4570]
25. {4509} Permittee shall clean concreted lanes such that the depth of manure does not exceed twelve (12) inches at any point or time. [District Rule 4570]
26. {4510} Permittee shall measure and document the depth of manure on the concrete lanes at least once every ninety (90) days. [District Rule 4570]
27. {4520} Permittee shall knockdown fence line manure build-up prior to it exceeding a height of twelve (12) inches at any time or point. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rule 4570]
28. {4521} Permittee shall measure and document the depth of manure at the fence line at least once every ninety (90) days. [District Rule 4570]
29. Calf housing, if present, shall consist of aboveground hutches over paved flush lanes. [District Rule 2201]
30. Permittee shall establish windbreaks along the entire length of the Eastern and Southern boundaries of the dairy site. The first row (closest to the dairy) shall consist of Arizona Cypress trees spaced ten feet apart. The second row shall consist of Walnut trees spaced twenty feet apart. Each row shall be offset from the adjacent row. Spacing between rows shall be sufficient to accommodate cultivation equipment. This spacing shall not exceed 24 feet. Any alternative windbreak proposal must be approved by the District. [District Rule 2201]
31. Trees/shrubs that are initially planted as part of the windbreak shall have a minimum container size of five gallons. [District Rule 2201]
32. 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]
33. Density shall be determined as 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]
34. Permittee shall maintain records of: (1) the number of times concrete feed lanes and walkways are flushed per day, (2) the frequency of scraping and manure removal from open corrals; and (3) a log of pothole inspections performed at the dairy. [District Rules 2201 and 4570]
35. {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]
36. {4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]
37. {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]

DRAFT

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT

PERMIT NO: S-6537-8-1

LEGAL OWNER OR OPERATOR: LERDA FARMS/LUCE TOM

MAILING ADDRESS: 18797 ROAD 142
TULARE, CA 93274

LOCATION: 18797 ROAD 142
TULARE, CA 93274

EQUIPMENT DESCRIPTION:

MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF TWO STORAGE PONDS. MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION AND FURROW IRRIGATION; ALLOW INCREASE IN THROUGHPUT DUE TO INCREASE IN NUMBER OF COWS; INSTALL A MECHANICAL SEPARATOR AND AN ANAEROBIC TREATMENT LAGOON (700'X190'X20')

CONDITIONS

1. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
4. The liquid manure handling system shall handle flush manure from no more than 1,500 milk cows; not to exceed a combined total of 1,868 mature cows (milk and dry); and 1,564 support stock (heifers, calves and bulls). [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (661) 392-5500 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT. This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Seyed Sadredin, Executive Director, APCO

DRAFT

DAVID WARNER, Director of Permit Services

S-6537-8-1; Feb 14 2012 5:06PM -- AIYABEUJ : Joint Inspection NOT Required

5. The liquid manure handling system shall include an anaerobic treatment lagoon designed, constructed and operated according to NCRCS Guideline No. 359. [District Rules 2201 and 4570]
6. Permittee shall maintain design specifications, calculations, including Minimum Treatment Volume (MTV), Hydraulic Retention Time (HRT) demonstrating that the anaerobic treatment lagoon meets the requirements listed in the NRCS Field Office Technical Guide Code 359. [Districts 2201 and Rule 4570]
7. The average concentration of undissociated hydrogen sulfide (H₂S) at the surface of the lagoon(s) and storage pond(s) shall not exceed 2.78 mg/L during the 1st calendar quarter (Jan - March); 3.30 mg/L during the 2nd calendar quarter (Apr - June); 4.25 mg/L during the 3rd calendar quarter (Jul - Sept); and 3.42 mg/L during the 4th calendar quarter (Oct - Dec). The concentration of undissociated H₂S at the surface of each lagoon and storage pond shall be calculated using the monitored values for the total sulfide concentration, pH, and temperature. The fraction of total sulfide that is undissociated H₂S shall be calculated using the formula $(10^{-\text{pH}})/(10^{-\text{pH}} + K_{a1})$, where K_{a1} is the temperature-adjusted dissociation constant for H₂S; or the procedures outlined in Standard Methods 4500-S₂-H; or using other procedures approved by the District. [District Rules 2201 and 4102]
8. The total sulfide concentration, pH, and temperature at the surface of each lagoon and storage pond shall be monitored and recorded at least once every calendar quarter and at other times requested by the District. If the average calculated undissociated H₂S concentration from monitoring the lagoon(s) and pond(s) exceeds the maximum allowed concentration, the permittee shall monitor and record the total sulfide concentration, pH, and temperature at the surface of at least two other locations in each lagoon and pond as soon as possible, but no longer than 24 hours after results were available from the initial monitoring indicating a potential exceedance. The undissociated H₂S concentration calculated from the initial monitoring locations and the secondary monitoring locations for the lagoons and ponds shall be averaged. If the calculated average concentration of undissociated H₂S continues to exceed the maximum allowed limit, then the total sulfide concentration, pH, and temperature at the surface of each lagoon and storage pond shall be monitored and recorded monthly until three consecutive months of monitoring show compliance, after which the monitoring frequency may return to quarterly. For each secondary storage pond that has a liquid depth of no greater than 5 feet during the monitoring period, the concentration of undissociated H₂S may be considered negligible and monitoring shall not be required. Records of the results of monitoring of the sulfide concentration, pH, and temperature at the surface of each lagoon and storage pond and the maximum depth of storage ponds during periods that they are not monitored shall be maintained. The District may also approve alternative monitoring frequencies and/or parameters. [District Rules 2201 and 4102]
9. Monitoring of the total sulfide concentration of lagoons and ponds shall be performed using a sulfide test kit, a sulfide meter, procedures of an accredited lab, Standard Methods 4500-S₂; ASTM D4658; USGS Method I-3840; EPA Method 376.2; Marine Pollution Studies Laboratory (MPSL) Standard Operating Procedure for measurement of sulfide; or an alternative method approved by the District. [District Rules 2201 and 4102]
10. Permittee shall remove solids with a solids separation system, prior to the manure entering the lagoon. [District Rules 2201 and 4570]
11. {4550} Permittee shall not allow liquid manure to stand in the fields for more than twenty-four (24) hours after irrigation. [District Rule 4570]
12. {4551} Permittee shall maintain records to demonstrate liquid manure did not stand in the fields for more than twenty-four (24) hours after irrigation. [District Rule 4570]
13. {4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]
14. {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. [District Rules 2070 and 2080, and Public Resources Code 21000-21177: California Environmental Quality Act]

DRAFT

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT

PERMIT NO: S-6537-9-1

LEGAL OWNER OR OPERATOR: LERDA FARMS/LUCE TOM

MAILING ADDRESS: 18797 ROAD 142
TULARE, CA 93274

LOCATION: 18797 ROAD 142
TULARE, CA 93274

EQUIPMENT DESCRIPTION:

MODIFICATION OF SOLID MANURE HANDLING CONSISTING OF OPEN MANURE STOCKPILES, WITH SOLID MANURE APPLICATION TO LAND, AND/OR OFFSITE HAULING: ALLOW INCREASE IN THROUGHPUT DUE TO INCREASE IN NUMBER OF COWS

CONDITIONS

1. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
4. {4526} Within seventy two (72) hours of removal of solid manure from housing, permittee shall either 1) remove dry manure from the facility, or 2) cover dry manure outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed twenty-four (24) hours per event. [District Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (661) 392-5500 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

DAVID WARNER, Director of Permit Services

S-6537-9-1; Feb 14 2012 5:06PM - AIYABEIJ : Joint Inspection NOT Required

5. {4527} Permittee shall keep records of dates when manure is removed from the facility or permittee shall maintain records to demonstrate that dry manure piles outside the pens are covered with a weatherproof covering from October through May. [District Rule 4570]
6. {4528} 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]
7. {4541} Permittee shall incorporate all solid manure within seventy-two (72) hours of land application. [District Rule 4570]
8. {4542} Permittee shall maintain records to demonstrate that all solid manure has been incorporated within seventy-two (72) hours of land application. [District Rule 4570]
9. {4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]
10. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [District Rules 2070 and 2080, and Public Resources Code 21000-21177: California Environmental Quality Act]

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San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT
DRAFT

PERMIT NO: S-6537-10-1

LEGAL OWNER OR OPERATOR: LERDA FARMS/LUCE TOM

MAILING ADDRESS: 18797 ROAD 142
TULARE, CA 93274

LOCATION: 18797 ROAD 142
TULARE, CA 93274

EQUIPMENT DESCRIPTION:

FEED HANDLING AND STORAGE CONSISTING OF COMMODITY BARNs AND SILAGE PILES

CONDITIONS

1. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
4. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
5. {4455} Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

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6. {4456} Permittee shall push feed so that it is within three feet of feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals. [District Rule 4570]
7. {4457} Permittee shall maintain an operating plan/record that requires feed to be pushed within three feet of feedlane fence within two hours of putting out the feed, or use of a feed trough or other structure designed to maintain feed within reach of the animals. [District Rule 4570]
8. {4458} Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rule 4570]
9. {4459} Permittee shall maintain an operating plan/record of when feeding of total mixed rations began within two hours of grinding and mixing rations. [District Rule 4570]
10. {4460} Permittee shall store grain in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rule 4570]
11. {4461} Permittee shall maintain records demonstrating grain is/was stored in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rule 4570]
12. {4462} Permittee shall feed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. [District Rule 4570]
13. {4463} Permittee shall maintain records to demonstrate animals are fed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rule 4570]
14. {4468} For bagged silage/feedstuff, permittee shall utilize a sealed feed storage system (e.g., ag bag). [District Rule 4570]
15. {4469} Permittee shall cover all silage piles, except for the area where feed is being removed from the pile, with a plastic tarp that is at least five (5) mils (0.005 inches) thick, multiple plastic tarps with a cumulative thickness of at least 5 mils (0.005 inches), or an oxygen barrier film covered with a UV resistant material. Silage piles shall be covered within seventy-two (72) hours of last delivery of material to the pile. Sheets of material used to cover silage shall overlap so that silage is not exposed where the sheets meet. [District Rule 4570]
16. {4470} Permittee shall maintain records of the thickness and type of cover used to cover each silage pile. Permittee shall also maintain records of the date of the last delivery of material to each silage pile and the date each pile is covered. [District Rule 4570]
17. {4471} Permittee shall select and implement one of the following mitigation measures for building each silage pile at the facility: Option 1) build the silage pile such that the average bulk density is at least 44 lb/cu ft for corn silage and 40 lb/cu ft for other silage types, as measured in accordance with Section 7.11 of District Rule 4570; Option 2) Adjust filling parameters when creating the silage pile to achieve an average bulk density of at least 44 lb/cu ft for corn silage and at least 40 lb/cu ft for other silage types as determined using a District-approved spreadsheet; or Option 3) build silage piles using crops harvested with the applicable minimum moisture content, maximum Theoretical Length of Chop (TLC), and roller opening identified in District Rule 4570, Table 4.1, 1.d and manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. Records of the option chosen as a mitigation measure for building each silage pile shall be maintained. [District Rule 4570]
18. {4472} For each silage pile that Option 1 (Measured Bulk Density) is chosen as a mitigation measure for building the pile, records of the measured bulk density shall be maintained. [District Rule 4570]
19. {4473} For each silage pile that Option 2 (Bulk Density Determined by Spreadsheet) is chosen as a mitigation measure for building the pile, records of the filling parameters entered into the District-approved spreadsheet to determine the bulk density shall be maintained. [District Rule 4570]
20. {4474} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall harvest corn used for the pile at an average moisture content of at least 65% and harvest other silage crops for the pile at an average moisture content of at least 60%. [District Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

21. {4475} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records of the average percent moisture of crops harvested for silage shall be maintained. [District Rule 4570]
22. {4476} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall adjust setting of equipment used to harvest crops for the pile to incorporate the following parameters for Theoretical Length of Chop (TLC) and roller opening, as applicable: 1) Corn with no processing: TLC not exceeding 1/2 inch, 2) Processed Corn: TLC not exceeding 3/4 inch and roller opening of 1-4 mm, 3) Alfalfa/Grass: TLC not exceeding 1.0 inch, 4) Other silage crops: TLC not exceeding 1/2 inch. [District Rule 4570]
23. {4477} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records that equipment used to harvest crops for the pile was set to the required TLC and roller opening for the type of crop harvested shall be maintained. [District Rule 4570]
24. {4478} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rule 4570]
25. {4479} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall maintain a plan that requires that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rule 4570]
26. {4480} Permittee shall select and implement at least two of the following mitigation measures for management of silage piles at the facility: Option 1) manage silage piles such that only one silage pile has an uncovered face and the total exposed surface area is less than 2,150 square feet, or manage multiple uncovered silage piles such that the total exposed surface area of all uncovered silage piles is less than 4,300 square feet; Option 2) use a shaver/facer to remove silage from the silage pile, or shall use another method to maintain a smooth vertical surface on the working face of the silage pile; or Option 3) inoculate silage with homolactic lactic acid bacteria in accordance with manufacturer recommendations to achieve a concentration of at least 100,000 colony forming units per gram of wet forage, apply propionic acid, benzoic acid, sorbic acid, sodium benzoate, or potassium sorbate at the rate specified by the manufacturer to reduce yeast counts when forming silage piles, or apply other additives at rates that have been demonstrated to reduce alcohol concentrations in silage and/or VOC emissions from silage and have been approved by the District and EPA. Records of the options chosen for managing each silage pile shall be maintained. [District Rule 4570]
27. {4481} If Option 1 (Limiting Exposed Area of Silage) is chosen as a mitigation measure for managing silage piles, the permittee shall calculate and record the maximum (largest part of pile) total exposed area of each silage pile. Records of the maximum calculated area shall be maintained. [District Rule 4570]
28. {4482} For each silage pile that Option 2 (Shaver/Facer or Smooth Face) is chosen as a mitigation measure for building the pile, the permittee shall maintain records that a shaver/facer was used to remove silage from the pile or shall visually inspect the pile at least daily to verify that the working face was smooth and maintain records of the visual inspections. [District Rule 4570]
29. {4483} For each silage pile that Option 3 (Silage Additives) is chosen as a mitigation measure for building the pile, records shall be maintained of the type additive (e.g. inoculants, preservative, other District & EPA-approved additive), the quantity of the additive applied to the pile, and a copy of the manufacturers instructions for application of the additive. [District Rule 4570]
30. {4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]
31. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [District Rules 2070 and 2080, and Public Resources Code 21000-21177: California Environmental Quality Act]

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