San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

NOV 1 4 2012

Frank Mendonsa
FM Jerseys Dairy
16777 South I Drive
Tulare, CA 93274

Re: Notice of Preliminary Decision - Authority to Construct
Project Number: S-1090443

Dear Mr. Mendonsa:

Enclosed for your review and comment is the District's analysis of FM Jerseys Dairy's application for an Authority to Construct for a new 3,200 milk cow (3,872 total head) dairy, at Road 124 between Avenue 160 and Avenue 164, Tipton.

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. Juscelino Siongco of Permit Services at (559) 230-5891.

Sincerely,

David Warner
Director of Permit Services

DW:jms

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
Fresno, CA 93726-0244
Tel: (559) 230-6000 FAX: (559) 230-6061
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Southern Region
34946 Flyover Court
Bakersfield, CA 93308-9725
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San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

NOV 1 4 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
Project Number: S-1090443

Dear Mr. Tollstrup:

Enclosed for your review and comment is the District's analysis of FM Jerseys Dairy's application for an Authority to Construct for a new 3,200 milk cow (3,872 total head) dairy, at Road 124 between Avenue 160 and Avenue 164, Tipton.

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 cornment 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. Juscelino Siongco of Permit Services at (559) 230-5891.

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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 FM Jerseys Dairy for a new 3,200 milk cow (3,872 total head) dairy, at Road 124 between Avenue 160 and Avenue 164, Tipton.

The analysis of the regulatory basis for this proposed action, Project #S-1090443, 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
New Dairy

Facility Name:	FM Jerseys Dairy	Date:	November 7, 2012
Mailing Address:	16777 South I Drive Tulare, CA 93274	Engineer:	Juscelino Siongco
		Lead Engineer:	Martin Keast
Contact Person:	Bruce Livingston		
Telephone:	(559) 687-1440		
Application #s:	S-7533-1-0, -2-0, -3-0, -4-0, and -5-0		
Project #:	S-1090443		
Deemed Complete:	June 13, 2012		

I. Proposal

FM Jerseys Dairy requests Authorities to Construct (ATC) permits to construct a new 3,200 milk cow (3,872 total head) dairy. The proposed dairy will house 3,200 milk cows not to exceed a combined total of 3,840 mature cows (milk and dry cows) and 32 total support stock (bulls only).

For the project, the dairy proposes to construct the following: four freestall barns to house all the milk cows; open corrals with shade structures to house the dry cows; a milk barn with an 80-stall rotary milking parlor; a special needs/maternity barn; and a liquid manure handling system consisting of two settling basins, a mechanical separator, a processing pit, and one two-stage anaerobic treatment lagoon system (consisting of an anaerobic treatment lagoon followed by a storage pond). Feed and silage will be stored in covered silage piles, commodity barns, and AgBag.

In addition, the dairy will be installing a 1,220 bhp diesel-fired emergency standby internal combustion (IC) engine powering an electrical generator to provide electrical power during an unscheduled outage caused by sudden and reasonably unforeseen natural disasters or sudden and reasonably unforeseen events beyond the control of the operator.

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.

II. Applicable Rules

Rule 2010 Permits Required (12/17/92)
Rule 2201 New and Modified Stationary Source Review Rule (4/21/11)
Rule 2520 Federally Mandated Operating Permits (6/21/01)
Rule 2550 Federally Mandated Preconstruction Review for Major Sources of Air Toxics (6/18/98)
Rule 4001 New Source Performance Standards (4/14/99)
Rule 4002 National Emission Standards for Hazardous Air Pollutants (5/20/04)
Rule 4101 Visible Emissions (2/17/05)
Rule 4102 Nuisance (12/17/92)
Rule 4201 Particulate Matter Concentration (12/17/92)
Rule 4550 Conservation Management Practices (CMP) (8/19/04)
Rule 4570 Confined Animal Facilities (CAF) (10/21/10)
Rule 4701 Stationary Internal Combustion Engines – Phase 1 (8/21/03)
Rule 4702 Stationary Internal Combustion Engines (8/18/11)
Rule 4801 Sulfur Compounds (12/17/92)
CH&SC 41700 Health Risk Assessment
CH&SC 42301.6 School Notice
Title 17 CCR, Section 93115 - Airborne Toxic Control Measure (ATCM) for Stationary Compression-Ignition (CI) Engines
Senate Bill 700 (SB 700)
Public Resources Code 21000-21177: California Environmental Quality Act (CEQA)
California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000-15387: CEQA Guidelines

III. Project Location

The facility is located at Road 124 between Ave 160 and Ave 164, in Tulare County. The equipment is not located within 1,000 feet of the outer boundary of a K-12 school. Therefore, the public notification requirement of California Health and Safety Code 42301.6 is not applicable to this project.

IV. Process Description

The primary function of FM Jerseys 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 on a a typical dairy there will be different ages and types of cows, including calves, heifers, lactating cows, dry cows, and mature bulls. At this dairy, heifers and calves are sent offsite to be raised until breeding age after which the animals are returned to the dairy.

The Holstein milk cows at a dairy usually generate anywhere from 130 to 150 pounds of manure per day. This dairy is stocked with Jersey cows, which are smaller than Holstein cows (approximately 1,000 lb. for a mature Jersey cow vs. 1,400 lb. for a mature Holstein cow) and therefore produce less manure. Manure accumulates in confinement areas such as barns, open corrals (dry lots), and the milking center. Manure is primarily deposited in areas where

the herd is fed and given water. How the manure is collected, stored and treated depends directly on the manure management techniques used at a particular dairy.

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

Cow Housing

The milk cows will be housed in freestall barns with either flush lanes or the manure vacuumed from the lanes. In a freestall barn, the cows are grouped in large pens with free access to feed bunks, water, and stalls for resting. A standard freestall barn design has a feed alley in the center of the barn separating two feed bunks on each side. The dry cows will be oused in open corrals with flushed lanes. An open corral is a large open area where cows are confined with unlimited access to feed and water. The open corrals at this dairy include structures that provide shade for the animals.

Special Needs/Maternity Housing

The special needs area serves the gestating cows at the dairy or any cows that are in need of medical condition. This area acts as a veterinary space. It is also the area in which cows are given special attention as they progress from dry cow, a mature cow that is gestating and not lactating, to maternity, to milking status or until their health improves. After completion of this project, the dairy will include a covered special needs barn with stalls for fresh and special needs cows and pens for maternity cows and sick cows

Milking Parlor

The milking parlor is a separate building, apart from the lactating cow confinement. The milking parlor is designed to facilitate changing the groups of cows milked and to allow workers access to the cows during milking. A holding area confines the cows that are ready for milking. The holding area is covered with open sides and is part of the milking parlor, which in turn, is located in the immediate vicinity of the cow housing. The cows will be milked in an eighty-stall rotary milk parlor. The lactating cows will be milked two to three times per day in the milking parlor. The milking parlor will have concrete floors sloped to a drain. Manure that is deposited in the milking parlor will be sprayed or flushed into the drain using fresh water after each milking. The effluent from the milking parlor will be carried through pipes to the lagoon system.

Liquid Manure handling System

The liquid manure handling system for the dairy will include the following components:

- One processing pits
- One mechanical separators
- Two settling basins
- Two anaerobic treatment lagoons (549x120x20 each) with a side slope of 1.5.
- One storage pond

Processing Pits (Flush Water Recycling Sumps)

A processing pit is a small basin or sump that temporarily stores the flush water from the milking parlor and the freestall flush system. The processing pit allows this water to be reused to flush the concrete feedlanes in the freestall barns. After each flush, the flush water, including the waste from the feedlanes, is returned to the processing pit to be recycled in the next flush. As the volume of flush water in the processing pit increases, pumps and agitators are turned on. The agitators mix the contents in the processing pit so that the solids in the processing pit do not settle. The stored flush water is then pumped to a mechanical separator to remove the fibrous solids prior to the lagoon. This is done daily or several times a day to prevent excessive solids buildup and to ensure that the water used for flushing the freestalls is relatively clean. Reusing flush water from the processing pit decreases the amount of piping and energy required by recycling the flush water and pumping water from a central location.

Mechanical Separator

As stated above, the liquid manure from the processing pits will be pumped to a mechanical screen separator for solids separation prior to entering the lagoon system. Solids separation removes material from the waste stream that would prematurely fill a lagoon or storage pond. A mechanical separator may achieve a solids removal rate of 20-50%. The efficiency of treatment would suffer without separation, which would result in more odors and potentially more VOC emissions from the liquid manure handling system. Most of the separated solids are fibrous material that leads to excessive sludge buildup or the formation of crusts on the surface of the storage ponds, both of which interfere with pumping operations. Separation reduces the land area required when designing a liquid manure treatment system since the volume to be treated is less.

Conveyors will pile the solids onto concrete stacking pads. The pads will be sloped to promote drainage to drains located around the perimeter of the stacking pads. The solids will be removed on a weekly basis. The separated solids from the mechanical separator will either be immediately incorporated into cropland or dried and stored for use as fertilizer or as bedding in the freestalls.

Settling Basins

The dairy will construct two settling basins for additional solid separation from the liquid manure prior to the anaerobic lagoons/storage pond. The Settling basins are structures designed to separate solids from liquid manure by sedimentation. The inflow of manure is restricted to allow some of the solids to settle out. The liquids from the settling basins will gradually drain to the treatment lagoons. Solids remaining in both the settling basins are left to dry and then are removed. The separated solids will either be immediately incorporated into cropland or stored for use as fertilizer or bedding in the freestalls.

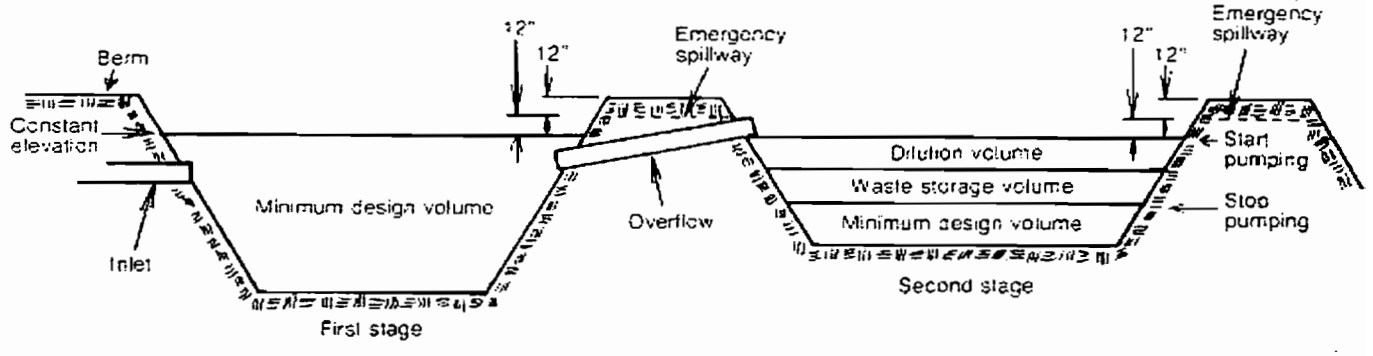
Anaerobic Treatment Lagoons

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

National Resource Conservation Service (NRCS) California Field Office Technical Guide Code 359 - Waste Treatment Lagoon specifies the following criteria for anaerobic treatment lagoons:

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

The dairy will construct an anaerobic treatment lagoon system designed in accordance with the specifications set forth in NRCS practice standard 359. The anaerobic treatment lagoon system consists of two 549 ft x 120 ft x 20 ft anaerobic treatment lagoon followed by a storage pond. The two anaerobic treatment lagoons 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 treatment lagoons will overflow into the storage pond/secondary lagoon, which is designed for liquid storage. The liquid level of the storage ponds/secondary lagoons fluctuates and they can be emptied when necessary. Effluent from the storage pond is used for the irrigation of cropland. All of the manure at the dairy will be pumped to the anaerobic treatment lagoons.



Storage Pond/Secondary Lagoon

The dairy will construct a 1,148 ft x 205 ft x 20 ft storage pond designed for temporary collection and storage of organic waste. Storage ponds are 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/secondary lagoon at this dairy will be part of a two-stage anaerobic treatment lagoon system. Storage ponds are designed to have sufficient volume to hold all of the following: all manure and wastewater accumulated at the dairy for a period of 120 days; normal

precipitation and any drainage to the lagoon system minus evaporation from the surface of lagoons; and precipitation during a 25 year, 24 hour storm event. The liquid manure from the storage pond will be used to irrigate crops.

Manure Stock Piles (Storage)

The only solid manure that will be stockpiled at this dairy is the separated solids from the mechanical separators. The separated solids will be immediately incorporated into cropland or will be dried and stored for use as fertilizer or as bedding in the freestalls.

Diesel-Fired Emergency Standby IC Engine

The emergency standby engine powers an electrical generator. Other than emergency standby operation, the engine may be operated up to 50 hours per year for maintenance and testing purposes.

V. Equipment Listing

S-7533-1-0: 3200 COW MILKING OPERATION WITH ONE 80-STALL ROTARY MILK PARLOR

S-7533-2-0: COW HOUSING - 3200 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 3840 MATURE COWS (MILK AND DRY); 32 TOTAL SUPPORT STOCK (BULLS ONLY); AND FOUR FREESTALLS WITH FLUSH/VACUUM SYSTEM

S-7533-3-0: LIQUID MANURE HANDLING SYSTEM CONSISTING OF ONE PROCESSING PIT, ONE MECHANICAL SEPARATOR, TWO SETTLING BASINS, TWO ANAEROBIC TREATMENT LAGOONS (549X120X20 EACH), AND ONE STORAGE POND; MANURE IS APPLIED THROUGH FLOOD/FURROW IRRIGATION

S-7533-4-0: SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES WITH SOLID MANURE APPLICATION TO LAND AND HAULED OFFSITE

S-7533-5-0: FEED STORAGE AND HANDLING CONSISTING OF COMMODITY BARNS AND SILAGE PILES

S-7533-6-0: 1,220 BHP (INTERMITTENT) CUMMINS MODEL QSK23-G7 TIER 2 CERTIFIED DIESEL-FIRED EMERGENCY STANDBY IC ENGINE POWERING AN ELECTRICAL GENERATOR

VI. Emission Control Technology Evaluation

PM_{10}, VOC, and NH_3 are the major pollutants of concern from dairy operations. H_2S is also emitted from anaerobic processes on dairies. Gaseous pollutant emissions at a dairy result from the ruminant digestive processes (enteric emissions), from the decomposition and fermentation of feed, and also from the decomposition of organic material in dairy 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. Hydrogen sulfide and other reduced sulfur compounds are produced when sulfur-containing compounds in manure decompose anaerobically. 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 will be used to control emissions at this dairy. Examples of some of these practices are discussed below:

Milking Parlor (S-7533-1-0)

This dairy uses a flush/spray system to wash out the manure from the milking parlors after each group of cows is milked. Since the milking parlors are constantly flushed, there will be no particulate matter emissions from the milking parlors. Manure, which is a source of VOC emissions, is removed from the milking parlors many times a day by flushing after each milking. Because of ammonia's high affinity for and solubility in water, volatilization of ammonia from the milking parlors will also be reduced by flushing after each milking. Flushing the milking parlors after each milking will also reduce anaerobic decomposition of manure on the milking parlor floor thereby eliminating any potential H_2S emissions.

Cow Housing and Feed (S-7533-2-0)

All of the cows at FM Jerseys Dairy are housed in freestall barns with concrete lanes. Practices that will be utilized to reduce emissions at the dairy include: freestall barns; frequent flushing of lanes; and feeding animals in accordance with NRC guidelines. These practices are described below.

Freestall Barns

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

Frequent Flushing/Vacuuming

Manure, which is a source of emissions, will be removed from the freestall lanes by either flushing or vacuuming. Because of ammonia's high affinity for and solubility in water, flushing/vacuuming the lanes and walkways will also reduce volatilization of ammonia from the manure deposited in the freestall lanes. The lanes and walkways for the mature cows (lactating and dry cows) will be flushed or vacuumed four times per day.

Feeding Animals in Accordance with the NRC Guidelines

All animals housed at the dairy 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 NH_3, VOCs, and H_2S upon decomposition. Uneaten feed will be

removed from the feed lanes on a daily basis to minimize gaseous emissions from decomposition.

Shade Structures and Scraping

All the dry cows will be housed in open corrals with shade structures. Providing shade for the animals reduces movement and unnecessary activity during hot weather, which reduces PM_{10} emissions. The surfaces of the 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 PM_{10}. This practice will also reduce the chance of anaerobic conditions developing in the manure pack of the corral surface, potentially reducing VOC emissions.

Windbreaks

FM Jerseys dairy proposes to install upwind and downwind shelterbelts around the perimeter of the dairy. The windbreak diagrams are attached as Appendix D.

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	Spacing[1]	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 tress or shrubs.
- Each row should plant trees that are offset of one another.

A two row upwind windbreak/shelterbelt will be established along the north and west perimeter of the dairy. The applicant will plant one row of shrubs (Photinia) and one row of evergreen trees (Pinus Eldarica). The applicant will maintain an irrigation system for greater survivability and rapid growth of the trees and shrubs. The following conditions will be placed on the permit:

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

Permittee shall establish upwind windbreaks along the north perimeter (1,795 ft) and west perimeter (1,828 ft) of the dairy. Windbreaks shall consist of the following rows with the first row closest to the dairy: first row shall consist of the Pinus Eldarica trees, planted 15 feet apart and the second row shall consist of Photinia shrubs, planted 7 feet apart. Each row should be offset from the adjacent row. Spacing between rows shall be sufficient to accommodate cultivation equipment. This spacing shall not exceed 24 feet. An alternative windbreak proposal must be approved by the District. [District Rule 2201]

A three row downwind windbreak/shelterbelt will be established along the east and south perimeter of the dairy. The applicant will plant one row of shrubs (Photinia), one row of evergreen trees (Pinus Eldarica), and one row of decidious trees (Raywood Ash). The applicant will maintain an irrigation system for greater survivability and rapid growth of the trees and shrubs. The following conditions will be placed on the permit:

Permittee shall establish downwind windbreaks along the east perimeter (1,828 ft) and south perimeter (1,176 ft) with both windbreaks originating from the southeast corner of the dairy. Windbreaks shall consist of the following rows with the first row closest to the dairy: first row shall consist of the Raywood Ash trees, planted 25 feet apart, the second row shall consist of Pinus Eldarica trees, planted 15 feet apart, and the third row shall consist of Photinia shrubs, planted 7 feet apart. Each row should be offset from the adjacent row. Spacing between rows shall be sufficient to accommodate cultivation equipment. This spacing shall not exceed 24 feet. An alternative windbreak proposal must be approved by the District. [District Rule 2201] N

Additional Requirements

Trees/shrubs that are initially planted as part of the windbreak shall have a minimum container size of five gallons. [District Rule 2201]

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

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

Liquid Manure Handling System (S-7533-3-0)

All emissions from the liquid manure handling system are the result of manure decomposition.

Anaerobic Treatment Lagoon

The liquid manure handling system at FM Jerseys Dairy consists of a two-stage anaerobic treatment lagoon 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 system meets the appropriate design requirements (see design check in Appendix A).

Solids Separation

The lagoon system at FM Jerseys Dairy will include one mechanical separators and two settling basins for solids separation. 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.

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 Handling (S-7533-4-0) - Rapid Incorporation of Solid Manure Applied to Land:

Based on the information currently available, emissions from solid manure applied to cropland are small in comparison to other sources. 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, VOCs, ammonia, and any hydrogen sulfide are absorbed onto particles of soil providing the opportunity for these soil microbes to oxidize these compounds into carbon dioxide, water, nitrates, and sulfates[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 Guideline.[3] The applicant has agreed to install a lagoon cover if it is required. The proposed lagoon system has been designed so that it can be retrofit with a cover and converted to a covered lagoon digester meeting the

[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)

[3] Settlement Agreement. Western United Dairymen, Alliance of Western Milk Producers v. San Joaquin Valley Air Pollution Control District, settled in the Fresno Superior Court September 2004 (http://www.valleyair.org/busind/pto/dpag/settlement.pdf)

specifications set forth in NRCS practice standard 365 – Anaerobic Digester – Ambient Temperature. If an anaerobic digester is required by the final Dairy BACT Guideline, the applicant shall submit the details of the proposed covered lagoon anaerobic digester system and combustion device to the District and shall install the system in accordance with the timeframes and procedures established by the APCO in the Dairy BACT Guideline.

Feed Handling and Storage (S-7533-5-0):

The feed storage system at FM Jerseys Dairy includes two corn silage piles (70 feet wide by 16 feet high) and two wheat silage piles (70 feet wide by 16 feet high) and silage storage bags. The dairy will may have a maximum of one of each type of silage pile at any given time. 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).

Diesel-Fired Emergency IC Engine (S-7533-6-0):

The applicant has proposed to install a Tier 2 certified diesel-fired IC engine that is fired on very low-sulfur diesel fuel (0.0015% by weight sulfur maximum).

The proposed engine meets the latest Tier Certification requirements; therefore, the engine meets the latest ARB/EPA emissions standards for diesel particulate matter, hydrocarbons, nitrogen oxides, and carbon monoxide.

The use of very low-sulfur diesel fuel (0.0015% by weight sulfur maximum) reduces SO_X emissions by over 99% from standard diesel fuel.

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 lagoon/storage pond and emergency IC engine 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 the dairy.
- All 3,200 milk cows and 32 mature bulls will be housed in freestall barns with a flush/vacuum system. The 640 dry cows will housed in open corrals with a flush system and shade structures.
- No heifers or calves will be housed onsite at this dairy.
- All PM_{10} emissions from the dairy will be allocated to the cow housing permit unit (S-7533-2).
- The PM_{10} emission factors for the dairy animals are based on a District document entitled "Dairy and Feedlot PM_{10} 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 PM_{10} control efficiencies for the proposed practices and mitigation measures are based on the SJVAPCD memo – *Dairy and Feedlot PM_{10} Mitigation Practices and their Control Efficiencies.*
- The applicant has proposed the following PM_{10} mitigation measures for dairy 2: provide shade structures for the dry cows in open corral (16.7% control); scrape corrals on a weekly basis with a pull type scraper in the morning hours (15% control); and install downwind windbreaks (12.5%) for all cows and upwind windbreaks for all cows (10% control).
- Because of the moisture content of the separated solids, PM_{10} emissions from solid manure handling are considered negligible.
- Because H_2S is produced as a result of the decomposition of sulfur compounds under anaerobic conditions and the lagoons and storage ponds will be the primary source of H_2S emissions at a dairy, all H_2S emissions from the dairy will be allocated to the lagoon/storage of the liquid manure handling permit unit (S-7533-2).
- The mechanical separators will remove at least 50% of solids prior to the manure entering the anaerobic treatment lagoon.
- The VOC Emission Factors for milk cows used in this evaluation are from the "APCO's Revision to the Dairy VOC Emission Factor", dated January 2010. The VOC emission factors for the support stock were developed by taking the ratio of volatile solids excreted by the different types of cows to the milk cow and multiplying it by the milk cow VOC emission factor.
- The NH_3 emission factors for milk cows are based on the dairy cattle ammonia emission factor used by the California Air Resources Board. This emission factor was apportioned to the dairy permit units based on VOC emissions from manure. The NH3 emission factors for the support stock were developed by taking the ratio of nitrogen excreted by the different types of cows to the milk cow and multiplying it by the milk cow NH_3 emission factor.
- Dairy VOC and NH3 emission factors are primarily based on Holstein cattle. The cattle at FM Jerseys Dairy are Jersey cattle. Jersey cattle are smaller than Holstein cows (approximately 1,000 lb. for a mature Jersey cow vs. 1,400 lb. for a mature Holstein cow), consume less feed, and produce less manure. Therefore, the enteric emissions and emissions from manure will be adjusted by a factor of 72% to account for the smaller size and reduced manure production of Jersey cattle.
- 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, no control efficiency will be evaluated for this practice because it was already being implemented on the dairies that were studied to develop the baseline emission factor.
- FM Jerseys Dairy will flush the feed lanes for 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. The control efficiency for this practice will conservatively be estimated as 10% until better information becomes available. This control efficiency only applies to the manure and does not apply to the enteric emissions generated from the cows themselves.
- 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.

Diesel-Fired Emergency IC Engine:

- Emergency operating schedule: 24 hours/day
- Non-emergency operating schedule: 50 hours/year
- Density of diesel fuel: 7.1 lb/gal
- EPA F-factor (adjusted to 60 °F): 9,051 dscf/MMBtu
- Fuel heating value: 137,000 Btu/gal
- BHP to Btu/hr conversion: 2,542.5 Btu/bhp-hr
- Thermal efficiency of engine: commonly ≈ 35%
- PM_{10} fraction of diesel exhaust: 0.96 (CARB, 1988)
- The engine has certified NO_X + VOC emissions of 4.8 g/bhp-hr. It will be assumed the NOx + VOC emission factor is split 95% NOx and 5% VOC (per the District's Carl Moyer program).

B. Emission Factors

Dairy Permits (S-7533-1-0, -2-0, -3-0, -4-0, and -5-0)

The emission factors for PM_{10}, VOC, and NH_3 given in the following tables will be used to calculate the combined emissions from the dairy and the pre/post-project emissions from the following permit units: the milking operation (permit S-7533-1); the cow housing (permit S-7533-2); the liquid manure handling system (permit S-7533-3); the solid manure handling system (permit S-7533-4); and the feed handling system (permit S-7533-5).

PM_{10} Emission Factors for the Dairy

The following tables list the PM_{10} emission factors for the animals at the dairy. The control efficiencies for the different management practices proposed for this dairy will be applied to the uncontrolled emission factors to arrive at the controlled emission factors that will be used to calculate post-project PM_{10} emissions from the dairy.

PM_{10} Emission Factors for Dairy Cows

	Uncontrolled Emission Factor (lb-PM_{10}/head-yr)	Control	Controlled EF Calculation	Controlled Emission Factor (lb-PM_{10}/head-yr)
Milk Cows and Bulls housed in Freestalls*	1.37	Upwind Shelterbelts (10%) Downwind Shelterbelts (12.5%)Weekly Scraping using Pull-Type Equipment in morning (15%)	1.37x(1-0.10)(1-0.125)(1-0.15)=	**0.917**
Dry Cows in Open Corrals	5.46	Upwind Shelterbelts (10%) Downwind Shelterbelts (12.5%) Weekly Scraping using Pull-Type Equipment in morning (15%) Shade Structures (16.7%)	5.46x(1-0.10)(1-0.125)(1-0.15)(1-0.167) =	**3.04**

*Based on a Summer 2003 study by Texas A&M ASAE at a West Texas Dairy

VOC Emission factors for Dairies

Dairy Emissions Factors for Holstein Cows (lb-VOC/hd-yr)

		Milk Cow	Dry Cow	Support Stock*
S-7533-1-0: **Milking Parlor**	Enteric Emissions in Milking Parlors	0.41	-	-
	Milking Parlor Floor	0.03	-	-

	Milking Parlor Total	**0.44**	-	-
S-7533-2-0: **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**
S-7533-3-0: **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**
S-7533-4-0: **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**

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

Silage and TMR (Total Mixed Ration) EF1 (S-7533-5-0)		
Type of Silage	**VOC EF (µg/m^2-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

Control Efficiencies for BACT and Rule 4570 Mitigation Measures

This will be required to implement various mitigation measures to comply with District Rule 4570. Because the dairy previously expanded and was subject to BACT, the majority of these mitigation measures, or very similar measures, are currently required. Therefore the controlled emission factors will be used for calculating pre-project and post-project VOC emissions from non-feed sources.

S-7533-1: Milking Parlor

Enteric Emissions Mitigations		
Apply	**Mitigation**	**CE (%)**

1	Feed according to National Research Council (NRC) guidelines.	5
	Total CE	5

Milking Parlor Floor Mitigations		
Apply	**Mitigation**	**CE (%)**
1	Feed according to National Research Council (NRC) guidelines.	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

S-7533-2: Cow Housing

Enteric Emissions Mitigations		
Apply	**Mitigation**	**CE (%)**
1	Feed according to National Research Council (NRC) guidelines.	5
	Total CE	5

Corrals/Pens Mitigations		
Apply	**Mitigation**	**CE (%)**
1	Feed according to National Research Council (NRC) guidelines.	5
1	Inspect water pipes and troughs and repair leaks at least once every seven (7) days NOTE: Control efficiency already included in EF2	0
1	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 NOTE: Control efficiency already included in EF2	0
1	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	10

	lanes such that the depth of manure does not exceed twelve (12) inches at any point or time.	
1	Implement one of the following: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 sq.ft. or less and slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 sq. ft.; 2) maintain corrals to ensure proper drainage preventing water from standing more than 48 hrs.; 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface NOTE: Control efficiency already included in EF2	0
	Install shade structure such that they are constructed with a light permeable roofing material 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.	0
1	Install all shade structures uphill of any slope in the corral 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
	Clean manure from under corral shades at least once every fourteen (14) days, when weather permits access into the corral 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.	0
	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.	0
1	Manage corrals such that the manure depth in the corral does not exceed twelve (12) inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. The	0

	facility must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. NOTE: Control efficiency already included in EF2	
	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.	0
	Use lime or a similar absorbent material in the corral according to the manufacturer's recommendation to minimize moisture in the corrals.	0
	Apply thymol to the corral soil in accordance with the manufacturer's recommendation.	0
	Total CE	18.78

Bedding Mitigations		
Apply	**Mitigation**	**CE (%)**
1	Feed according to National Research Council (NRC) guidelines.	5
	Use non-manure-based bedding and non-separated solids based bedding for at least 90% of the bedding material, by weight, for freestalls (e.g. rubber mats, almond shells, sand, or waterbeds.).	0
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
	For a medium dairy only (500 to 999 milk cows) – Remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every fourteen (14) days.	0

Total CE	14.5

Lanes Mitigations		
Apply	**Mitigation**	**CE (%)**
1	Feed according to National Research Council (NRC) guidelines.	5
1	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 *No control efficiency at this time.	0
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
	Have no animals in exercise pens or corrals at any time.	0
	Total CE	14.5

S-7533-3: Liquid Manure Handling

Lagoons/Storage Ponds Mitigations		
Apply	**Mitigation**	**CE (%)**
1	Feed according to National Research Council (NRC) guidelines.	5
	Use phototropic lagoon.	0
1	Use an anaerobic treatment lagoon designed according to NRCS Guideline No. 359.	40
1	Remove solids from the waste system with a solid separator system, prior to the waste entering the lagoon NOTE: Control efficiency already included in EF2	0
	Maintain lagoon pH between 6.5 and 7.5.	0
	Total CE	43

Liquid Manure Land Application Mitigations		
Apply	**Mitigation**	**CE (%)**
1	Feed according to National Research Council (NRC) guidelines.	5
	Only apply liquid manure that has been treated with an anaerobic or aerobic treatment lagoon, aerobic lagoon, or digester system.	40
1	Allow liquid manure to stand in the fields for no more than twenty-four (24) hours after irrigation NOTE: Control efficiency already included in EF2	0
	Apply liquid/slurry manure via injection with drag hose or similar apparatus.	0
	Total CE	43

S-7533-4: Solid Manure Handling

Solid Manure Storage Mitigations		
Apply	**Mitigation**	**CE (%)**
1	Feed according to National Research Council (NRC) guidelines.	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.	5
	Within 72 hours of removal from the drying process, either a) remove separated solids from the facility, or b) cover separated solids outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed 24 hours per event.	0

Total CE	5

Solid Manure Land Application Mitigations		
Apply	**Mitigation**	**CE (%)**
1	Feed according to National Research Council (NRC) guidelines.	5
1	Incorporate all solid manure within 72 hours of land application NOTE: Control efficiency already included in EF2	0
	Only apply solid manure that has been treated with an anaerobic treatment lagoon, aerobic lagoon or digester system.	0
	Apply no solid manure with a moisture content of more than 50%.	0
	Total CE	5

S-7533-5: Silage & TMR

Corn/Alfalfa/Wheat Silage Mitigations		
Apply	**Mitigation**	***CE (%)**
1	1. Utilize a sealed feed storage system (e.g. Ag-Bag) for bagged silage. < or > 2. Cover the surface of silage piles, except for the area where feed is being removed from the pile, with a plastic tarp that is at least 5 mils thick (0.005 inches), multiple plastic tarps with a cumulative thickness of at least 5 mils (0.005 inches), or an oxygen barrier film covered with a UV resistant material within 72 hours of last delivery of material to the pile, and Implement one of the following: a) build silage piles such that the average bulk density is at least 44 lb/cu-ft for corn silage and 40 lb/cu-ft for other silage types, as measured in accordance with Section 7.10 of Rule 4570,	39

	b) when creating a silage pile, adjust filling parameters to assure a calculated average bulk density of at least 44 lb/cu ft for corn silage and at least 40 lb/cu-ft for other silage types, using a spreadsheet approved by the District; c) harvest silage crop at > or = 65% moisture for corn; and > = 60% moisture for alfalfa/grass and other silage crops; manage silage material delivery such that no more than 6 inches of materials are uncompacted on top of the pile; and incorporate the applicable Theoretical Length of Chop (TLC) and roller opening for the crop being harvested Manage exposed silage Implement two of the following: <u>Manage Exposed Silage</u>. a) manage silage piles such that only one silage pile has an uncovered face and the uncovered face has a total exposed surface area of less than 2,150 sq. ft., or b) manage multiple uncovered silage piles such that the total exposed surface area of all silage piles is less than 4,300 sq.ft. <u>Maintain Silage Working Face</u>. a) use a shaver/facer to remove silage from the silage pile, or b) maintain a smooth vertical surface on the working face of the silage pile <u>Silage additive</u>. a) inoculate silage with homolactic acid bacteria in accordance with manufacturer recommendations to achieve a concentration of at least 100,000 colony forming units per gram of wet forage or apply proprionic acid, benzoic acid, sorbic acid, sodium benzoate, or potassium sorbate at a rate specified by the manufacturer to reduce yeast counts when forming silage pile; or b) apply other additives at specified rates that have been demonstrated to reduce alcohol concentrations in silage and/or VOC emissions from silage and have been approved by the District and EPA.	
	*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	Begin feeding total mixed rations within 2 hours of grinding and mixing rations NOTE: Control efficiency already included in EF2	0
1	Feed stream-flaked, dry rolled, cracked or ground corn or other ground cereal grains.	10
	Remove uneaten wet feed from feed bunks within 24 hours after the end of a rain event.	0
	For total mixed rations that contain at least 30% by weight of silage, feed animals total mixed rations that contain at least 45% moisture.	0
	Total CE	19

Controlled VOC Emission Factors for the Dairy

The following tables list the controlled VOC emission factors that will be used to calculate the post-project VOC emissions for the enteric and manure sources at the dairy and will be used to calculate the post-project VOC emissions for the feed sources at the dairy. The non-feed emission factors are based on Holstein dairy animals. As explained above, these emission factors will be adjusted by a factor of 72% to account for the smaller size, feed consumption, and manure production of the Jersey animals at the dairy.

The mitigation measures will reduce VOC emissions from the following emission units and are calculated as follows:

EF2 = EF1 x (1 – Total CE)

Dairy Emissions Factors for Holstein Cows Including the Controls to be Implemented at the Dairy (lb-VOC/hd-yr)				
		Milk Cow	**Dry Cow**	**Support Stock***
S-7533-1-0: **Milking Parlor**	Enteric Emissions in Milking Parlors	0.39	-	-
	Milking Parlor Floor	0.029	-	-
	Milking Parlor Total	**0.042**	-	-
S-7533-2-0:	Enteric Emissions in	3.51	2.12	1.62

Cow Housing	Cow Housing			
	Corrals/Pens	5.36	2.91	2.24
	Bedding	0.86	0.46	0.36
	Lanes	0.68	0.38	0.28
	Cow Housing Total	**10.41**	**5.87**	**4.5**
S-7533-3-0: **Liquid Manure Handling**	Lagoons/Storage Ponds	0.74	0.40	0.31
	Liquid Manure Land Application	0.80	0.43	0.33
	Liquid Manure Handling Total	**1.54**	**0.83**	**0.64**
S-7533-4-0: **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.

Dairy Emissions Factors for Jersey Cows Including the Controls to be Implemented at the Dairy (lb-VOC/hd-yr)				
		Milk Cow	**Dry Cow**	**Support Stock***
S-7533-1-0: **Milking Parlor**	Enteric Emissions in Milking Parlors	0.28	-	-
	Milking Parlor Floor	0.021	-	-
	Milking Parlor Total	**0.30**	-	-
S-7533-2-0: **Cow Housing**	Enteric Emissions in Cow Housing	2.53	1.53	1.17
	Corrals/Pens	3.86	2.10	1.61
	Bedding	0.62	0.33	0.26
	Lanes	0.49	0.27	0.20
	Cow Housing Total	**7.50**	**4.23**	**3.24**
S-7533-3-0: **Liquid Manure Handling**	Lagoons/Storage Ponds	0.53	0.29	0.22
	Liquid Manure Land Application	0.58	0.31	0.24
	Liquid Manure Handling Total	**1.11**	**0.60**	**0.46**
S-7533-4-0: **Solid Manure Handling**	Solid Manure Storage	0.09	0.05	0.04
	Separated Solids Piles	0.04	0.02	0.02
	Solid Manure Land Application	0.22	0.12	0.09

	Solid Manure Handling Total	**0.35**	**0.19**	**0.15**

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

Silage and TMR (Total Mixed Ration) EF2 (S-7533-5-0)		
Type of Silage	**VOC EF (µg/m^2-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

NH_3 Emission Factors for Dairies

The following table lists the NH_3 emission factors for dairy animals. These emission factors are based on Holstein dairy animals. As explained above, these emission factors will be adjusted by a factor of 72% to account for the smaller size, feed consumption, and manure production of the Jersey animals at the dairy.

NH_3 Emissions Factors for Holstein Dairy Cows (lb/hd-yr)				
		Milk Cow	**Dry Cow**	**Support Stock***
Milking Parlor	Milking Parlor Floor	0.19	-	-
	Milking Parlor Total	**0.19**	-	-
Cow Housing	Corrals/Pens	N/A	N/A	N/A
	Bedding	6.3	3.2	1.7
	Lanes	5.1	2.6	1.3
	Cow Housing Total	**11.4**	**5.8**	**3.0**
Liquid Manure Handling	Lagoons/Storage Ponds	8.2	4.2	2.2
	Liquid Manure Land Application	8.9	4.5	2.3
	Liquid Manure Handling Total	**17.1**	**8.7**	**4.5**
Solid Manure Handling	Solid Manure Storage	0.95	0.48	0.25
	Separated Solids Piles	0.38	0.19	0.10
	Solid Manure Land Application	2.09	1.06	0.55
	Solid Manure Handling Total	**3.42**	**1.73**	**0.90**

*In order to conservatively calculate the emissions, the emission factors for large

heifers (15 to 24 months) are used for support stock.

NH_3 Emissions Factors for Jersey Cows at the Dairy (lb/hd-yr)				
		Milk Cow	**Dry Cow**	**Support Stock***
Milking Parlor	Milking Parlor Floor	0.14	-	-
	Milking Parlor Total	**0.14**	-	-
Cow Housing	Corrals/Pens	N/A	N/A	N/A
	Bedding	4.54	2.30	1.224
	Lanes	3.67	1.87	0.936
	Cow Housing Total	**8.2**	**4.2**	**2.2**
Liquid Manure Handling	Lagoons/Storage Ponds	5.90	3.02	1.58
	Liquid Manure Land Application	6.41	3.24	1.66
	Liquid Manure Handling Total	**12.3**	**6.3**	**3.2**
Solid Manure Handling	Solid Manure Storage	0.684	0.346	0.18
	Separated Solids Piles	0.274	0.137	0.072
	Solid Manure Land Application	1.50	0.763	0.396
	Solid Manure Handling Total	**2.46**	**1.25**	**0.65**

*In order to conservatively calculate the emissions, the emission factors for large heifers (15 to 24 months) are used for support stock.

Hydrogen Sulfide (H_2S)

Hydrogen Sulfide (H_2S) is produced as a result of the decomposition of sulfur compounds under anaerobic conditions. Therefore, the lagoons and storage ponds will be the primary source of H_2S emissions at a dairy. The H_2S emissions rate from lagoons and storage ponds is strongly influenced by the amount of exposed surface area and environmental conditions (e.g. wind, temperature, pH). For this evaluation, average annual H_2S emissions will be conservatively estimated as 10% of the average annual NH_3 emissions from the storage pond. This is because both organic nitrogen and sulfur compounds excreted by cattle are primarily ingested as components of amino acids and tend to occur in set ratios. Studies have also indicated that the average ammonia emissions from lagoons and ponds treating or storing liquid manure are generally more than ten times greater than the H_2S emissions.[4] However, because

[4] For examples see: 1.) L. Y. Zhao, M. Darr, X. Wang, R. Manuzon, M. Brugger, E. Imerman, G. Arnold, H. Keener, A. J. Heber, Temporal variations in gas and odor emissions from a dairy manure storage pond, Proceedings of the 6th International Dairy Housing Conference2007St. Joseph, MIASABEASABE Paper No. 701P0507e. 2.) Ron E. Sheffield and Bruce Louks, Diurnal Variations of Ammonia and Hydrogen Sulfide Flux from a Dairy Manure Storage Pond in Idaho. 3) Blunden, J., and V. P. Aneja, 2008, "Characterizing ammonia and hydrogen sulfide emissions from a swine waste treatment lagoon in North Carolina", *Atmospheric Environment*, vol. 42, No. 14, pp. 3277-3290]

studies have indicated substantial variation in daily H_2S emission rates, the maximum daily H_2S rate will be conservatively estimated at five times the average daily H_2S in this evaluation.

Diesel-Fired Emergency Standby IC Engine (S-7533-6-0)

Emission Factors		
Pollutant	Emission Factor (g/bhp-hr)	Source
NO_X	4.56	ARB/EPA Certification
SO_X	0.0051	Mass Balance Equation Below
PM_{10}	0.15	ARB/EPA Certification
CO	2.61	ARB/EPA Certification
VOC	0.24	ARB/EPA Certification

$$\frac{0.000015\,lb-S}{lb-fuel}\times\frac{7.1\,lb-fuel}{gallon}\times\frac{2\,lb-SO_2}{1\,lb-S}\times\frac{1\,gal}{137{,}000\,Btu}\times\frac{1\,bhp\,input}{0.35\,bhp\,out}\times\frac{2{,}542.5\,Btu}{bhp-hr}\times\frac{453.6\,g}{lb}=\ 0.0051\ \frac{g-SO_x}{bhp-hr}$$

C. Calculations

1. Pre-Project Potential to Emit (PE1)

Since these are all new emissions units, PE1 = 0 for all pollutants for all emissions units.

2. Post Project Potential to Emit (PE2)

S-7533-1-0:

$PE2_{VOC}$ = [# Milk Cows] x [EF]
= 3,200 x 0.30 lb-VOC/hd-yr
= **960 lb-VOC/yr**

$PE2_{VOC}$ = 960 lb-VOC/yr ÷ 365 day/yr
= 2.6 lb-VOC/day

$PE2_{NH3}$ = [# Milk Cows] x [EF]
= 3,200 x 0.14 lb-NH_3/hd-yr
= **448 lb-NH_3/yr**

$PE2_{NH3}$ = 448 lb-NH_3/yr ÷ 365 day/yr
= 1.2 lb-NH_3/day

S-7533-2-0:

$PE2_{PM10}$ = [# milk cows] x [EF] + [# dry cows] x [EF] + [# support stock] x [EF]

= 3,200 x 0.917 lb-PM_{10}/hd-yr + 640 x 3.04 lb-PM_{10}/hd-yr + 32 x 0.917 lb-PM_{10}/hd-yr
= **4,909 lb-PM_{10}/yr**

$PE2_{PM10}$ = 4,909 lb-PM_{10}/yr ÷ 365 day/yr
= 13.4 lb-PM_{10}/day

$PE2_{VOC}$ = [# Milk Cows] x [EF] + [# Dry Cows] x [EF] + [# Support Stock] x [EF]
= 3,200 x 7.5 lb-VOC/hd-yr + 640 x 4.23 lb-VOC/hd-yr +32 x 3.24 lb-VOC/hd-yr
= **26,811 lb-VOC/yr**

$PE2_{VOC}$ = 26,811 lb-VOC/yr ÷ 365 day/yr
= 73.5 lb-VOC/day

$PE2_{NH3}$ = [# Milk Cows] x [EF] + [# Dry Cows] x [EF] + [# Support Stock] x [EF]
= 3,200 x 8.2 lb-NH_3/hd-yr + 640 x 4.2 lb-NH_3/hd-yr +32 x 2.2 lb-NH_3/hd-yr
= **28,998 lb-NH_3/yr**

$PE2_{NH3}$ = 28,998 lb-NH_3/yr ÷ 365 day/yr
= 79.4 lb-NH_3/day

S-7533-3-0:

Lagoon/Storage Pond

$PE2_{VOC}$ = [# Milk Cows] x [EF] + [# Dry Cows] x [EF] + [# Support Stock] x [EF]
= 3,200 x 0.53 lb-VOC/hd-yr + 640 x 0.29 lb-VOC/hd-yr + 32 x 0.22 lb-VOC/hd-yr
= **1,889 lb-VOC/yr**

$PE2_{VOC}$ = 1,889 lb-VOC/yr ÷ 365 day/yr
= 5.2 lb-VOC/day

$PE2_{NH3}$ = [# Milk Cows] x [EF] + [# Dry Cows] x [EF] + [# Support Stock] x [EF]
= 3,200 x 5.9 lb-NH_3/hd-yr + 640 x 3.02 lb-NH_3/hd-yr +32 x 1.58 lb-NH_3/hd-yr
= **20,863 lb-NH_3/yr**

$PE2_{NH3}$ = 20,863 lb-NH_3/yr ÷ 365 day/yr
= 57.2 lb-NH_3/day

Liquid Manure Land Application

$PE2_{VOC}$ = [# Milk Cows] x [EF] + [# Dry Cows] x [EF] + [# Support Stock] x [EF]
= 3,200 x 0.58 lb-VOC/hd-yr + 640 x 0.31 lb-VOC/hd-yr + 32 x 0.24 lb-VOC/hd-yr
= **2,062 lb-VOC/yr**

$PE2_{VOC}$ = 2,062 lb-VOC/yr ÷ 365 day/yr
= 5.6 lb-VOC/day

$PE2_{NH3}$ = [# Milk Cows] x [EF] + [# Dry Cows] x [EF] + [# Support Stock] x [EF]
= 3,200 x 6.41 lb-NH_3/hd-yr + 640 x 3.24 lb-NH_3/hd-yr +32 x 1.66 lb-NH_3/hd-yr
= **22,639 lb-NH_3/yr**

$PE2_{NH3}$ = 22,639 lb-NH_3/yr ÷ 365 day/yr
= 62.0 lb-NH_3/day

Total Post-Project Emissions from Liquid Manure Handling System

Pollutant	Lagoon Emissions (lb/year)	+	Land Application (lb/year)	=	**Total from Liquid Manure Handling**	
					Annual Emissions (lb/year)	Daily Emissions (lb/day)
VOC	1,889	+	2,062	=	3,951	10.8
NH_3	20,863	+	22,639	=	43,502	119.2

S-7533-4-0:

$PE2_{VOC}$ = [# Milk Cows] x [EF] + [# Dry Cows] x [EF] + [# Support Stock] x [EF]
= 3,200 x 0.35 lb-VOC/hd-yr + 640 x 0.19 lb-VOC/hd-yr + 32 x 0.15 lb-VOC/hd-yr
= **1,246 lb-VOC/yr**

$PE2_{VOC}$ = 1,246 lb-VOC/yr ÷ 365 day/yr
= 3.4 lb-VOC/day

$PE2_{NH3}$ = [# Milk Cows] x [EF] + [# Dry Cows] x [EF] + [# Support Stock] x [EF]
= 3,200 x 2.46 lb-NH_3/hd-yr + 640 x 1.25 lb-NH_3/hd-yr +32 x 0.65 lb-NH_3/hd-yr
= **8,693 lb-NH_3/yr**

$PE2_{NH3}$ = 8,693 lb-NH_3/yr ÷ 365 day/yr
= 23.8 lb-NH_3/day

S-7533-5-0:

Open Face Area:

= [#open face piles] x [height] x (([width] + ([width]/(0.1667 x ([width]/[height]) + 1.111)))/2)

Corn Area
= 1 x 16 ft x ((70 ft + (70 ft / (0.1667 x (70 ft /16 ft) + 1.111 ft))) / 2)
= 864 ft^2

Wheat Area
= 1 x 16 ft x ((70 ft + (70 ft / (0.1667 x (70 ft /16 ft) + 1.111 ft))) / 2)

= 864.2961 ft^2

Silage Annual PE:

Corn Emissions
=emission factor x area x 0.0929 m^2/ft^2 x 8,760 hr/yr x 60 min/hr x 2.20E-9 lb/µg
= 21,155 x 864x 0.0929 x 8760 x 60 x 2.20E-9 lb/µg
= 1,963 lb-VOC/yr

Wheat Emissions
=emission factor x area x 0.0929 m^2/ft^2 x 8,760 hr/yr x 60 min/hr x 2.20E-9 lb/µg
= 26,745 x 864.2961 x 0.0929 x 8760 x 60 x 2.20E-9 lb/µg
= 2,483 lb-VOC/yr

TMR Annual PE:

= [Total Head] x [emission factor] x [area] x [min/yr] x [lb/µg]
= 3,872 x 10,575 µg/m^2-min x 0.658 m^2 x 525,600 min/yr x 2.20E-9 lb/µg
= 31,154 lb-VOC/yr

Total Emissions from Feed Storage and Handling

$PE2_{VOC}$ = 1,963 lb-VOC/yr + 2,483 lb-VOC/yr + 31,154 lb-VOC/yr
= 35,600 lb-VOC/yr

$PE2_{VOC}$ = 35,600 lb-VOC/yr ÷ 365 day/yr
= 97.5 lb-VOC/day

S-7533-6-0:

The daily and annual PE are calculated as follows:

Pollutant	Emissions Factor (g/bhp-hr)	Rating (bhp)	Daily Hours of Operation (hrs/day)	Annual Hours of Operation (hrs/yr)	Daily PE2 (lb/day)	Annual PE2 (lb/yr)
NO_X	4.56	1220	24	50	**294.3**	**613**
SO_X	0.0051	1220	24	50	**0.3**	**1**
PM_{10}	0.15	1220	24	50	**9.7**	**20**
CO	2.61	1220	24	50	**168.5**	**351**
VOC	0.24	1220	24	50	**15.5**	**32**

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

Pursuant to Section 4.9 of District Rule 2201, the Pre-Project Stationary Source Potential to Emit (SSPE1) is the Potential to Emit (PE) from all units with valid Authorities to Construct (ATC) or Permits to Operate (PTO) at the Stationary Source and the quantity of emission reduction credits (ERC) which have been banked since September 19, 1991 for Actual Emissions Reductions that have occurred at the source, and which have not been used on-site.

Since this is a new facility, there are no valid ATCs, PTOs, or ERCs at the Stationary Source; therefore, the SSPE1 is equal to zero.

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

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

Post-Project Stationary Source Potential to Emit [SSPE2] (lb/year)						
	NO_X	SO_X	PM_{10}	CO	VOC	NH_3
S-7533-1-0	0	0	0	0	960	448
S-7533-2-0	0	0	4,909	0	26,811	28,998
S-7533-3-0	0	0	0	0	3,951	43,502
S-7533-4-0	0	0	0	0	1,246	8,693
S-7533-5-0	0	0	0	0	35,600	0
S-7533-6-0	613	1	20	351	32	0
Post-Project SSPE (SSPE2)	**613**	**1**	**4,929**	**351**	**68,600**	**81,641**

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 difficultly, 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/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-7533-3-0 Lagoon/Storage Pond Only	0	0	0	0	1,889
S-7533-6-0	613	1	20	351	32
Non-Fugitive SSPE	**613**	**1**	**20**	**351**	**1,921**

Major Source Determination (lb/year)					
	NO_X	SO_X	PM_{10}	CO	VOC
Non-Fugitive SSPE (SSPE2)	613	1	20	351	1,921
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 becoming a Major Source as a result of this project.

6. Baseline Emissions (BE)

The BE calculation (in lb/year) is performed on a pollutant-by-pollutant basis to determine the amount of offsets required, where necessary, when the SSPE1 is greater than the offset threshold. This project is exempt from offsets pursuant to Rule 2201, Section 4.6.9. Therefore, BE calculations are not required.

7. SB 288 Major Modification

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

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

8. Federal Major Modification

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

Since this source is not included in the 28 specific source categories specified in 40 CFR 51.165, the increases in fugitive emissions are not included in the Federal Major Modification determination. Since this facility is not a Major Source for any pollutants, this project does not constitute a Federal Major Modification. Additionally, since the facility is not a major source for PM_{10} (140,000 lb/year), it is not a major source for PM2.5 (200,000 lb/year).

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.

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

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

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

Rule 2010 Permits Required

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

Pursuant to Section 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 an SB 288 Major Modification or a Federal Major Modification, as defined by the rule.

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

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

As discussed in Section VII.A above, each permit unit at a dairy is treated as an emissions unit for BACT purposes, except for the liquid manure handling permit unit, which is treated as two emissions units: lagoons/storage ponds and liquid manure land application. The following permit units are new:

Milking Parlor (S-7533-1-0)
As seen in Section VII.C.2 of this evaluation, the applicant is proposing to install a new milk parlor with a PE greater than 2.0 lbs/day for VOC; therefore, BACT is triggered for VOC from the milk parlor.

Cow Housing (S-7533-2-0)
As seen in Section VII.C.2 of this evaluation, the applicant is proposing to install a new cow housing with a PE greater than 2.0 lbs/day for VOC, PM_{10}, and NH_3; therefore, BACT is triggered for VOC, PM10, and NH_3 from the cow housing.

Liquid Manure Handling (S-7533-3-0)
As seen in Section VII.C.2 of this evaluation, the applicant is proposing to install a new liquid manure handling with both the lagoon/storage pond emissions unit and land application emissions unt with a PE greater than 2.0 lbs/day for VOC and NH_3; therefore, BACT is triggered for VOC and NH_3 from the lagoon/storage pond and land application emissions unit.

Solid Manure Handling System (S-7533-4-0):
As seen in Section VII.C.2 of this evaluation, the applicant is proposing to install a new solid manure handling system with a PE greater than 2.0 lbs/day for VOC and NH_3; therefore, BACT is triggered for VOC and NH_3 from the solid manure handling system.

Feed Handling and Storage (S-7533-5-0):
As seen in Section VII.C.2 of this evaluation, the applicant is proposing to install a new feed handling and storage system with a PE greater than 2.0 lbs/day for VOC; therefore, BACT is triggered for VOC from the feed handling and storage system.

Diesel-Fired Emergency Standby IC Engine (S-7533-6-0):

As seen in Section VII.C.2 of this evaluation, the applicant is proposing to install a new diesel-fired emergency standby IC engine with a PE greater than 2.0 lbs/day for NO_X, PM_{10}, CO, and VOC. BACT is triggered for NO_x, PM_{10}, and VOC since the PEs are greater than 2 lbs/day. BACT is not triggered for CO since the SSPE2 for CO is greater is less than 200,000 lbs/year, as demonstrated in Section VII.C.2 of this document.

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

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

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

AIPE = PE2 – 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)

HAPE = PE1 x (EF2/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

AIPE = PE2 – (PE1 x (EF2 / EF1))

As discussed in Section I above, there are no modified emissions units associated with this project. Therefore BACT is not triggered for modification of emission units.

d. SB 288/Federal Major Modification

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

2. Top-Down BACT Analysis

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

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

Milking Parlor (S-7533-1-0)

VOC: Flush/Spray down milking parlors after each group of cows is milked

Cow Housing (S-7533-2-0)

PM_{10}: 1) Weekly scraping of open corrals using a pull-type scraper in the morning hours except when prevented by wet conditions.
2) Concrete feed lanes and walkways for all cows
3) Shade structures located uphill of the corrals
4) Upwind and downwind shelter belts designed in accordance to the NRCS guideline #380

VOC: 1) Concrete feed lanes and walkways for all cows.
2) Freestall feed lanes and walkways for milk cows flushed/vacuumed four times per day and feed lanes and walkways in the corrals for the remaining animals flushed two times per day.
3) 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).
4) Weekly scraping of freestall exercise pens and open corrals using a pull-type scraper in the morning hours except when prevented by wet conditions.

NH_3: 1) Concrete feed lanes and walkways in freestall barns for milk cows.
2) Freestall feed lanes and walkways for milk cows flushed four times per day and feed lanes and walkways in the corrals for the remaining animals flushed two times per day.
3) 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).
4) Weekly scraping of freestall exercise pens and open corrals using pull-type scraper in the morning hours except when prevented by wet conditions.

Liquid Manure Handling System (S-7533-3-0)

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.

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

Land Application

VOC: Irrigation of crops using liquid manure from the storage pond.

NH_3: Irrigation of crops using liquid manure from the storage pond.

Solid Manure Handling and Land Application (S-7533-4-0)

VOC: 1) Weekly removal of separated solids from mechanical separator stacking pad.
2) Rapid incorporation of solid manure into the soil.

NH_3: 1) Weekly removal of separated solids from mechanical separator stacking pad.
2) Rapid incorporation of solid manure into the soil.

Feed Handling and Storage (S-7533-5-0)

VOC: 1) All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.
2) Cover or ensile all silage piles except the face of pile.
3) Drain leachate from the silage piles and send it to a waste treatment system such as a lagoon.
4) Silage face management–only disturb the require area of face.

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 in District Rule 4570 are cost effective and technologically feasible for confined animal facilities. Therefore, in addition to the BACT requirements determined in the Top-Down BACT Analysis and listed 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 and NH_3 emissions from the dairy.

Emergency Standby IC Engine (S-7533-6-0)

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

NO_X: Latest EPA Tier Certification level for applicable horsepower range

VOC: Latest EPA Tier Certification level for applicable horsepower range
PM_{10}: 0.15 g/hp-hr or the Latest EPA Tier Certification level for applicable horsepower range, whichever is more stringent. (ATCM)

B. Offsets

Pursuant to Section 4.6.9 of District Rule 2201, agricultural sources that are not major sources are exempt from offsets if emissions reductions from that source would not meet the criteria for real, permanent, quantifiable, and enforceable emission reductions. Over time, EPA policies and court determinations have established fairly rigorous definitions and tests for each of these terms.

For agricultural operations and other nontraditional sources of emissions, 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, Emission Reduction Credits (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, EPA has not approved the issuance of ERCs by California air districts 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. Therefore, offsets are not required for this project.

C. Public Notification

1. Applicability

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

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

New Major Sources are new facilities, which are also Major Sources. As shown in Section VII.C.5 above, the SSPE2 is not greater than the Major Source threshold for

any pollutant. Therefore, public noticing is not required for this project for new Major Source purposes.

b. 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. As stated above, for the dairy, each permit unit, except the liquid manure handling, is treated as an emissions unit. The liquid manure handling system is treated as two emissions units.

As seen in Section VII.C.2 above, permit units S-7533-1-0, -2-0, -3-0, -4-0, and -5-0 have daily emissions less than 100 lb/day for any pollutant. Therefore public noticing for PE > 100 lb/day is not required for these permit units.

As seen in Section VII.C.2 above, permit unit S-7533-6-0, the diesel-fired emergency standby IC engine have daily emissions for NO_X and CO greater than 100 lb/day. Therefore, public noticing for PE > 100 lb/day is required for this permit unit.

c. Offset Threshold

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

Offset Threshold				
Pollutant	SSPE1 (lb/year)	SSPE2 (lb/year)	Offset Threshold	Public Notice Required?
NO_X	0	613	20,000 lb/year	No
SO_X	0	1	54,750 lb/year	No
PM_{10}	0	4,929	29,200 lb/year	No
CO	0	351	200,000 lb/year	No
VOC	0	68,600	20,000 lb/year	Yes
NH_3	0	81,641	NA	No

As detailed above, offset thresholds were surpassed for VOC with this project; therefore public noticing is required for offset purposes.

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	0	0	0	20,000 lb/year	No
SO_x	0	0	0	20,000 lb/year	No
PM_{10}	4,909	0	4,909	20,000 lb/year	No
CO	0	0	0	20,000 lb/year	No
VOC	68,568	0	68,568	20,000 lb/year	Yes
NH_3	81,641	0	81,641	20,000 lb/year	Yes

As demonstrated above, the SSIPE for VOC and NH_3 is 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 project because of the following; a new emissions unit with a PE > 100 lb/day, offset threshold for VOC is surpassed, and the SSIPE for VOC and NH_3 is greater than 20,000 lb/year. Therefore, public notice documents will be submitted to the California Air Resources Board (CARB) and a public notice will be published in a local newspaper of general circulation in Tulare County prior to the issuance of the ATCs for the new dairy.

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 and the required controls and mitigation measures. The number and types of cows are listed in the permit equipment description for the Cow Housing (Permit S-7533-2-0).

Milking Parlor (S-7533-1-0)

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

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]

Cow Housing (S-7533-2-0)

For the cow housing, the DEL is satisfied by the number of cows listed in the permit equipment description.

Additionally, the following conditions will be placed on the ATC to ensure that the DEL requirements for PM_{10} 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]

The freestall and corral feed lanes and walkways at this dairy shall be constructed of concrete. [District Rule 2201]

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

Permittee shall establish upwind windbreaks along the north perimeter (1,795 ft) and west perimeter (1,828 ft) of the dairy. Windbreaks shall consist of the following rows with the first row closest to the dairy: first row shall consist of the Pinus Eldarica trees, planted 15 feet apart and the second row shall consist of Photinia shrubs, planted 7 feet apart. Each row should be offset from the adjacent row. Spacing between rows shall be sufficient to accommodate cultivation equipment. This spacing shall not exceed 24 feet. An alternative windbreak proposal must be approved by the District. [District Rule 2201]

Permittee shall establish downwind windbreaks along the east perimeter (1,828 ft) and south perimeter (1,176 ft) with both windbreaks originating from the southeast corner of the dairy. Windbreaks shall consist of the following rows with the first row closest to the dairy: first row shall consist of the Raywood Ash trees, planted 25 feet apart, the second row shall consist of Pinus Eldarica trees, planted 15 feet apart, and the third row shall consist of Photinia shrubs, planted 7 feet apart. Each row should be offset from the adjacent row. Spacing between rows shall be sufficient to accommodate cultivation equipment. This spacing shall not exceed 24 feet. An alternative windbreak proposal must be approved by the District. [District Rule 2201]

Trees/shrubs that are initially planted as part of the windbreak shall have a minimum container size of five gallons. [District Rule 2201]

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

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

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

Freestall concrete feed lanes and walkways shall be flushed/vacuumed at least four times per day. [District Rules 2201]

The open corral concrete feed lanes and walkways shall be flushed at least two times per day. [District Rule 2201]

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). [District Rule 2201]

Permittee shall maintain an operating plan that requires the feed lanes and walkways to be flushed/vacuumed at least four times per day for mature cows and at least two times per day for all other cows. [District Rules 2201 and 4570]

Liquid Manure Handling System (S-7533-3-0)

The following conditions will be placed on the ATC to ensure that the DEL requirements for VOC and NH_3 are met:

Permittee shall operate the lagoon as an anaerobic treatment lagoon designed according to NCRCS Guideline No. 359. [District Rule 2201]

The separated solids from the mechanical separator shall be removed weekly from the stacking pad. [District Rule 2201]

Crops shall be irrigated using liquid manure from the storage pond that had been treated by an anaerobic treatment lagoon. District Rule 2201]

Solid Manure Handling System (S-7533-4-0)

The following conditions will be placed on the ATC to ensure that the DEL requirements for VOC and NH_3 are met:

Solid manure shall be rapidly incorporated into the soil after land application. [District Rule 2201]

Feed Handling and Storage (S-7533-5-0)

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

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]

Cover or ensile all silage piles except the face of the pile. [District Rule 2201]

Drain leachate from the silage piles and send it to a waste treatment system such as a lagoon. [District Rule 2201]

Practice silage face management by disturbing only the required area of the silage face. [District Rule 2201]

Diesel-Fired Emergency Standby IC Engine (S-7533-6-0)

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

Emissions from this IC engine shall not exceed any of the following limits: 4.56 g-NOx/bhp-hr, 2.61 g-CO/bhp-hr, or 0.24 g-VOC/bhp-hr. [District Rule 2201, 17 CCR 93115, and 40 CFR Part 60 Subpart IIII]

Emissions from this IC engine shall not exceed 0.15 g-PM10/bhp-hr based on USEPA certification using ISO 8178 test procedure. [District Rules 2201 and 4102, 17 CCR 93115, and 40 CFR Part 60 Subpart IIII]

Only CARB certified diesel fuel containing not more than 0.0015% sulfur by weight is to be used. [District Rules 2201 and 4801, 17 CCR 93115, and 40 CFR Part 60 Subpart IIII]

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 (S-7533-2-0)

Based on guidelines from the University of Idaho in a document entitled "*Dairy Odor Management and Control Practices*"[5] 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:

- Inspect and fill potholes in the freestall excerise pens and open corrals 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]

[5] http://courses.ag.uidaho.edu/bae/bae404/Dairy%20Odor%20Mgmt.pdf

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 (S-7533-1-0), the liquid manure handling System (S-7533-2-0), the solid manure handling system (S-7533-4-0), and the feed handling and storage is satisfied with the records that must be kept to demonstrate compliance with the numbers and types of cows listed in the permit equipment description for the Cow Housing (S-7533-2-0). The following conditions will be placed on the ATC permits:

Milking Parlor (S-7533-1-0)
The following condition will appear on the ATC for the milking parlor:

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

Cow Housing (S-7533-2-0)
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]

- Permittee shall maintain records of: (1) the number of times feed lanes are flushed/vacuumed 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]

- Permittee shall maintain sufficient records to demonstrate that corrals are maintained to ensure drainage and prevent water from standing for more than forty-eight (48) hours after a storm. [District Rules 2201]

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

Liquid Manure Handling System (S-7533-3-0)

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 Rule 2201]

- Permittee shall maintain records that only liquid animal waste treated with an anaerobic treatment lagoon is applied to fields. [District Rules 2201]

Solid Manure Handling System (S-7533-4-0)

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

- Permittee shall maintain records to demonstrate that all solid animal waste has been incorporated within seventy-two (72) hours of removal from animal housing. [District Rules 2201]

- Permittee shall maintain records to demonstrate that separated solids on the mechanical separator stacking pad are removed weekly. [District Rules 2201]

Feed Storage and Handling (S-7533-5-0)

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

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

Additionally, the permit units are subject to the recordkeeping requirements of Section 7.2 of District Rule 4570, *Confined Animal Facilities.* Recordkeeping for compliance with District Rule 4570 will be discussed under the Rule 4570 section below.

Diesel-Fired Emergency Standby IC Engine (S-7533-6-0)

Recordkeeping requirements, in accordance with District Rule 4702, will be discussed in Section VIII, *District Rule 4702*, of this evaluation.

4. Reporting

No reporting is required to demonstrate compliance with Rule 2201.

F. Ambient Air Quality Analysis

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

The proposed location is in an attainment area for NO_X, CO, and SO_X. The proposed dairy expansion 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 PM_{10} and $PM_{2.5}$. The increase in the ambient PM_{10} and $PM_{2.5}$ concentration due to the proposed dairy expansion is shown on the following table.

PM_{10} Pollutant Modeling Results
Values are in $\mu g/m^3$

Category PM_{10}	24 Hours
Proposed Dairy	9.49
Interim Significance Level	10.4[1]
Result	Pass

[1]The District has decided on an interim basis to use a threshold for fugitive dust sources of 10.4 $\mu g/m^3$ for the 24-hour average concentration.

$PM_{2.5}$ Pollutant Modeling Results
Values are in $\mu g/m^3$

Category $PM_{2.5}$	24 Hours
Proposed Dairy	1.42
Interim Significance Level	2.5[1]
Result	Pass

[1]The District has decided on an interim basis to use a threshold for fugitive dust sources of 2.5 $\mu g/m^3$ for the 24-hour average concentration.

Ambient Air Quality Analysis was also performed for the Emergency Diesel ICE (Unit S-7533-6-0). The modeling was performed for criteria pollutants NOx, SOx, PM_{10}, and $PM_{2.5}$; as well as a RMR. The emission rates used for criteria pollutant modeling were 613 lb/yr NOx, 1 lb/yr SOx, 20 lb/yr PM_{10}, and 20 lb/yr $PM_{2.5}$.

The results from the Criteria Pollutant Modeling are as follows:

Criteria Pollutant Modeling Results*

Diesel ICE	1 Hour	3 Hours	8 Hours	24 Hours	Annual
CO	NA[1]	X	NA[1]	X	X
NO_x	NA[1]	X	X	X	Pass
SO_x	NA[1]	NA[1]	X	NA[1]	Pass
PM_{10}	X	X	X	NA[1]	Pass[2]
$PM_{2.5}$	X	X	X	NA[1]	Pass[2]

*Results were taken from the attached PSD spreadsheet.
[1]The project is an intermittent source as defined in APR-1920. In accordance with APR-1920, compliance with short-term (i.e., 1-hour, 3-hour, 8-hour, and 24-hour) standards is not required.
[2]The criteria pollutants are below EPA's level of significance as found in 40 CFR Part 51.165 (b)(2).

The ambient air quality impacts at the dairy do not exceed the District's 24-hour interim threshold for fugitive dust sources or cause/contribute significantly to a violation of the State or National AAQS.

Rule 2520 Federally Mandated Operating Permits

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

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

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

Under Rule 2550, newly constructed facilities or reconstructed units or sources[6] at existing facilities would be subject to preconstruction review requirements if they have the potential to emit hazardous air pollutants (air toxics) in "major" amounts (10 tons or more of an individual pollutant or 25 tons or more of a combination of pollutants) and the new units are not already subject to a standard promulgated under Section 112(d), 112(j), or 112(h) of the Clean Air Act." Facilities or sources subject to Rule 2550 would be subject to stringent air pollution control requirements, referred to Maximum Achievable Control Technology.

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

Hazardous Air Pollutant Emissions		
HAP	lbs-milk cow-yr	Source
Methanol	1.35	UC Davis - *VOC Emission from Dairy Cows and their Excreta*, 2005
Carbon disulfide	0.027	Dr. Schmidt - *Dairy Emissions using Flux Chambers (Phase I & II)*, 2005
Eythylbenzene	0.003	
o-Xylene	0.005	
1,2-Dibromo-3chloropropane	0.011	
1,2,4-Trichlorobenzene	0.025	
Napthalene	0.012	
Hexachlorobutadiene	0.012	
Formaldehyde	0.005	
Acetaldehyde	0.029	
Chloroform	0.017	California State University Fresno (CSUF) - *Monitoring and Modeling of ROG at California Dairies*, 2005
Styrene	0.01	
Vinyl acetate[7]	0.08	Dr. Schmidt - *Dairy Emissions using*

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

[7] 0.01 + 0.07 = 0.08 lbs/hd-yr

Toluene[8]	0.162	*Flux Chambers (Phase I & II)* & California State University Fresno (CSUF) - *Monitoring and Modeling of ROG at California Dairies*, 2005
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**	

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

HAP Emissions FM Jerseys						
Type of Cow	**Number of cows**		**Emission Factor lbs/hd-yr[9]**		**lbs/yr**	**tons/yr**
Milking Cow	3200	x	1.828	=	5,850	2.9
Dry Cow	640	x	1.123	=	719	0.4
Bulls	32	X	1.123	=	36	0.02
Total				=	**6,605**	**3.3**

As shown above, each individual HAP is expected to be below 10 tons per year and total HAP emissions are expected to be below 25 tons per year. The largest individual HAP would be methanol, at 2.4 tons per year (3.3 x (1.35 lbs-methanol/1.828 lbs-HAPs)). Therefore, this facility will not be a major air toxics source and the provisions of Rule 2550 do not apply.

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

[8] 0.012 + 0.15 = 0.162 lbs/hd-yr

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

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

Rule 4001 New Source Performance Standards (NSPS)

40 CFR 60 Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

The following table demonstrates how the proposed engine(s) will comply with the requirements of 40 CFR Part 60 Subpart IIII.

40 CFR 60 Subpart IIII Requirements for New Emergency IC Engines Powering Generators (2007 and Later Model Year)	Proposed Method of Compliance with 40 CFR 60 Subpart IIII Requirements
Engine(s) must meet the appropriate Subpart IIII emission standards for new engines, based on the model year, size, and number of liters per cylinder.	The applicant has proposed the use of engine(s) that are certified to the latest EPA Tier Certification level for the applicable horsepower range, guaranteeing compliance with the emission standards of Subpart IIII.
Engine(s) must be fired on 500 ppm sulfur content fuel or less, and fuel with a minimum centane index of 40 or a maximum aromatic content of 35 percent by volume. Starting in October 1, 2010, the maximum allowable sulfur fuel content will be lowered to 15 ppm.	The applicant has proposed the use of CARB certified diesel fuel, which meets all of the fuel requirements listed in Subpart IIII. A permit condition enforcing this requirement was included earlier in this evaluation.
The operator/owner must install a non-resettable hour meter prior to startup of the engine(s).	The applicant has proposed to install a non-resettable hour meter. The following condition will be included on the permit: • This engine shall be equipped with an operational non-resettable elapsed time meter or other APCO approved alternative. [District Rule 4702, 17 CCR 93115, and 40 CFR 60 Subpart IIII]
Emergency engine(s) may be operated for the purpose of maintenance and testing up to 100 hours per year. There is no limit on emergency use.	The Air Toxic Control Measure for Stationary Compression Ignition Engines (Stationary ATCM) limits this engine maintenance and testing to 50 hours/year. Thus, compliance is expected.
The owner/operator must operate and maintain the engine(s) and any installed control devices according to the manufacturers written instructions.	The following condition will be included on the permit: • This engine shall be operated and maintained in proper operating condition as recommended by the engine manufacturer or emissions control system supplier. [District Rule 4702 and 40 CFR 60 Subpart IIII]

Rule 4002 National Emission Standards for Hazardous Air Pollutants

40 CFR 63 Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Emissions (RICE)

Emergency engines are subject to this subpart if they are operated at a major or area source of Hazardous Air Pollutant (HAP) emissions. A major source of HAP emissions is a facility that has the potential to emit any single HAP at a rate of 10 tons/year or greater or any combinations of HAPs at a rate of 25 tons/year or greater. An area source of HAPs is a facility is not a major source of HAPs. The proposed engine(s) are new stationary RICE located at an area source of HAP emissions; therefore, these engines are subject to this Subpart.

40 CFR 63 Subpart ZZZZ requires the following engines to comply with 40 CFR 60 Subpart IIII:

1. New emergency engines located at area sources of HAPs
2. Emergency engines rated less than or equal to 500 bhp and located at major sources of HAPs

The proposed engine(s) will be in compliance with 40 CFR 60 Subpart IIII.

Additionally, 40 CFR 63 Subpart ZZZZ requires engines rated greater 500 bhp and located at major sources of HAPs to meet the notification requirements of §63.6645(h); however, that section only applies if an initial performance test is required. Since an initial performance test is not required for emergency engines, the notification requirement is not applicable.

The proposed engines are expected to be in compliance with 40 CFR 63 Subpart ZZZZ.

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 in this project are used solely for the raising of dairy animals. Therefore, these units, except for permit unit S-7533-6-0, are exempt from the provisions of this rule.

Diesel-Fired Emergency Standby IC Engine (S-7533-6-0)

Since IC engines are not subject to or specifically exempt from Regulation VIII, the provisions of Rule 4101 apply to IC engines. Therefore, the following condition will be placed on the permit(s).

- {15} No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]

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 and Safety Code 41700 (Health Risk Assessment)

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

An HRA is not required for a project with a total facility prioritization score of less than one. According to the Technical Services Memo for this project (Appendix E), the total facility prioritization score including this project was less than one. Therefore, no further analysis was required and the project was approved without TBACT.

RMR Summary					
Categories	**Dairy Milking Parlor (Unit 1-0)**	**Dairy Cow Housing (Unit 2-0)**	**Dairy Lagoons (Unit 3-0)**	**Emergency Diesel ICE (Unit 6-0)**	**Project & Facility Totals**
Prioritization Score	**0.27**[1]	6.49	5.23	N/A[2]	>1.0
Acute Hazard Index	N/A	0.33	**1.00**[4]	N/A[3]	1.00[4]
Chronic Hazard Index	N/A	0.09	0.03	N/A[3]	0.12
Maximum Individual Cancer Risk	N/A	**2.11E-06**	**1.63E-06**	**7.30E-07**	4.47E-06
T-BACT Required?	**No**	**Yes**	**Yes**	**No**	
Special Permit Conditions?	**No**	**No**	**Yes**	**Yes**	

[1]The unit passed on prioritization with a score of less than 1; therefore, no further analysis was required.
[2] Prioritization for this unit was not conducted since it has been determined that all diesel-fired IC engines will result in a prioritization score greater than 1.0.
[3] Acute and Chronic Hazard Indices were not calculated since there is no risk factor, or the risk factor is so low that the risk has been determined to be insignificant for this type of unit.
[4]H2S analysis was required for this unit which resulted in an Acute Hazard Index of 1.0. The

facilitywide cumulative total for the Acute Hazard Index is now at its maximum allowed total of 1.0. No future projects are allowed for this facility without first re-examining this project.

District policy APR 1905 also specifies that the increase in emissions associated with a proposed new source or modification not have acute or chronic indices, or a cancer risk greater than the District's significance levels (i.e. acute and/or chronic indices greater than 1 and a cancer risk greater than 10 in a million).

As shown above, the emissions increases for this project was determined to be less than significant. The HRA Summary are attached in Appendix E of this report.

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

S-7533-3-0

1. The pH value cannot be any lower than 7.5.
2. The quarterly H2S concentration cannot exceed 3.82 mg/L.

S-7533-6-0

1. Modified {1901} The PM10 emissions rate shall not exceed **0.15** g/hp-hr based on US EPA certification using ISO 8178 test procedure. [District Rule 2201]
2. {1898} The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102]
3. Modified {1344} The engine shall be operated only for maintenance, testing, and required regulatory purposes, and during emergency situations. Operation of the engine for maintenance, testing, and required regulatory purposes shall not exceed **50** hours per year. [District NSR Rule and District Rule 4701]

Rule 4201 Particulate Matter Concentration

Rule 4201 limits particulate matter emissions from any single source operation to 0.1 g/dscf, which, as calculated below, is equivalent to a PM_{10} emission factor of 0.4 g-PM_{10}/bhp-hr.

$$0.1\ \frac{grain-PM}{dscf} \times \frac{g}{15.43 grain} \times \frac{1\,Btu_{in}}{0.35\,Btu_{out}} \times \frac{9{,}051 dscf}{10^6\,Btu} \times \frac{2{,}542.5\,Btu}{1\,bhp-hr} \times \frac{0.96g-PM_{10}}{1g-PM} = 0.4\,\frac{g-PM_{10}}{bhp-hr}$$

The new engine has a PM_{10} emission factor less than 0.4 g/bhp-hr. Therefore, compliance is expected and the following condition will be listed on the ATC:

- {14} Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]

Rule 4550 Conservation Management Practices (CMP)

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

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

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

The facility received District approval for its CMP plan on February 23, 2009. Continued compliance with the requirements of District Rule 4550 is expected. The applicant has proposed to comply with the same PM_{10} mitigation measures for the expansion as proposed for the existing facility.

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

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

The following condition will be placed on each permit.

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

Section 7.0 Administrative Requirements

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

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

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

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

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

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

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

- {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]

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

- {4616} Mitigation measures that are currently being implemented as required by Phase I of Rule 4570 should continue to be implemented until the mitigation measures required under this permit are implemented. [District Rule 4570]

- {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]

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

Feed 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]

- {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]

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]

- {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]

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]

- {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]

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]

- {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]

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 ≥ 65% moisture for corn; and ≥ 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:

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

- {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]

- {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]

- {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]

- {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]

- {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]

- {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]

- {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]

- {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]

- {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]

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]

- {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]

- {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]

- {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]

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]

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

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]

Optional

Flush or scrape freestall flush lanes at least three times per day.

- {4489} Permittee shall flush or scrape freestall flush lanes at least three (3) times per day. [District Rule 4570]

- {4490} Permittee shall keep records or maintain an operating plan that requires freestall flush lanes to be flushed or scraped at least three times per day. [District Rule 4570]

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]

- {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]

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 feed 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]

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]

- {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]

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]

- {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]

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]

- {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]

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]

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

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

- {4513} Permittee shall install all shade structures uphill of any slope in the corral. [District Rule 4570]

Manage corrals such that the manure depth in the corral does not exceed twelve (12) inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. The facility must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible.

- {4518} Permittee shall manage corrals such that the manure depth in the corral does not exceed twelve (12) inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events.

However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rule 4570]

{4519} Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rule 4570]

Solid Manure

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

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

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

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

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

Liquid Manure

Use an anaerobic treatment lagoon designed according to NRCS Guideline No. 359.

- {4535} Permittee shall use an anaerobic treatment lagoon designed according to NCRCS Guideline No. 359. [District Rule 4570]

- {4536} Permittee shall maintain records, such as design specifications, calculations, including Minimum Treatment Volume (MTV), Hydraulic Retention Time (HRT) demonstrating that the anaerobic treatment lagoon meets the requirements listed in the NRCS Field Office Technical Guide Code 359. [District Rule 4570]

- {4537} Permittee shall test any other parameters determined necessary by the APCO, ARB, and EPA to demonstrate compliance with rule requirements as frequently as determined necessary by the APCO, ARB, and EPA. [District Rule 4570]

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]

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]

- {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]

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]

- {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]

Therefore this facility is in compliance with this Rule.

Rule 4701 Internal Combustion Engines – Phase 1

The purpose of this rule is to limit the emissions of nitrogen oxides (NOx), carbon monoxide (CO), and volatile organic compounds (VOC) from internal combustion engines. Except as provided in Section 4.0, the provisions of this rule apply to any internal combustion engine, rated greater than 50 bhp, that requires a PTO.

The proposed engine(s) are also subject to District Rule 4702, Internal Combustion Engines. Since emissions limits of District Rule 4702 and all other requirements are equivalent or more stringent than District Rule 4701 requirements, compliance with District Rule 4702 requirements will satisfy requirements of District Rule 4701.

Rule 4702 Internal Combustion Engines

The following table demonstrates how the proposed engine(s) will comply with the requirements of District Rule 4702.

District Rule 4702 Requirements Emergency Standby IC Engines	Proposed Method of Compliance with District Rule 4702 Requirements
Operation of emergency standby engines is limited to 100 hours or less per calendar year for non-emergency	The Air Toxic Control Measure for Stationary Compression Ignition Engines (Stationary ATCM) limits this engine maintenance and testing to 50

purposes, verified through the use of a non-resettable elapsed operating time meter.	hours/year. Thus, compliance is expected.
Emergency standby engines cannot be used to reduce the demand for electrical power when normal electrical power line service has not failed, or to produce power for the electrical distribution system, or in conjunction with a voluntary utility demand reduction program or interruptible power contract.	The following conditions will be included on the permit: • {3807} An emergency situation is an unscheduled electrical power outage caused by sudden and reasonably unforeseen natural disasters or sudden and reasonably unforeseen events beyond the control of the permittee. [District Rule 4702] • {3808} This engine shall not be used to produce power for the electrical distribution system, as part of a voluntary utility demand reduction program, or for an interruptible power contract. [District Rule 4702]
The owner/operator must operate and maintain the engine(s) and any installed control devices according to the manufacturers written instructions.	A permit condition enforcing this requirement was shown earlier in the evaluation.
The owner/operator must monitor the operational characteristics of each engine as recommended by the engine manufacturer or emission control system supplier.	The following condition will be included on the permit: • {3478} During periods of operation for maintenance, testing, and required regulatory purposes, the permittee shall monitor the operational characteristics of the engine as recommended by the manufacturer or emission control system supplier (for example: check engine fluid levels, battery, cables and connections; change engine oil and filters; replace engine coolant; and/or other operational characteristics as recommended by the manufacturer or supplier). [District Rule 4702]
Records of the total hours of operation of the emergency standby engine, type of fuel used, purpose for operating the engine, all hours of non-emergency and emergency operation, and support documentation must be maintained. All records shall be retained for a period of at least five years, shall be readily available, and be made available to the APCO upon request.	The following conditions will be included on the permit: • {3496} The permittee shall maintain monthly records of emergency and non-emergency operation. Records shall include the number of hours of emergency operation, the date and number of hours of all testing and maintenance operations, the purpose of the operation (for example: load testing, weekly testing, rolling blackout, general area power outage, etc.) and records of operational characteristics monitoring. For units with automated testing systems, the operator may, as an alternative to keeping records of actual operation for testing purposes, maintain a readily accessible written record of the automated testing schedule. [District Rule 4702 and 17 CCR 93115]

	• The permittee shall maintain monthly records of the type of fuel purchased. [District Rule 4702 and 17 CCR 93115] • {3475} All records shall be maintained and retained on-site for a minimum of five (5) years, and shall be made available for District inspection upon request. [District Rule 4702 and 17 CCR 93115]

Rule 4801 Sulfur Compounds

Rule 4801 requires that sulfur compound emissions (as SO_2) shall not exceed 0.2% by volume. Using the ideal gas equation, the sulfur compound emissions are calculated as follows:

Volume SO_2 = (n x R x T) ÷ P
n = moles SO_2
T (standard temperature) = 60 °F or 520 °R
R (universal gas constant) = $\frac{10.73\,psi \cdot ft^3}{lb \cdot mol \cdot {}^\circ R}$

$$\frac{0.000015\,lb-S}{lb-fuel} \times \frac{7.1\,lb}{gal} \times \frac{64\,lb-SO_2}{32\,lb-S} \times \frac{1\,MMBtu}{9{,}051\,scf} \times \frac{1\,gal}{0.137\,MMBtu} \times \frac{lb-mol}{64\,lb-SO_2} \times \frac{10.73\,psi-ft^3}{lb-mol-{}^\circ R} \times \frac{520{}^\circ R}{14.7\,psi} \times 1{,}000{,}000 = 1.0\ ppmv$$

Since 1.0 ppmv is ≤ 2,000 ppmv, this engine is expected to comply with Rule 4801. Therefore, the following condition will be listed on the ATC to ensure compliance:

- Only CARB certified diesel fuel containing not more than 0.0015% sulfur by weight is to be used. [District Rules 2201 and 4801, 17 CCR 93115, and 40 CFR Part 60 Subpart IIII]

California Health and Safety Code 42301.6 (School Notice)

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

California Senate Bill 700 (SB 700)

FM Jerseys Dairy is an agricultural operation that raises dairy cows for the production of milk for human consumption. Pursuant to Senate Bill (SB) 700, all agricultural 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.

Both the pre-project and 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 facility has District Permits to Operate (PTO) for the existing dairy operation and has applied for ATC permits for the proposed expansion; therefore compliance with the requirements of SB 700 is expected.

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-7533-1-0, -2-0, -3-0, -4-0, -5-0, and -6-0 subject to the permit conditions on the attached draft Authorities to Construct in Appendix F.

X. Billing Information

Annual Permit Fees			
Permit Number	Fee Schedule	Fee Description	Annual Fee
S-7533-1-0	3020-06	Milking Parlors	$105.00
S-7533-2-0	3020-06	Cow Housing	$105.00
S-7533-3-0	3020-06	Liquid Manure Handling System	$105.00
S-7533-4-0	3020-06	Solid Manure Handling System	$105.00
S-7533-5-0	3020-06	Feed Storage and Handling	$105.00
S-7533-6-0	3020-10-F	1,220 bhp IC Engine	$749.00

Appendixes

A: Anaerobic Treatment lagoon Design Check
B: Quarterly Net Emissions Change
C: BACT Analysis
D: Windbreak Design
E: Summary of Health Risk Assessment (HRA) and Ambient Air Quality Analysis (AAQA)
F: Draft ATCs (S-7533-1-0, -2-0, -3-0, -4-0, -5-0, and -6-0)

APPENDIX A
Anaerobic Treatment Lagoon Design Check

FM Jerseys Dairy
S-7533

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	1098	ft	549
Width	240	ft	120
Depth	20	ft	20
Slope	3	ft	

Primary Lagoon Volume	**3,760,800 ft3**

FM Jerseys Dairy
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Lagoon Design Check in Accordance with NRCS Guideline #359

Net Volatile Solids loading Calculation

Net Volatile Solids (VS) Loading of Treatment Lagoons									
Breed: Jersey **Type of Cow**	**Number of Animals**	**x**	VS Excreted[1] (lb/day)	**x**	% Manure in Flush[2]	**x**	(1 - % VS Removed in Separation[3])	**=**	**Net VS Loading (lb/day)**
Milk Cows (Free Stall)	800	x	12.8	x	71%	x	(1 – 50%)	=	**3,635**
Milk Cows (Open corrall)	2,400		12.8		48%		(1 – 50%)	=	**7,373**
Dry Cow (Open Corrals)	640	x	6.9	x	48%	x	(1 – 50%)	=	**1,060**
Heifer (15 to 24 months)	0	x	5.3	x	48%	x	(1 – 50%)	=	**0**
Heifer (7 to 14 months)	0	x	3.7	x	48%	x	(1 – 50%)	=	**0**
Heifer (3 to 6 months)	0	x	2	x	48%	x	(1 – 50%)	=	**0**
Calf (under 3 months)	0	x	0.8	x	100%	x	(1 – 50%)	=	**0**
Bulls	32	x	6.9	x	48%	x	(1 – 50%)	=	**53**
Total for Dairy									**12,121**

[1]The Volatile Solids (VS) excretion rates for Holstein cows are taken from Table 1.b – Section 3 of ASAE D384.2 (March 2005). These values were reduced by 25% to account for the difference in size between Holstein and Jersey cows (1,350 –1500 lb for a mature Holstein cow & 900 – 1000 lb for a mature Jersey cow).

[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.

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Lagoon Design Check in Accordance with NRCS Guideline #359

Minimum Treatment Volume Calculation

MTV = TVS/VSLR

Where:

MTV = Minimum Treatment Volume (ft^3)

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

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

Minimum Treatment Volume in Primary Lagoon					
Breed: Jersey **Type of Cow**	**Net VS Loading (lb/day)**		**VSLR (lb/ft3-day)[1]**		**MTV (ft^3)**
Milk Cows (Free Stalls)	3,635	÷	0.011	=	**330,473**
Milk Cows (Open Corrals)	7,373	÷	0.011	=	**670,255**
Dry Cow (Open Corrals)	1,060	÷	0.011	=	**96,349**
Heifer (15 to 24 months)	0	÷	0.011	=	**0**
Heifer (7 to 14 months)	0	÷	0.011	=	**0**
Heifer (3 to 6 months)	0	÷	0.011	=	**0**
Calf (under 3 months)	0	÷	0.011	=	**0**
Bulls	53	÷	0.011	=	**4,817**
Total for Dairy					**1,101,894**

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

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Lagoon Design Check in Accordance with NRCS Guideline #359

Sludge Accumulation Volume

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

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

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

SAV = VPL - MTV

Where:

SAV = Sludge Accumulation Volume (ft^3)
VPL = total Volume of Primary Lagoon (ft^3)
MTV = Minimum Treatment Volume (ft^3)

SAV =	**VPL**	**-**	**MTV**	
SAV =	**3,760,800**	**1,101,894**	**=**	**2,658,906 (ft3)**

FM Jerseys Dairy
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Lagoon Design Check in Accordance with NRCS Guideline #359

Hydraulic Retention Time (HRT) Calculation

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

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

HRT = MTV/HFR

where:

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

The Hydraulic Flow Rate is Calculated below

Type	# of cows		Amount of Manure*			HFR	
Milk Cows (Free Stalls)	800	x	1.80	ft^3	=	1,440	ft^3/day
Milk Cows (Open Corrals)	2,400	x	1.80	ft^3	=	4,320	ft^3/day
Dry Cows (Open Corrals)	640	x	0.98	ft^3	=	627	ft^3/day
Heifers (15-24 mo)	0	x	0.59	ft^3	=	-	ft^3/day
Heifers (7-14 mo)	0	x	0.59	ft^3	=	-	ft^3/day
Heifers (3-6 mo)	0	x	0.23	ft^3	=	-	ft^3/day
Calves	0	x	0.11	ft^3	=	-	ft^3/day
Bulls	32	x	0.98	ft^3	=	31	ft^3/day
Total	3,872					**6,419**	**ft^3/day**
Fresh water per milk cow used in flush at milk parlor			**50**	gal/day			

* The volumes of total daily manure production for Holstein milk cows, dry cows, and large heifers were taken from Table 1.b – Section 3 of ASAE D384.2 (March 2005). These values were reduced by 25% to account for the difference in size between Holstein and Jersey cows (1,350 –1500 lb for a mature Holstein cow & 900 – 1000 lb for a mature Jersey cow).

Formula:

$$\frac{\text{Gallon}}{\text{Milk Cow*Day}} \times \frac{\#}{\text{Milk Cows}} \times \frac{ft^3}{\text{gallon}} + \frac{ft^3}{\text{day}}$$

Total HFR:

$$\frac{50\ \cancel{gal}}{\cancel{milk\ cow}*day} \times \frac{3200\ \cancel{milk\ cows}}{} \times \frac{ft^3}{7.48\ \cancel{gal}} + 6{,}419\ \frac{ft^3}{day}$$

$$= \mathbf{27{,}808.9\ ft^3/day}$$

Formula:

$$\frac{MTV\ (ft^3)}{HFR\ (ft^3)/(day)} =$$

HRT:

$$\frac{1{,}101{,}894\ ft^3}{27{,}808.9\ ft^3/day} = \mathbf{39.62373405\ days}$$

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.

Using the values in Sections VII.C.2 in the evaluation above, quarterly PE2 can be calculated as follows. Since these are all new permit units, BE =0.

Milking Parlor (S-7533-1-0)

BE (lb/qtr) S-7533-1-0					
	BE (lb/year)	÷	4 qtr/year	=	BE (lb/qtr)
NO_X	0	÷	4 qtr/year	=	0.0
SO_X	0	÷	4 qtr/year	=	0.0
PM_{10}	0	÷	4 qtr/year	=	0.0
CO	0	÷	4 qtr/year	=	0.0
VOC	0	÷	4 qtr/year	=	0.0
NH_3	0	÷	4 qtr/year	=	0.0

PE2 (lb/qtr) S-7533-1-0					
	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO_X	0	÷	4 qtr/year	=	0.0
SO_X	0	÷	4 qtr/year	=	0.0
PM_{10}	0	÷	4 qtr/year	=	0.0
CO	0	÷	4 qtr/year	=	0.0
VOC	960	÷	4 qtr/year	=	240.0
NH_3	448	÷	4 qtr/year	=	112.0

Quarterly NEC [QNEC] S-7533-1-0					
	PE2 (lb/qtr)	-	BE (lb/qtr)	=	NEC (lb/qtr)
NO_X	0.0	-	0.0	=	0.0
SO_X	0.0	-	0.0	=	0.0
PM_{10}	0.0	-	0.0	=	0.0
CO	0.0	-	0.0	=	0.0
VOC	240.0	-	0.0	=	240.0
NH_3	112.0	-	0.0	=	112.0

Cow Housing (S-7533-2-0)

BE (lb/qtr) S-7533-2-0					
	BE (lb/year)	÷	4 qtr/year	=	BE (lb/qtr)
NO_X	0	÷	4 qtr/year	=	0.0
SO_X	0	÷	4 qtr/year	=	0.0
PM_{10}	0	÷	4 qtr/year	=	0.0
CO	0	÷	4 qtr/year	=	0.0
VOC	0	÷	4 qtr/year	=	0.0
NH_3	0	÷	4 qtr/year	=	0.0

PE2 (lb/qtr) S-7533-2-0					
	PE2 (lb/year)	÷	4 qtr/year	=	PE 2 (lb/qtr)
NO_X	0	÷	4 qtr/year	=	0.0
SO_X	0	÷	4 qtr/year	=	0.0
PM_{10}	4,909	÷	4 qtr/year	=	1,227.3
CO	0	÷	4 qtr/year	=	0.0
VOC	26,811	÷	4 qtr/year	=	6,702.8
NH_3	28,998	÷	4 qtr/year	=	7,249.5

Quarterly NEC [QNEC] S-7533-2-0					
	PE2 (lb/qtr)	-	BE (lb/qtr)	=	NEC (lb/qtr)
NO_X	0.0	-	0.0	=	0.0
SO_X	0.0	-	0.0	=	0.0
PM_{10}	1,227.3	-	0.0	=	1,227.3
CO	0.0	-	0.0	=	0.0
VOC	6,702.8	-	0.0	=	6,702.8
NH_3	7,249.5	-	0.0	=	7,249.5

Liquid Manure Handling System (S-7533-3-0)

BE (lb/qtr) S-7533-3-0					
	BE (lb/year)	÷	4 qtr/year	=	BE (lb/qtr)
NO_X	0	÷	4 qtr/year	=	0.0
SO_X	0	÷	4 qtr/year	=	0.0
PM_{10}	0	÷	4 qtr/year	=	0.0
CO	0	÷	4 qtr/year	=	0.0
VOC	0	÷	4 qtr/year	=	0.0
NH_3	0	÷	4 qtr/year	=	0.0

PE2 (lb/qtr) S-7533-3-0					
	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO_X	0	÷	4 qtr/year	=	0.0
SO_X	0	÷	4 qtr/year	=	0.0
PM_{10}	0	÷	4 qtr/year	=	0.0
CO	0	÷	4 qtr/year	=	0.0
VOC	3,951	÷	4 qtr/year	=	987.8
NH_3	43,502	÷	4 qtr/year	=	10,875.5

Quarterly NEC [QNEC] S-7533-3-0					
	PE2 (lb/qtr)	-	BE (lb/qtr)	=	NEC (lb/qtr)
NO_X	0.0	-	0.0	=	0.0
SO_X	0.0	-	0.0	=	0.0
PM_{10}	0.0	-	0.0	=	0.0
CO	0.0	-	0.0	=	0.0
VOC	987.8	-	0.0	=	987.8
NH_3	10,875.5	-	0.0	=	10,875.5

Solid Manure Handling System (S-7533-4-0)

BE (lb/qtr) S-7533-4-0					
	BE (lb/year)	÷	4 qtr/year	=	BE (lb/qtr)
NO_X	0	÷	4 qtr/year	=	0.0
SO_X	0	÷	4 qtr/year	=	0.0
PM_{10}	0	÷	4 qtr/year	=	0.0
CO	0	÷	4 qtr/year	=	0.0
VOC	0	÷	4 qtr/year	=	0.0
NH_3	0	÷	4 qtr/year	=	0.0

PE2 (lb/qtr) S-7533-4-0					
	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO_X	0	÷	4 qtr/year	=	0.0
SO_X	0	÷	4 qtr/year	=	0.0
PM_{10}	0	÷	4 qtr/year	=	0.0
CO	0	÷	4 qtr/year	=	0.0
VOC	1,246	÷	4 qtr/year	=	311.5
NH_3	8,693	÷	4 qtr/year	=	2,173.3

Quarterly NEC [QNEC] S-7533-4-0					
	PE2 (lb/qtr)	-	BE (lb/qtr)	=	NEC (lb/qtr)
NO_X	0.0	-	0.0	=	0.0
SO_X	0.0	-	0.0	=	0.0
PM_{10}	0.0	-	0.0	=	0.0
CO	0.0	-	0.0	=	0.0
VOC	311.5	-	0.0	=	311.5
NH_3	2,173.3	-	0.0	=	2,173.3

Feed Handling (S-7533-5-0)

BE (lb/qtr) S-7533-5-0					
	BE (lb/year)	÷	4 qtr/year	=	BE (lb/qtr)
NO_X	0	÷	4 qtr/year	=	0.0
SO_X	0	÷	4 qtr/year	=	0.0
PM_{10}	0	÷	4 qtr/year	=	0.0
CO	0	÷	4 qtr/year	=	0.0
VOC	0	÷	4 qtr/year	=	0.0
NH_3	0	÷	4 qtr/year	=	0.0

PE2 (lb/qtr) S-7533-5-0					
	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO_X	0	÷	4 qtr/year	=	0.0
SO_X	0	÷	4 qtr/year	=	0.0
PM_{10}	0	÷	4 qtr/year	=	0.0
CO	0	÷	4 qtr/year	=	0.0
VOC	35,600	÷	4 qtr/year	=	8,900.0
NH_3	0	÷	4 qtr/year	=	0.0

Quarterly NEC [QNEC] S-7533-5-0					
	PE2 (lb/qtr)	-	BE (lb/qtr)	=	NEC (lb/qtr)
NO_X	0.0	-	0.0	=	0.0
SO_X	0.0	-	0.0	=	0.0
PM_{10}	0.0	-	0.0	=	0.0
CO	0.0	-	0.0	=	0.0
VOC	8,900.0	-	0.0	=	8,900.0
NH_3	0.0	-	0.0	=	0.0

Diesel-Fired Emergency Standby IC Engine (S-7533-6-0)

BE (lb/qtr) S-7533-6-0					
	BE (lb/year)	÷	4 qtr/year	=	BE (lb/qtr)
NO_X	0	÷	4 qtr/year	=	0.0
SO_X	0	÷	4 qtr/year	=	0.0
PM_{10}	0	÷	4 qtr/year	=	0.0
CO	0	÷	4 qtr/year	=	0.0
VOC	0	÷	4 qtr/year	=	0.0
NH_3	0	÷	4 qtr/year	=	0.0

PE2 (lb/qtr) S-7533-6-0					
	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO_X	613	÷	4 qtr/year	=	153.3
SO_X	1	÷	4 qtr/year	=	0.3
PM_{10}	20	÷	4 qtr/year	=	5.0
CO	351	÷	4 qtr/year	=	87.8
VOC	32	÷	4 qtr/year	=	8.0
NH_3	0	÷	4 qtr/year	=	0.0

Quarterly NEC [QNEC] S-7533-6-0					
	PE2 (lb/qtr)	-	BE (lb/qtr)	=	NEC (lb/qtr)
NO_X	153.3	-	0.0	=	153.3
SO_X	0.3	-	0.0	=	0.3
PM_{10}	5.0	-	0.0	=	5.0
CO	87.8	-	0.0	=	87.8
VOC	8.0	-	0.0	=	8.0
NH_3	0.0	-	0.0	=	0.0

APPENDIX C
BACT Analysis

FM Jerseys Dairy (S-7533, Project # S-1090443)

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....*".[10] 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. PM_{10} Emissions from Dairies

The National Ambient Air Quality Standards currently regulate concentrations of particulate matter with an aerodynamic diameter of 10 micrometers or less (PM_{10}) and particulate matter with an aerodynamic diameter of 2.5 micrometers or less ($PM_{2.5}$). Studies have shown that particles in the smaller size fractions contribute most to human health effects. The $PM_{2.5}$ standard was published in 1997, but is only recently beginning to be implemented because of the time that was required to resolve litigation regarding the standard. On April 5, 2005, EPA finalized classification of areas for the $PM_{2.5}$ standard. On April 21, 2011 District Rule 2201 – New and Modified Stationary Source Review Rule was amended to incorporate PM2.5 new and modified source review requirements.

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 feed, bedding materials, dry manure, and unpaved soil surfaces such as corrals.

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.

[10] Settlement Agreement. Western United Dairymen, Alliance of Western Milk Producers v. San Joaquin Valley Air Pollution Control District, settled in the Fresno Superior Court September 2004 (http://www.valleyair.org/busind/pto/dpag/settlement.pdf

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.[11] 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. Emissions from Silage and Total Mixed ration (TMR):

Volatile Organic Compounds (VOCs) are created during the process that is used to create silage, which is preserved, fermented plant matter that is fed to cattle. The purpose of silage production is to move the ensiled plant material from an aerobic phase to an anaerobic phase as quickly as possible and achieve a rapid drop in pH that will hinder further microbial decomposition in order to preserve the nutritive value of the forage. The rapid drop in pH is primarily caused by conversion of soluble carbohydrates to nonvolatile lactic acid. In addition to lactic acid, alcohols (primarily ethanol), volatile fatty acids (primarily acetic acid), and other VOC compounds (primarily oxygenated VOCs) are also formed during the process. These VOCs largely remain trapped in the silage piles until the silage is exposed to the surrounding atmosphere at the open face of the silage pile from where silage is removed, during mixing, or when placed in feed lanes for the cattle to consume as a Total Mixed Ration (TMR). Once exposed to the surrounding air much of the VOCs contained in the silage and TMR will begin to be rapidly emitted to the atmosphere and the concentration of the VOCs in the silage and TMR will decrease. Loss of VOCs from the silage and TMR can be reduced by minimizing the area exposed to the atmosphere and good silage management practices that will reduce the formation of these VOCs in the silage reduce aerobic deterioration, which leads to heating of the open faces of silage piles and of the TMR placed in the feed lanes.

4. Ammonia Emissions from Dairies

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

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

acids, which are produced from sulfur dioxide and nitrogen oxides in the ambient air, to form ammonium sulfate, ammonium nitrate, and other fine particulates.[12] 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 manure handled as liquids and semi-solids or slurries, but will volatize rapidly with drying from manure handled as solids.

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 application.[13]

5. Hydrogen Sulfide Emissions from Dairies

Hydrogen Sulfide (H_2S) is produced from the anaerobic decomposition of organic sulfur compounds. In the absence of oxygen, sulfur reducing bacteria in the lagoons and storage ponds reduce sulfate ions in the manure into sulfide. Aqueous sulfide exists in three different forms: molecular (un-dissociated) hydrogen sulfide (H_2S) and the bisulfide (HS^-) and sulfide (S^{2-}) ions. In aqueous solutions molecular H_2S exists in equilibrium with the bisulfide (HS-) and sulfide (S^{2-}) ions but only molecular H_2S, 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 a solution is a function of temperature and pH. Under acidic conditions (pH < 7) greater amounts of sulfide will be in the form of molecular H_2S and the potential for H_2S emissions will increase. As the pH increases, a greater proportion of sulfide will be in the ionic form and the potential for H_2S emissions will decrease.

In a dairy, the conditions for the production of hydrogen sulfide exist in small amounts such as wet indentions in corrals, manure piles, and separated solids piles. However, the most significant sources are the liquid manure lagoons and storage ponds.

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

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

II. Top Down BACT Analysis for the Milking Parlor (Permit S-7533-1)

1. BACT Analysis for VOC Emissions from the Milking Parlor:

a. Step 1 - Identify all control technologies

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

1) Enclose, capture, and incineration (≈93%; 95% Capture, 98% Control)
2) Enclose, capture, and biofiltration (≈76%; 95% Capture, 80% Control)
3) Flush/spray down milking parlors after each group of cows is milked (≈16.5% of the total VOC emissions from the milking parlors; 75% of manure emissions)

Description of Control Technologies

1) Milking Parlor vented to an incinerator capable of achieving 98% control

Milking parlors can be either naturally or mechanically ventilated. According to some dairy designers, mechanical ventilation is more reliable than natural ventilation. Mechanical ventilation can be easily applied to all areas of the milking parlors, except the holding area. 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. Although the feasibility of such a technology is in question, it will be considered in this analysis. The captured VOC emissions could then be sent to an incinerator. Thermal incineration is a well-established VOC control technique. During combustion, gaseous hydrocarbons are oxidized to form CO_2 and water. It is assumed that 95% of the gasses emitted from the milking parlor will be captured by the mechanical ventilation system and that 98% of the captured VOCs will be eliminated by thermal incineration[14]; therefore the total control for VOCs from the milking parlor = 0.95 x 0.98 = 93.1%.

2) Milking Parlor vented to a biofilter capable of achieving 80% control

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

[14] OAQPS Control Cost Manual, 4th Edition, EPA 450/3-90-006, January 1990, page 3-8.

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 milking parlors will be captured by the mechanical ventilation system and that a properly functioning biofilter will eliminate 80% of the captured VOCs[15]; therefore, the total control for VOCs from the milking parlor = 0.95 x 0.80 = 76%.

3) 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 VOC emissions, is removed from the milking parlors many times a day by flushing after each milking. 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 milking parlors. 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 flushing or spraying out the milking parlors after each group of cows is milked 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. It will be assumed that the control efficiency for VOCs emitted from manure is 75%. Enteric emissions compose approximately 78% of the VOC emissions from the milking parlor and VOC emissions from the manure make up the remaining 22%; therefore the total control for VOCs from the milking parlor = 0.75 x 0.22 =16.5%.

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) Enclose, capture, and incineration (≈93% of VOC emissions from the milking parlors)

[15] According to the SCAQMD Rule 1133.2 final staff report (page 18) "Technology Assessment Report states a well designed, well operated, and well-maintained biofilter is capable of achieving 80% destruction efficiency for VOC and NH_3."

2) Enclose, capture, and biofiltration (≈76% of VOC emissions from the milking parlors)
3) Flush/spray after each group of cows is milked (≈16.5% of VOC emissions from the milking parlors)

d. Step 4 - Cost Effectiveness Analysis

Thermal and 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.

Air Flow Rate of Milking Parlor

In order to effectively calculate the costs of this control option, the airflow rate of the milking parlors must be determined. According to Cornell University's publication "Environmental Controls for Today's Milking Center", the minimum ventilation rate required for milking parlors is 15 room exchanges per hour in the winter and 60 to 90 room exchanges per hour in the summer.[16] For calculation purposes, an average airflow rate of 35 room exchanges per hour will assumed for the new milking parlor.

As discussed in section I of this evaluation, the dairy is proposing to milk 3,200 milk cows with an 80-stall rotary milking parlor. According to the drawings submitted, the milking parlor are approximately 143 ft long by 86 ft wide and is conservatively assumed to have a height of 20 feet. The total airflow rate is calculated as follows:

143 ft x 86 ft x 20 ft x 35/hr = 8,608,600 ft^3/hr

Fuel Requirement for Thermal Incineration:

The gas leaving the milking parlors is principally air, with a volumetric specific heat of 0.0194 Btu/scf-°F under standard conditions.

Natural Gas Requirement = (flow)(Cp_{Air})(ΔT)(1-HEF)

Where:

Flow (Q) = exhaust flow rate of VOC exhaust
Cp_{Air} = specific heat of air: 0.0194 Btu/scf
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

[16] Environmental Control for Today's Milking Center, C.A. Gooch, http://www.ansci.cornell.edu/tmplobs/doc217.pdf

Natural Gas Requirement = (8,608,600 scf/hr)(0.0194 Btu/scf)(600°F - 100°F)(1-0.7)
= **25,051,026 Btu/hr**

Fuel Cost for Thermal Incineration:

The cost for natural gas will be based upon the average spot market contract price for the October 2011 – March 2012 taken from the Energy Information Administration website (http://tonto.eia.doe.gov/dnav/ng/ng_sum_lsum_dcu_SCA_m.htm).

Average Cost for natural gas = $6.48/MMBtu

The oxidizer is assumed to operate 12 hours per day and 365 days per year.

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

25,051,026 Btu/hr x 1 MMBtu/10^6 Btu x 12 hr/day x 365 day/year x $6.48/MMBtu
= **$711,008/year**

VOC Emission Reductions for Thermal Incineration

The annual VOC Emission Reductions for the milking parlors is calculated as follows:

[Number of milk cows] x [Uncontrolled Milking Parlor VOC EF (lb/milk cow-year)] x [Capture Efficiency] x [Thermal Incinerator Control Efficiency]

= (3,200 milk cows) x (0.44 lb-VOC/milk cow-year) x (0.95) x (0.98)
= **1,311 lb-VOC/year**

Cost of VOC Emission Reductions

Cost of reductions = ($711,008/year)/((1,311 lb-VOC/year)(1 ton/2000 lb))
= **$1,084,680/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.

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 effective

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." 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 stated above, the minimum ventilation rate required for milking parlor is 15 room exchanges per hour in the winter and 60 to 90 room exchanges per hour in the summer.[21] For more conservative calculations, a warm weather airflow rate of 60 room exchanges will be assumed for the milking parlor. According to the applicant, the new milking parlor is 143 ft long by 86 ft wide and are conservatively assumed to have a height of 20 feet. The maximum airflow rate entering the biofilter is calculated as follows:

143 ft x 86 ft x 20 ft x 60/hr x 1 hr/60 min = 245,960 cfm

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/cfm x 245,960 cfm = $578,006

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.

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

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

N = Equipment Life (10 years)

A = $[\$578,006 \times 0.1(1.1)^{10}]/[(1.1)^{10}-1]$
= **$94,068/year**

VOC Emission Reductions for Biofiltration

The annual VOC Emission Reductions for the milking parlors is calculated as follows:

[Number of milk cows] x [Uncontrolled Milking Parlor VOC EF (lb/milk cow-year)] x [Capture Efficiency] x [Biofilter Control Efficiency]

= (3,200 milk cows) x (0.44 lb-VOC/milk cow-year) x (0.95) x (0.80)
= **1,070 lb-VOC/year**

Cost of VOC Emission Reductions

Cost of reductions = ($94,068/year)/((1,070 lb-VOC/year)(1 ton/2000 lb))
= **$175,828/ton of VOC reduced**

As shown above, the capital cost alone for a biofilter 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.

Flushing/Spraying down Milking Parlor after each Group of Cows is Milked:

The applicant has proposed this option; therefore a cost-effective 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 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 milking parlor.

III. Top Down BACT Analysis for the Cow Housing Permit Unit (S-7533-2-0)

1. BACT Analysis for PM_{10} Emissions from the Cow Housing Permit Unit:

a. Step 1 - Identify all control technologies

The following control options were identified for PM_{10} emissions from the new freestall barns and corrals.

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
   - Windbreaks/Shelterbelts

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 PM_{10}.

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 PM_{10} emissions. Additionally, the manure that is deposited in the lanes and walkways will be flushed, which will prevent PM_{10} emissions from drying manure.

Shade Structures in corrals
Installing shade structures in corral areas helps to decrease PM_{10} 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 PM_{10} emissions are expected because of drier conditions. PM_{10} emissions are reduced because the cows will spend less time walking on the dry corral surface.

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.

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) 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
   - Windbreaks/Shelterbelts

d. Step 4 - Cost Effectiveness Analysis

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
- Windbreaks/Shelterbelts

The applicant has proposed these options; therefore a cost-effective analysis is not required.

e. Step 5 - Select BACT

The facility is proposing weekly scraping of open corrals in the morning hours except when prevented by wet conditions; concrete all feed lanes and walkways; install shade structures in open corrals; and install upwind and down wind windbreaks that satisfy BACT requirements.

2. BACT Analysis for VOC Emissions from the Cow Housing Permit Unit:

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 (≈93%; 95% Capture, 98% Control of 100% of cow housing emissions)
2) Enclosed freestalls vented to an incinerator - Mature cows only (≈92% overall control of entire housing; 95% capture, 98% Control of 99% of cow housing emissions[17])
3) Enclosed freestalls vented to a biofilter - Entire herd (≈76%; 95% Capture, 80% Control of 100% of cow housing emissions)
4) Enclosed freestalls vented to a biofilter - Mature cows only (≈75% overall control of entire housing; 95% Capture, 80% Control of 99% of cow housing emissions[18])
5) Feed and Manure Management Practices (≈22%)
   - Concrete feed lanes and walkways for all cows
   - Freestall feed lanes and walkways for milk cows and dry cows flushed four times per day (≈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 two times per day
   - 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) 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

[17] Emissions from cow housing (S-7533-2-0) is equal to 26,811 lbs/hd-yr for all cows, while emissions from mature cows is equal to 26,707 lbs/hd-yr. Therefore, mature cows represent 99% of the emissions from the cow housing (26,707 lbs/hd-yr/26,811 lbs/hd-yr). The overall control efficiency can then be calculated as follows: 95% Capture x 98% Control x 99 % of emissions = 92% overall control efficiency from entire cow housing.
[18] The overall control efficiency can be calculated as follows: 95% Capture x 80% Control x 99% of emissions = 75% overall control efficiency.

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 incineration[14]; therefore the total control for VOCs from the freestall barns = 0.95 x 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 VOCs[15]; therefore, the total control for VOCs from the cow housing permit unit = 0.95 x 0.80 = 76%.

3) Feed and Manure Management Practices

<u>Concrete Feed Lanes and Walkways</u>

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 are 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 PM_{10}, 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 report[19], 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 x 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 waste.[20] This undigested protein also produces ammonia emissions. The level of microbial action in the manure corresponds to the level of

[19] "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).

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

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 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.

1) Enclosed freestalls vented to an incinerator (≈93%; 95% Capture, 98% Control)
2) Enclosed freestalls vented to an incinerator - Mature cows only (≈92% overall control of entire housing; 95% capture, 98% Control of 99% of cow housing emissions)

3) Enclosed freestalls vented to a biofilter (≈76%; 95% Capture, 80% Control)
4) Enclosed freestalls vented to a biofilter - Mature cows only (≈75% overall control of entire housing; 95% Capture, 80% Control of 99% of cow housing emissions)
5) Feed and Manure Management Practices (≈22%)
   - Concrete feed lanes and walkways for all cows.
   - Freestall feed lanes and walkways for milk cows flushed four times per day (≈ 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.

d. Step 4 - Cost Effectiveness Analysis

Thermal and 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)			
Age	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.[21]

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 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 worst-case 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, the new dairy consists of the following: 3,200 milk cows; and 640 dry cows. 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:

[21] 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)

Type of cow	# of cows	cfm/cow	min/hr	ft^3/hr
Milk cow	3,200	335	60	64,320,000
Dry cow	640	335	60	12,864,000
Bulls	32	335	60	643,200
Total				**77,827,200**

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.

Natural Gas Requirement = (flow)(Cp_{Air})(ΔT)(1-HEF)

Where:

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

= (77,827,200 scf/hr)(0.0194 Btu/scf-°F)(600 °F - 100 °F)(1-0.7)
= **226,477,152 Btu/hr**

Fuel Cost for Thermal Incineration:

The cost for natural gas will be based upon the average spot market contract price for the October 2011 – March 2012 taken from the Energy Information Administration website (http://tonto.eia.doe.gov/dnav/ng/ng_sum_lsum_dcu_SCA_m.htm).

Average Cost for natural gas = $6.48/MMBtu

The oxidizer is assumed to operate 12 hours per day and 365 days per year.

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

226,477,152 Btu/hr x 1 MMBtu/10^6 Btu x 12 hr/day x 365 day/year x $6.48/MMBtu
= $6,427,965/year

VOC Emission Reductions for Thermal Incineration

The uncontrolled cow housing VOC EF for holstein cows will be adjusted by a factor of 72% to account for the smaller size, feed consumption, and manure production of the jersey cows in this dairy.

Uncontrolled Housing VOC EF for Jersey Milk Cows = 12.4 lb-VOC/cow-year x 0.72
= 8.9 lb-VOC/cow-year

Uncontrolled Housing VOC EF for Jersey Dry Cows = 8.2 lb-VOC/cow-year x 0.72
= 5.9 lb-VOC/cow-year

Uncontrolled Housing VOC EF for Jersey Bulls = 7.7 lb-VOC/cow-year x 0.72
= 5.5 lb-VOC/cow-year

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

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

Type of cow	# of cows	EF- lbs/hd-yr	CE	lbs-VOC/yr
Milk cow	3,200	8.9	93%	26,486
Dry cow	640	5.9	93%	3,512
Bulls	32	5.5	93%	164
Total				**30,162**

Cost of VOC Emission Reductions

Cost of reductions = ($6,427,965/year)/((30,162 lb-VOC/year)(1 ton/2000 lb))
= **$426,229/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. Additional costs such as the cost of constructing freestalls for all support stock, enclosing all freestalls, and the cost of installing and operating a cooling system for cow comfort would make it even less cost effective to install this technology. 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, the expansion will consist of the following number of mature cows: 3,840 mature cows (3,200 jersey milk cows and 640 dry cows). The milk cows are proposed to be housed in freestalls and dry cows housed in corrals. Enclosed freestalls will be evaluated as a housing alternative for the mature cows.

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

Type of cow	# of cows	cfm/cow	min/hr	ft^3/hr
Milk cow	3,200	335	60	64,320,000
Dry cow	640	335	60	12,864,000
Total				**77,184,000**

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.

Natural Gas Requirement = (flow)(Cp_{Air})(ΔT)(1-HEF)

Where:

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

= (77,184,000 scf/hr)(0.0194 Btu/scf-°F)(600 °F - 100 °F)(1-0.7)
= **224,605,440 Btu/hr**

The cost for natural gas will be based upon the average spot market contract price for the October 2011 – March 2012 taken from the Energy Information Administration website (http://tonto.eia.doe.gov/dnav/ng/ng_sum_lsum_dcu_SCA_m.htm).

Average Cost for natural gas = $6.48/MMBtu

The oxidizer is assumed to operate 12 hours per day and 365 days per year.

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

224,605,440 Btu/hr x 1 MMBtu/10^6 Btu x 12 hr/day x 365 day/year x $6.48/MMBtu
= **$6,374,841/year**

VOC Emission Reductions for Thermal Incineration

The uncontrolled cow housing VOC EF for holstein cows will be adjusted by a factor of 72% to account for the smaller size, feed consumption, and manure production of the jersey cows in this dairy.

Uncontrolled Housing VOC EF for Jersey Milk Cows = 12.4 lb-VOC/cow-year x 0.72
= 8.9 lb-VOC/cow-year

Uncontrolled Housing VOC EF for Jersey Dry Cows = 8.2 lb-VOC/cow-year x 0.72
= 5.9 lb-VOC/cow-year

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

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

Type of cow	# of cows	EF- lbs/hd-yr	CE	lbs-VOC/yr
Milk cow	3,200	8.9	93%	26,486
Dry cow	640	5.9	93%	3,512
Total				**29,998**

Cost of VOC Emission Reductions

Cost of reductions = ($6,374,841/year)/((29,998 lb-VOC/year)(1 ton/2000 lb))
= **$425,018/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. Additional costs such as the cost of constructing freestalls for dry cows, enclosing all freestalls, and the cost of installing and operating a cooling system for cow comfort would make it even less cost effective to install this technology. 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 effective 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."[22] The cost is largely dependent on the

[22] "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

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 in the thermal/catalytic incineration section, the following average year round airflow requirements will be assumed for worst-case purposes (based on the averages from the Minnesota's publication "Improving Mechanical Ventilation in Dairy Barns"[22]. See discussion on page 17 of this BACT analysis): 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, the new dairy consists of the following: 3,200 jersey milk cows; 640 dry cows; and 32 bulls. Enclosed freestalls 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:

Type of cow	# of cows	cfm/cow	cfm
Milk cow	3,200	335	1,072,000
Dry cow	640	335	214,400
Bulls	32	335	10,720
Total			**1,297,120**

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 cfm x 1,297,120 cfm = $3,048,232

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.

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

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

$A = [\$3,048,232 \times 0.1(1.1)^{10}]/[(1.1)^{10}-1]$
= **$496,086/year**

VOC Emission Reductions for Biofiltration

The uncontrolled cow housing VOC EF for holstein cows will be adjusted by a factor of 72% to account for the smaller size, feed consumption, and manure production of the jersey cows in this dairy.

Uncontrolled Housing VOC EF for Jersey Milk Cows = 12.4 lb-VOC/cow-year x 0.72
= 8.9 lb-VOC/cow-year

Uncontrolled Housing VOC EF for Jersey Dry Cows = 8.2 lb-VOC/cow-year x 0.72
= 5.9 lb-VOC/cow-year

Uncontrolled Housing VOC EF for Jersey Bulls = 7.7 lb-VOC/cow-year x 0.72
= 5.5 lb-VOC/cow-year

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 [Overal Control Efficiency]

Type of cow	# of cows	EF- lbs/hd-yr	CE	lbs-VOC/yr
Milk cow	3,200	8.9	76%	21,645
Dry cow	640	5.9	76%	2,870
Bulls	32	5.5	76%	134
Total				**24,648**

Cost of VOC Emission Reductions

Cost of reductions = ($496,086/year)/((24,648 lb-VOC/year)(1 ton/2000 lb))
= **$40,254/ton of VOC reduced**

As shown above, the capital cost alone for a biofilter would cause the cost of the VOC reductions to be greater than the $17,500/ton cost effectiveness threshold of the District BACT policy. Additional costs such as the cost of constructing freestalls for all support stock, enclosing all freestalls, and the cost of installing and operating a cooling system for cow comfort would make it even less cost effective to install this technology.

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, the expansion will consist of the following number of mature cows: 3,840 mature cows (3,200 jersey milk cows and 640 dry cows). Enclosed freestalls will be evaluated as a housing alternative for the mature cows.

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

Type of cow	# of cows	cfm/cow	cfm
Milk cow	3,200	350	1,120,000
Dry cow	640	350	224,000
Total			**1,344,000**

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/cfm x 1,344,000 cfm = **$3,158,400**

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.

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

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

$$A = [\$3,158,400 \times 0.1(1.1)^{10}]/[(1.1)^{10}-1]$$
$$= \mathbf{\$514,015/year}$$

VOC Emission Reductions for Biofiltration

The uncontrolled cow housing VOC EF for holstein cows will be adjusted by a factor of 72% to account for the smaller size, feed consumption, and manure production of the jersey cows in this dairy.

Uncontrolled Housing VOC EF for Jersey Milk Cows = 12.4 lb-VOC/cow-year x 0.72
= 8.9 lb-VOC/cow-year

Uncontrolled Housing VOC EF for Jersey Dry Cows = 8.2 lb-VOC/cow-year x 0.72
= 5.9 lb-VOC/cow-year

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 [Capture Efficiency] x [Biofilter Control Efficiency]

Type of cow	# of cows	EF- lbs/hd-yr	CE	lbs-VOC/yr
Milk cow	3,200	8.9	76%	21,645
Dry cow	640	5.9	76%	2,870
Total				**24,515**

Cost of VOC Emission Reductions

Cost of reductions = ($514,015/year)/((24,515 lb-VOC/year)(1 ton/2000 lb))
= **$41,935/ton of VOC reduced**

As shown above, the capital cost alone for a biofilter would cause the cost of the VOC reductions to be greater than the $17,500/ton cost effectiveness threshold of the District BACT policy. Additional costs such as the cost of constructing freestalls for dry cows, enclosing all freestalls, and the cost of installing and operating a cooling system for cow comfort would make it even less cost effective to install this technology. Therefore, this option is not cost effective and is being removed from consideration at this time.

Manure Management Practices:

- Concrete feed lanes and walkways for all cows.
- Freestall feed lanes and walkways for milk cows flushed four times per day and feed lanes and walkways in the corrals for the remaining animals flushed at two times per day.
- 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.

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 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; 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.

3. BACT Analysis for NH_3 Emissions from the Cow Housing Permit Unit:

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 NH_3 emissions from the cow housing permit unit and have been proposed by the applicant:

1) Manure Management Practices
   - Concrete feed lanes and feed walkways for all cows
   - Feed lanes and walkways for milk cows and dry cows flushed four times per day and feed lanes and walkways in the corrals for the remaining animals flushed at two times per day
   - 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) 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 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 PM_{10}, VOC, and ammonia emissions. The manure deposited in the lanes, which is also a source of NH_3 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.

Open Corrals Sloped to Facilitate Runoff and Drying
This practice requires the corrals to be sloped so that runoff water having contacted manure can be channeled to a potential place of removal, storage, or treatment, rather than stay in the corrals and create anaerobic conditions.

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) Manure Management Practices
   - Concrete feed lanes and feed walkways for all cows
   - Freestall feed lanes and walkways for milk cows flushed four times per day and feed lanes and walkways in the corrals for the remaining animals flushed at least two times per day
   - 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 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 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; 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 NH_3 emissions from the cow housing permit.

IV. Top Down BACT Analysis for the Liquid Manure Handling System - Lagoon & Storage Pond (S-7533-3-0)

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

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 (≈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. (≈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 (≈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 Guideline. [3]

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

As stated above, the gas generated in the covered lagoon 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 CO_2 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 (CH_4), carbon dioxide (CO_2), and water rather than intermediate metabolites (VOCs). The National Resource 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 (≈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. (≈75%)

3) Anaerobic Treatment Lagoon designed to meet Natural Resources Conservation Service (NRCS) standards (≈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 effective 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. According to Dr. Ruihong Zhang of the University of California, Davis, 2.4 lbs (1.1 kg) of oxygen (O_2) per cow must be provided each day for complete removal of Biological Oxygen Demand (BOD_5).[23] This does not include the additional oxygen that would be required for conversion of ammonia to nitrate (nitrification). The typical aeration efficiencies for mechanical aerators range from 1 to 2 kg of oxygen (O_2) provided per kW-hr of energy utilized.[23] For this analysis it will be assumed that the mechanical aerators provide the average of 1.5 kg of oxygen (O_2) per kW-hr of energy. The yearly energy requirement per cow is calculated as follows:

[23] 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/ag/caf/dairypnl/dmtfaprprt.pdf)

[(1.1 kg/cow-day) ÷ (1.5 kg/kW-hr)] x (365 day/year) = 267.67 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, and the BOD loading from the bull will be 100% of milk cows.[24]

As discussed in the evaluation, after completion of the project, the dairy will house 3,200 jersey milk cows, 640 dry cows, and 32 bulls. The amount of electricity required for complete aeration of the lagoon system is calculated as follows:

(3,200 milk cows x 267.67 kW/cow-year) + (640 dry cows x 0.8 x 267.67 kW/cow-year) + (32 bulls x 267.67 kW/cow-year) = 1,002,156 kW-hr/year

Cost of Electricity for Complete Aeration:

The cost for electricity is based upon on an average retail price of industrial electricity in California for the year 2011 taken from the Energy Information Administration (EIA) Website: http://www.eia.doe.gov/cneaf/electricity/epm/table5_6_b.html.

Average Cost for electricity = $0.1202/kW-hr

The electricity costs for complete aeration are calculated as follows:

1,002,156 kW-hr/year x $0.1202/kW-hr
= $120,459/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 uncontrolled cow lagoon and land application VOC EF for holstein cows will be adjusted by a factor of 72% to account for the smaller size, feed consumption, and manure production of the jersey cows in this dairy.

Uncontrolled Lagoon VOC EF for Jersey Milk Cows = 2.7 lb-VOC/cow-year x 0.72
= 1.9 lb-VOC/cow-year

Uncontrolled Lagoon VOC EF for Jersey Dry Cows = 1.4 lb-VOC/cow-year x 0.72
= 1.0 lb-VOC/cow-year

Uncontrolled Lagoon VOC EF for Jersey Bulls = 1.6 lb-VOC/cow-year x 0.72

[24] 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)

= 1.2 lb-VOC/cow-year

Uncontrolled Land VOC EF for Jersey Milk Cows = 5.0 lb-VOC/cow-year x 0.72
= 3.6 lb-VOC/cow-year

Uncontrolled Land VOC EF for Jersey Dry Cows = 2.3 lb-VOC/cow-year x 0.72
= 1.7 lb-VOC/cow-year

Uncontrolled Land VOC EF for Jersey Bulls = 2.9 lb-VOC/cow-year x 0.72
= 2.1 lb-VOC/cow-year

The annual VOC Emission Reductions for the lagoons, storage ponds, and liquid manure land application unit are calculated as follows:

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

[(3,200 milk cows x 1.9 lb-VOC/milk cow-year) + (640 dry cows x 1.0 lb-VOC/milk cow-year) + (32 bulls x 1.2 lb-VOC/cow-year)] x 0.95 + [(3,200 milk cows x 3.6 lb-VOC/milk cow-year) + (640 dry cows x 1.7 lb-VOC/milk cow-year) + (32 bulls x 2.1 lb-VOC/cow-year)] x 0.95

=[6,758 lb-VOC/year x 0.95] + [12,675 lb-VOC/year x 0.95]

= **18,461 lb-VOC/year**

Cost of VOC Emission Reductions

Cost of reductions = ($120,459/year)/((18,461 lb-VOC/year)(1 ton/2000 lb))
= **$13,050/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 Guideline[3].

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-effective 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 an anaerobic treatment lagoon, as described in full detail under section VI, Emission Control Technology Evaluation, of the main evaluation. The applicant's proposal therefore meets the BACT requirements under this category.

e. Step 5 - Select BACT

The facility is proposing an anaerobic treatment lagoon designed according to National Resource 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 NH_3 Emissions from the Lagoon & Storage Pond

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 Inc[3], 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 NH_3 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 NH_3 emissions from the lagoons/storage ponds.

V. Top Down BACT Analysis for the Liquid Manure Handling System – Liquid Manure Land Application (S-7533-3-0)

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 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 (≈95%)
2) Anaerobic Treatment Lagoon designed to meet Natural Resources Conservation Service (NRCS) standards (≈40%)
3) Injection of Liquid and Slurry Manure (≈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, 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. 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) 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 (CH_4), carbon dioxide (CO_2), and water rather than intermediate metabolites (VOCs). The National Resource 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.

3) 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 NH_3 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 be a feasible BACT option in their report of BACT options for dairies in the San Joaquin Valley.[25]

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. 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; therefore, this option 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) Aerobic Treatment Lagoon – mechanical aeration to achieve a dissolved oxygen concentration of 2.0 mg/L (≈95%)

2) Anaerobic Treatment Lagoon designed to meet Natural Resources Conservation Service (NRCS) standards (≈40%)

d. Step 4 - Cost Effectiveness Analysis

Aerobic Treatment Lagoon:

The preceding cost analysis performed for the BACT analysis for VOC emissions from the lagoon and storage pond demonstrated that the energy costs alone, not including any capital costs, caused complete aeration to exceed the District VOC cost effective 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 analysis is required for complete aeration.

Anaerobic Treatment Lagoon:

[25] 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/dpag_idx.htm)

The applicant has proposed a this control method; therefore a cost-effectiveness analysis is not required.

e. Step 5 - Select BACT

The facility is proposing an anaerobic treatment lagoon designed according to National Resource 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 NH_3 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 Producers Inc[3], 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 NH_3 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 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 NH_3 emissions from liquid manure land application.

VI. Top Down BACT Analysis for the Solid Manure Handling and Land Application System (S-7533-4-0)

Solid manure refers to manure that has a solid content of 20% or greater. The manure produced by the dry cows and heifers at George and Marie Petrissans Dairy will be scraped from the feed lanes and walkways in the partial house corrals. This manure will be primarily handled as a solid. This BACT analysis will be performed from the solid manure that will be scraped from the feed lanes and walkways in the partial house corrals

1. BACT Analysis for VOC Emissions from Solid Manure Handling & Land Application:

a. Step 1 - Identify all control technologies

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

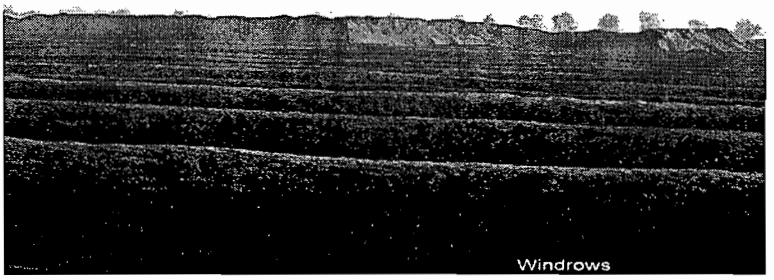
The following options were identified as possible controls for VOC emissions from Solid Manure Handling and Land Application:

1) Open Windrow Composting
2) Open Aerated Static Pile (ASP) (≈23.2%)
3) Open Negatively Aerated Static Pile vented to biofilter ≥ 80% destruction efficiency for both active and curing phases (or a combination of controls) (≈84.6%)
4) Enclosed Negatively Aerated Static Pile (≈33.2%)
5) In-Vessel/Enclosed Negative Aerated Static Piles vented to biofilter ≥ 80% destruction efficiency for both active and curing phases (or a combination of controls) (≈86.6%)
6) Daily Land Application with Immediate Incorporation (≈43.5%)

Description of Control Technologies

1) Open Windrow Composting

Composting is the aerobic decomposition of manure or other organic materials in the thermophilic temperature range (104–149 degrees F). It is the same process that decays leaves and other organic debris in nature. Composting controls the conditions so that the natural decomposition process occurs at a faster rate. Composting can be performed using windrows. A windrow process involves forming long piles (windrows as shown in the picture below) turned by specially designed machines. Typically the rows are 1 to 2 meters high and 2 to 5 meters at the base. The piles are turned periodically to mix and introduce and rebuild bed porosity. This helps to insure that all the material is uniformly composted. However, studies have shown that VOC and ammonia emissions from open windrow composting are significant.



Co-composting is a three-stage process that begins as soon as appropriate materials are combined and piled together. The initial stage of the process is referred to as active composting followed by curing or finishing, and storage and/or processing of composted products.

The composted material is usually odorless, fine-textured, and low-moisture, and can be bagged and sold for use in gardens, nurseries or used as fertilizer on cropland. Composting improves the handling characteristics of any organic residue by reducing its volume and weight. Composting also kills pathogens and weed seeds. Composting reduces material volume through natural biological action and produces a product that enhances soil structure and benefits new growth.

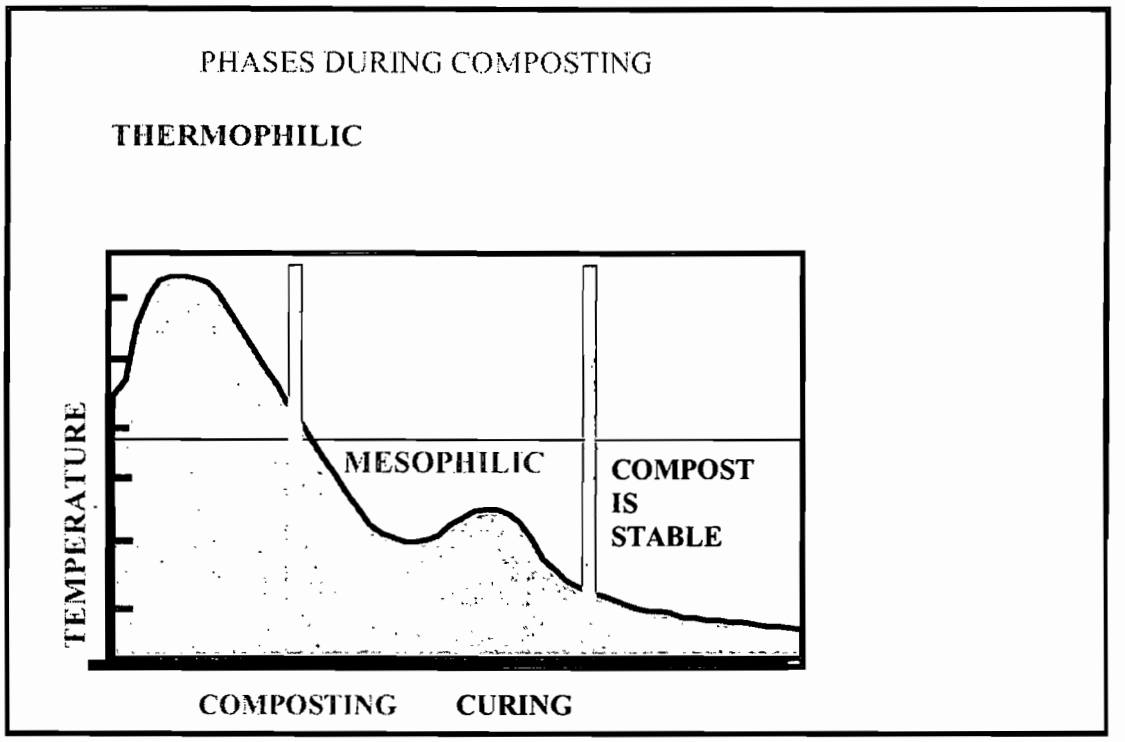
Active composting phase (Thermophilic stage):
Based on SCAQMD Rule 1133.2, titled "Emission Reductions from Co-Composting Operations" the active composting phase is the phase of the composting process that begins when organic materials are mixed together for composting purposes and lasts approximately 22 days. According to SCAQMD, 80% of VOC emissions and 50% of NH_3 emissions occur during the first 22 days of composting.[26] The active phase of composting is where the population of thermophilic microorganisms is usually the highest. This stage is characterized by high temperatures, high level of oxygen demand, and high evaporation rates due to temperature.

Curing phase (Mesophilic stage):
Conversely, the curing stage of the process is where the mesophilic microorganism population is the highest and the need for oxygen and evaporation rates decreases. The curing phase is defined in SCAQMD Rule 1133.2 as "a period that begins immediately after the active phase and lasts 40 days or until the compost exhibits a Solvita Maturity Index of 7, or the product respiration rate is below 10 milligrams of oxygen per gram of volatile solids per day as measured by direct respirometry". 20% of VOC emissions and 50% of NH_3 emissions are expected to occur during this phase.[27]

VOC emissions from composting:
VOC emissions primarily occur during the active and curing phases of the composting. To ensure consistent temperatures within the piles, a layer of finished compost can be placed on top of the active and curing phase piles. This helps minimize volatility of VOCs at the surface of the compost piles.

[26] Page 8 of SCAQMD Rule 1133 final staff report
[27] SCAQMD Rule 1133 Technology Assessment

There is a linkage between the microbial activity and the VOC emissions profile from composting operations. Emissions are generally higher during thermophilic temperatures and lower during mesophilic temperatures. The figure below illustrates the oxygen demand and microbial profile of the various composting stages. This figure also illustrates the corresponding VOC emissions primarily occurring during active and curing phases of composting.[28]



This graphic was provided by Eliot Epstein, Ph.D. Chief Environmental Scientist, Tetra Tech, Inc.
*VOC emissions are expected to follow the similar profile as oxygen demand.

During the composting process the volume of waste will be reduced anywhere from 40–50 percent. The rate at which manure will compost depends on the following[29]: moisture content; pH; temperature; amount of oxygen available; size of particles in the material; the carbon-to-nitrogen ratio - the weight of decomposable carbon to the weight of total nitrogen in an organic material

The bacterial breakdown of substrates in the material being composted produces various organic and inorganic gases that can contribute to several different air pollution problems. Source testing conducted by the SCAQMD District in 1994 and early 1995 indicated that outdoor windrow composting of dewatered sewage sludge releases significant levels of ammonia, methane and VOCs (SCAQMD, 1995).

[28] Page 9-10, SCAQMD Final Staff Report for Proposed Rules 1133, 1133.1, and 1133.2.
[29] Proposed SCAQMD Rule 1133 (Pages 1-6)

Disadvantages of composting organic residues include loss of nitrogen and other nutrients, time for processing, cost for handling equipment, available land for composting, odors, marketing, and slow release of available nutrients. During a three year Nebraska study as much as 40 percent of total beef feedlot manure nitrogen and 60 percent of total carbon was lost to the atmosphere during composting[30]. Increasing the carbon-to-nitrogen ratio by incorporating high carbon materials (leaves, plant residue, paper, sawdust, etc.) can reduce nitrogen loss.

2) Negatively Aerated Static Pile (ASP)

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

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

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

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

A study conducted by City of Columbus, Ohio, demonstrated that the weighted-average odor emissions from an outdoor negative aeration pile is approximately 67% lower than those from an outdoor positive aeration pile. Negative aeration is usually used during the beginning of the composting process to greatly reduce odors. In enclosed active composting area, negative pressure aeration also reduces moisture released into the building, and thus, reduces fogging. Positive aeration is used mostly near the end of the composting cycle for more efficient drying of the compost.[31]

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[30] University of Nebraska-Lincoln

[31] Technology Assessment for SCAQMD proposed Rule 1133 Page 3-2

An odor and emissions study done at the City of Philadelphia biosolids co-composting facility by the Department of Water[32] also concluded that controlling the temperature by controlling the oxygen availability using negative aeration composting is expected to result in lower emissions than those from open windrow composting.

3) Open negatively aerated static pile with exhaust vented to a biofilter > 80% control efficiency

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

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

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

Organic(s) + Oxygen + Nutrients + Microorganisms => CO_2 + H_2O + Microorganisms

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

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

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

demonstrates that a well-designed, well-operated, and well-maintained biofilter is capable of achieving 80% control efficiency for VOC and ammonia.[33]

4) Enclosed Aerated Static Pile

An enclosed aerated static pile uses the same forced aeration principle of an open ASP, except that the entire pile is fully enclosed. There are a few companies that are promoting this type of system. In this evaluation, the following two companies will be discussed: AgBag International Ltd and the Gore Cover. Both technologies are briefly described below:

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

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

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

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

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

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

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

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

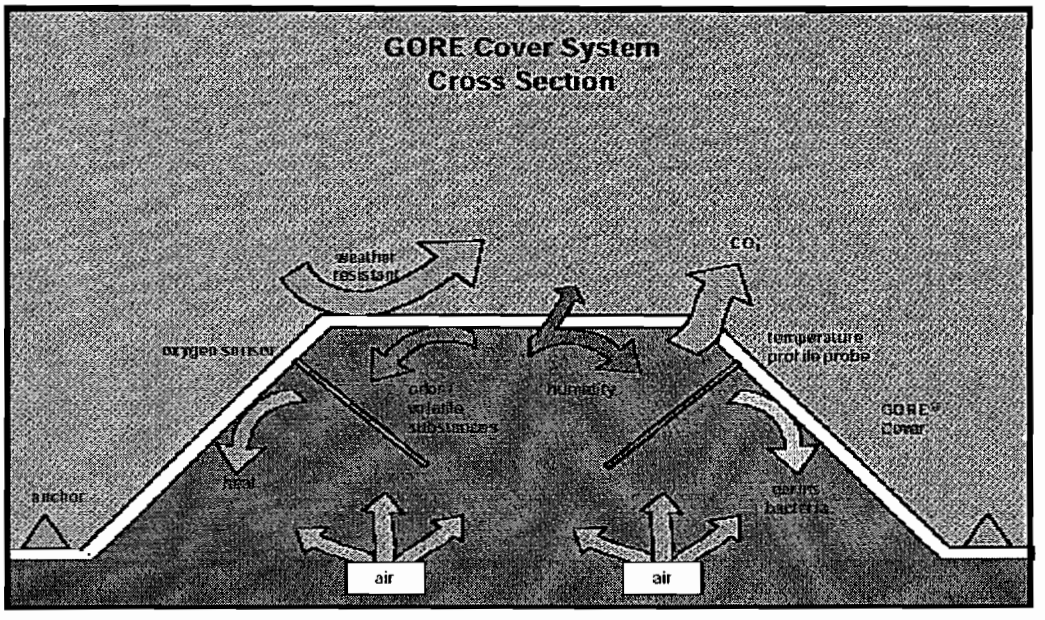
AgBag is working closely with SCAQMD and the Milk Producers Council to perform a pilot study to evaluate the efficiency of this technology. Until the study is completed, this technology will be conservatively assumed to control emissions by at least 10% more than open aerated static piles, with a minimum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

Gore Cover

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

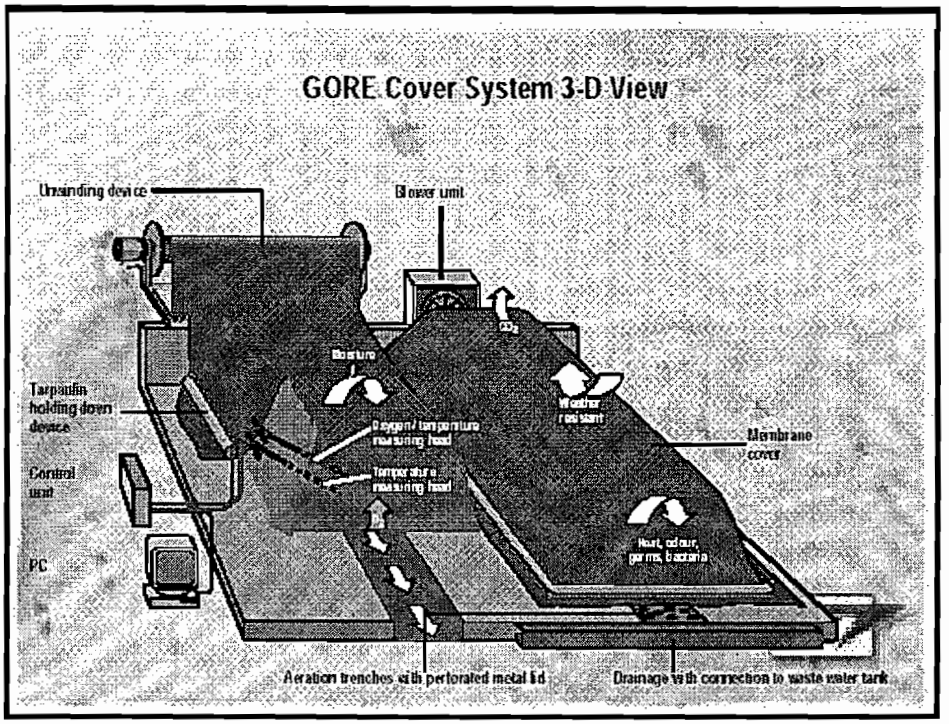
In addition to the membrane, which covers the organic material during composting, the system includes a concrete floor and wall, blowers for aeration, and a winder for efficient movement of the cover. The system also requires consistent management including preparation of materials to achieve a homogenous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

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



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

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



The Gore Cover technology is being implemented in over 140 facilities, mainly in Europe and the Mid East. This technology is capable of reducing anywhere from 90-97% of the odor created. However, not much is known regarding the control efficiencies for VOC and ammonia emissions. Oley Shermeta from Oley Shermeta Environmental has stated that this technology is superior to other in-vessel systems and has control efficiencies greater than 80% for both VOC and ammonia. However, at this point in time, there is no data to validate this. Mr. Shermeta has stated that he will gather all the information necessary to validate his claims and will provide this information to the District as soon as possible.

Until the data is presented, this technology will also be conservatively assumed to control emissions by at least 10% more than open aerated static piles, with a minimum control efficiency of 33.2% (similar to AgBag). Once the data is available, the District will be able to more accurately determine the control efficiency for this technology.

5) In-Vessel/Enclosed Negatively Aerated Static Piles with exhaust vented to biofilter > 80% control efficiency

An in-vessel system confines the composting material within a building or container and uses forced air and mechanical turning to speed up the composting process. The systems enclosed ASP discussed above (AgBag and the Gore Cover) are also considered in-vessel systems. In these types of systems, close to 100% capture efficiency can be achieved. The captured gases can be sent to a control device such as a biofilter.

The enclosed systems typically allow treatment to be completed in less time than the windrow or aerated pile by providing better control of composting conditions. Rapid treatment time is offset by the high initial cost of the composting reactor.

There are a few co-composting facilities that compost in a fully enclosed building. One of these facilities is located in Rockland County, New York. This facility began operations in February of 1999. However, this facility processes biosolids from five publicly owned treatment works (POTWs) and does not process any dairy manure. A brief explanation of system at this the facility is discussed below in order to show some of the intricacies and costs of this type of system.

The facility was designed to handle 110 wet tons/day. The facility had to go through a 12-week odor control acceptance test, which included performance testing of ammonia, reduced sulfur compounds, VOCs and hydrogen sulfide. The facility is located approximately 1,000 feet away from a residential development. New York state regulations required that the facility not cause any objectionable odor impacts, however the required removal rates could not be guaranteed with conventional open biofilter systems. Consequently, proposals for proprietary biofilter systems were evaluated where the required performance could be guaranteed. A system was selected supplied by Envirogen with a guaranteed odor removal rate of 94%. The Envirogen package cost $1,670,000 and included supply and construction/installation of the exhaust fans, dual pretreatment scrubbers with chemical feed system, enclosed biofilter, and discharge stack. In addition to odor concentration, removal rate guarantees were provided for ammonia, hydrogen sulfide, and methyl mercaptn. Ammonia removal of 99% was achieved. VOC concentrations in the inlet averaged in the 20-ppmv range with peaks exceeding 200 ppmv as propane. Based on the data collected, VOCs were reduced from an average 15 ppmv in the inlet to less than 0.5 ppmv in the outlet, or a removal rate greater than 95 percent.

There are also two in-vessel composting systems that are currently being operated in the South Coast AQMD. Both use control equipment for ammonia, VOCs, and odors as well. However, these operations are currently composting materials other than manure.

No dairy or heifer facilities could be identified that are currently utilizing these types of in-vessel composting systems at their facility. The in-vessel systems, although very efficient in controlling emissions, can be extremely costly and are not considered to be cost effective for confined animal facilities at this time.

6) Daily Incorporation of Solid Manure into cropland

Incorporation of solid manure into the soil immediately after removal from animal housing will reduce emissions by minimizing the amount of time that the solid waste is exposed to the atmosphere. Limiting the exposure of the solid manure to the atmosphere will reduce the rate of volatilization of gaseous pollutants, such as VOCs and ammonia, thereby reducing overall emissions. Once the solid manure has been incorporated into the soil, VOCs will be absorbed onto particles of soil providing the opportunity for the VOCs to be oxidized into carbon dioxide and water[34].

[34] 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)

Based on estimates in 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", daily incorporation of solid manure removed from the cow housing will be assumed to have a 43% control efficiency for VOC emissions from solid manure handling and land application until data becomes available.

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) In-Vessel/Enclosed Negative Aerated Static Piles vented to biofilter $\geq$ 80% destruction efficiency for both active and curing phases (or a combination of controls) (≈86.6%)[35]
2) Open Negatively Aerated Static Pile vented to biofilter $\geq$ 80% destruction efficiency for both active and curing phases (or a combination of controls) (≈84.6%)[36]
3) Daily Land Application with Immediate Incorporation (≈43.5%)
4) Enclosed Negatively Aerated Static Pile (≈33.2%)[37]
5) Open Negatively Aerated Static Pile (ASP) (≈23.2%)[38]
6) Open Windrow Composting (0%)

d. Step 4 - Cost Effectiveness Analysis

Aerobic Treatment Lagoon:

[35] According to the SCAQMD Rule 1133.2 final staff report (page 18) "Technology Assessment Report states a well designed, well operated, and well-maintained biofilter is capable of achieving 80% destruction efficiency for VOC and NH3." The overall control efficiency of this technology is equal to the combined control efficiencies of the enclosed aerated system (33.2%) and the biofilter. (80%), calculated as follows: (0.332) + (1-0.332)*0.8 =86.6%

[36] The overall control efficiency of this technology is equal to the combined control efficiencies of the open aerated system (23.2%) and the biofilter. (80%), calculated as follows: (0.232) + (1-0.232)*0.8 =84.6%

[37] There is no control efficiency available at this time for enclosed aerated static piles, however vendors for this technology are claiming a high degree of control. A study is under way by SQAQMD and the Milk Producers Council to determine the control efficiencies for VOC and ammonia emissions from enclosed aerated composting systems. Until the study is conducted, this technology will be conservatively assumed to control emissions by at least 10% more than open aerated static piles, with a minimum control efficiency of 33.2%.

[38] Control Efficiency is based on emissions capture efficiency of 25 to 33% from an open ASP multiplied by a conservative 80% control equipment efficiency from the Technology Assessment for Proposed Rule 1133 Table 3-2. The average control efficiency for open aerated static piles based on the Technology Assessment is 23.2%. Additional emission reduction potential from ASP cannot be quantified at this time.

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

Option 1) In-Vessel/Enclosed Composting vented to a biofilter; Option 2) Open Aerated Static Pile (ASP) vented to a biofilter; Option 4) Enclosed ASP; and Option 5) Open ASP

A cost effectiveness was evaluated by SCAQMD for a variety of controls for new and existing co-composting facilities based on implementation of several possible scenarios. The cost effectiveness for new co-composting facilities was estimated to be about $24,000 to $27,000 per ton of VOC reduced or $11,000 to $12,000 per ton of VOC and ammonia reduced based on fabric or concrete type of enclosure for the active phase of composting and forced aeration system for the active and curing phases vented to a bio-filter.[39]

For existing co-composting operations, SCAQMD analyzed a few different scenarios. Under one of the scenarios, assuming enclosure without an aeration system for active phase of composting and a forced aeration system for curing phase (both vented to a biofilter) and depending on the type of enclosure, the cost-effectiveness ranged from $11,400 to $15,400 per ton of VOC and ammonia reduced, or $30,000 to $40,000 per ton of VOC reduced. Under another scenario, using enclosure and aeration system for active phase, and aeration system for curing phase, both vented to biofilter, the cost effectiveness ranged from $8,700 to $10,000 per ton of VOC and ammonia reduced or $23,000 to $26,500 per ton of VOC reduced (depending on the type of enclosure). Under another scenario, assuming that forced aeration system (in combination with process controls, optimized feedstock mix ratios, and best management practices) for both active and curing phases (combined with a biofiltration system) could achieve the required reductions (i.e., 70% for VOC and ammonia), the cost-effectiveness could be as low as $6,500 per ton of VOC and ammonia reduced or $17,000 per ton of VOC reduced. However, SCAQMD stated that additional test data would be necessary to validate the efficiency of such control methods.[40]

The VOC and ammonia baseline emission factors, used in determining the cost effective analysis (also included in Rule 1133.2), were developed based on the AQMD source tests conducted in 1995 and 1996 for three windrow co-composting facilities (1.78 pounds of VOC and 2.93 pounds of ammonia per ton of throughput). These emission factors do not accurately represent the baseline emissions of manure storage piles from dairy/calf facilities. The emission factor for manure piles may in fact be lower.

Enclosed ASP or in-vessel systems with control equipment, while feasible and effective at significantly reducing emissions, are costly. There may be additional emission reductions associated with ASP systems that have not been quantified in this evaluation. Additional testing of ASP systems, such as the ones discussed in this

[39] Final Staff report for proposed Rule 1133, 1133.1, and 1133.2)

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

evaluation would allow the emission reduction potential of all control scenarios to be refined.

Therefore, all aerated static composting systems will be eliminated at this time.

Daily Land Application with Immediate Incorporation:

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

e. Step 5 - Select BACT

The facility is proposing to land apply and immediately incorporate the manure scraped from the feed lanes and walkways in the housing for the all cows on a daily basis.

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 Solid Manure Handling and land Application.

2. BACT Analysis for NH_3 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 NH_3 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

amount of undigested nitrogen compounds in the manure. The level of microbial action in the manure corresponds to the level of organic nitrogen content in the manure; the lower the level of nitrogen the lower the level of microbial action and the lower the production of ammonia and VOCs.

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

2) 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 NH_3 emissions from solid manure handling and land application.

VII. Top Down BACT Analysis for the Feed Handling and Storage (S-7533-5-0)

1. BACT Analysis for VOC Emissions from Feed Handling and Storage:

a. Step 1 - Identify all control technologies

The following options were identified as possible controls for VOC emissions from feed and silage:

1) Fully Enclosed Silage Vented to a Control Device
2) Feed and Silage Management Practices:
   - 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)
   - Cover or ensile all silage piles except the face of pile.
   - Collect leachate from the silage piles and send it to a waste treatment system such as a lagoon at least once every 24 hours.
   - Silage face management–only disturb the require area of face.
   - Compliance with District Rule 4570 mitigation measures.

Description of Control Technologies

1) Fully Enclosed Silage Vented to a Control Device

This control would entail total containment of the silage in a sealed space such as a silo, plastic bag, or building. The containment would then be ducted and vented appropriately to ensure that any emissions coming off the silage is captured and directed to a VOC control device such as a thermal oxidizer or biofilter, as already described in full in the preceding parts of this evaluation.

2) Management Practices

Various management measures can be used to minimize the release of VOC emissions from silage. These measures include feeding all animals in accordance with NRC or other District-approved guidelines, building silage piles with higher bulk densities, using silage additives and inoculants, limiting the number of silage piles faces exposed for access purposes, using a silage shaver/facer to maintain a clean silage pile face, and covering the surfaces of the silage piles or using sealed silage bags. These management practices, which are included in full detail in the District Rule 4570 discussion section, either reduce the quantities of VOCs produced by the silage, or reduce the rate at which the VOCs already produced escape into the atmosphere.

b. Step 2 - Eliminate technologically infeasible options

Fully Enclosed Silage Vented to a Control Device cannot reasonably be considered to be technologically feasible at this point, as explained below:

Production of silage is an anaerobic process whose purpose is to move the ensiled plant material from an aerobic phase to an anaerobic phase as quickly as possible and achieve a rapid drop in pH that will hinder further microbial decomposition in order to preserve the nutritive value of the forage. The rapid drop in pH is primarily caused by conversion of soluble carbohydrates to nonvolatile lactic acid.

Infiltration of air into the ensiled material is highly undesirable as this encourages the growth of aerobic microbes which cause decomposition (spoilage) of the feed. Aerobic deterioration and heating of silage in bunkers or piles are well-known problems. Many steps are taken to prevent this loss of nutritive value. Active venting of silage would therefore be completely counter-intuitive to the silage making process as it would introduce air into the silage and result in spoilage and the loss of nutritive value that producers are attempting to avoid.

Passive venting of silage to a control device may be considered to be more feasible but this option is not currently reasonable. Because of the need to maintain anaerobic conditions to preserve the nutritive value of the silage, silage piles are usually tightly compacted and covered with plastic to prevent air penetration. Because most of the surface area of silage piles will usually have a compacted surface covered by plastic, the vast majority of emissions will be from the part of the pile that is uncovered to allow removal of feed. Machinery must access this open portion of the silage pile at various times throughout the day to withdraw feed for the animals; therefore, enclosing this portion of the pile to allow passive ventilation is not reasonable.

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 Silage Management Practices

d. Step 4 - Cost Effectiveness Analysis

Since the remaining control option has been achieved in practice and/or proposed by the applicant, a cost effectiveness analysis is not required.

e. Step 5 - Select BACT

The facility is proposing to comply with the feed and silage management practices including District Rule 4570 mitigation measures.

VIII. Top Down BACT Analysis for the 1,220 bhp Diesel-Fired Emergency Standby Internal Combustion (IC) Engine (S-7533-6-0)

Top Down BACT Analysis for the Emergency IC Engine

BACT Guideline 3.1.1 (July 10, 2009) applies to emergency diesel IC engines. In accordance with the District BACT policy, information from that guideline will be utilized without further analysis.

1. BACT Analysis for NO_X and VOC Emissions:

a. Step 1 - Identify all control technologies

BACT Guideline 3.1.1 identifies only the following option:

- *Latest EPA Tier Certification level for applicable horsepower range*

To determine the latest applicable Tier level, the following EPA and state regulations were consulted:

- 40 CFR Part 60 Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines
- 40 CFR Part 89 – Control of Emissions from New and In-Use Nonroad Compression – Ignition Engines
- 40 CFR Part 1039 – Control of Emissions from New and In-Use Nonroad Compression-Ignition Engines
- Title 17 CCR, Section 93115 - Airborne Toxic Control Measure (ATCM) for Stationary Compression-Ignition (CI) Engines

40 CFR Parts 89 and 1039, which apply only to nonroad engines, do not directly apply because the proposed emergency engine(s) do not meet the definition of a nonroad engine. Therefore, only Title 17 CCR, Section 93115 and 40 CFR Part 60 Subpart IIII apply directly to the proposed emergency engine(s).

Title 17 CCR, Section 93115.6(a)(3)(A) (CARB stationary diesel engine ATCM) applies to emergency standby diesel-fired engines and requires that such engines be certified to the emission levels in Table 1 (below). Please note that these levels are at least as stringent or more stringent than the emission levels in 40 CFR Subpart IIII.

Table 1: Emission Standards for New Stationary Emergency Standby Diesel-Fueled CI Engines g/bhp-hr (g/kW-hr)					
Maximum Engine Power	**Tier**	**Model Year(s)**	**PM**	**NMHC+NOx**	**CO**
50 ≤ HP < 75 (37 ≤ kW < 56)	2	2007	0.15 (0.20)	5.6 (7.5)	3.7 (5.0)
	4i	2008+		3.5 (4.7)	
75 ≤ HP < 100 (56 ≤ kW < 75)	2	2007	0.15 (0.20)	5.6 (7.5)	3.7 (5.0)
	3	2008+		3.5 (4.7)	
100 ≤ HP < 175 (75 ≤ kW < 130)	3	2007	0.15 (0.20)	3.0 (4.0)	3.7 (5.0)
		2008+			
175 ≤ HP < 300 (130 ≤ kW < 225)	3	2007	0.15 (0.20)	3.0 (4.0)	2.6 (3.5)
		2008+			
300 ≤ HP < 600 (225 ≤ kW < 450)	3	2007	0.15 (0.20)	3.0 (4.0)	2.6 (3.5)
		2008+			
600 ≤ HP ≤ 750 (450 ≤ kW ≤ 560)	3	2007	0.15 (0.20)	3.0 (4.0)	2.6 (3.5)
		2008+			
HP > 750 (kW > 560)	2	2007	0.15 (0.20)	4.8 (6.4)	2.6 (3.5)
		2008+			

Additionally, 40 CFR Subpart IIII establishes emission standards for emergency diesel IC engines. These emission standards are the same as those specified in the CARB ATCM, except for engines rated greater than or equal to 50 and less than 75 hp. For such IC engines, the CARB ATCM is more stringent.

Therefore, the most stringent applicable emission standards are those listed in the CARB ATCM (Table 1).

For IC engines rated greater than or equal to 50 hp and less than 75 hp the the higherst Tier required is Tier 4i. For IC engines rated greater than or equal to 75 hp and less than 750 hp the highest Tier reqired is Tier 3. For engines rated equal to or greater than 750 hp the highest Tier required is Tier 2.

Also, please note that neither the state ATCM nor the Code of Federal Regulations require the installation of IC engines meeting a higher Tier standard than those listed above for emergency applications, due to concerns regarding the effectiveness of the exhaust emissions controls during periods of short-term operation (such as testing operational readiness of an emergency engine).

The proposed engine(s) is/are rated at 1,220 hp. Therefore, the applicable control technology option is EPA Tier 2 certification.

b. Step 2 - Eliminate technologically infeasible options

The control option listed in Step 1 is not technologically infeasible.

c. Step 3 - Rank remaining options by control effectiveness

No ranking needs to be done because there is only one control option listed in Step 1.

d. Step 4 - Cost Effectiveness Analysis

The applicant has proposed the only control option remaining under consideration. Therefore, a cost effectiveness analysis is not required.

e. Step 5 - Select BACT

BACT for NOx and VOC will be the use of an EPA Tier 2 certified engine. The applicant is proposing such a unit. Therefore, BACT will be satisfied.

APPENDIX D

Windbreak Design

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FM Jerseys Dairy
Windbreak Establishment

Purpose -

Improve air quality by reducing and intercepting air borne particulate matter and odors.

Criteria -

The location, layout and density of the planting will accomplish the purpose and function intended within a 20 year period.

The maximum design height for the windbreak shall be the expected height of the tallest row of trees or shrubs at age 20 for the given site.

Species must be adapted to the soils, climate and site conditions.

Spacing between individual plants shall be based on the needed growing space for plant type and species, the accommodation of maintenance equipment, and the desired characteristics of the stem(s), branches and canopy as required for a specific purpose.

Orientation to wind direction and length of the windbreak will be defined by property boundaries, pre-existing construction/development and on-site utilities.

Supplemental watering will be provided for plant establishment and growth.

Windbreak density on the leeward(downwind) side of the project shall be greater than 65%.

Tree species shall be selected with foliar and structural characteristics to optimize interception of particulate matter, adsorption and absorption of airborne odors.

Plans and Specifications -

Wind direction is from Northwest to Southeast. The proposed open corrals are located on the north and east side of the dairy facility.

Tall Trees - (2 species), spacing 25 feet.

Raywood Ash (*Fraxinus oxycarpa* "Raywoodi")
Fast growing, dark green leaves. Grows to a height of 35-45 feet and a spread of 30 feet. Plantings will be from bare-root, 3/4" diameter.

Western Cottonwood (*Populus fremontii*)
Fast growing, thick flossy triangular leaves. Grows to a height of 40-60 feet. Plantings will be from bare-root, 3/4" diameter.

1. These trees will grow up to 8 feet per year and reach their full mature height within 5 to 7 years.

2. These trees are deciduous and densely branched such that the disruption of air flow is effective even when the trees are bare of leaves.

3. Anticipated density is greater than 65% from ground level to a height greater than 35 feet (tall),

4. These trees have structural characteristics which will optimize interception of particulate matter , adsorption and absorption of airborne odors.

Medium Trees - (2 species), spacing 15 feet, 20 feet from row 1.

Pine (Pinus eldarica)
Tall, to 60 feet, trunk usually slender with short branches forming an open round topped head. Evergreen. Plantings will be from 5 gallon containers.

Krauter Vesuvius Flowering Plum (*Prunus cerasifera Krauter Vesuvuis*)
Upright, oval form. Mature height is 15 to 20 feet with a spread of 15 to 20 feet. Plantings will be from bare-root, 3/4" diameter.

Shrubs - (2 Species), spacing 5 feet (evergreen), 7 feet deciduous

Chaste Tree (*Vitex agnus castus*) grows fairly slowly to 15 feet in height and cascades all the way to the ground. They are tolerant of a variety of soil

conditions. They are deciduous. Plantings will be from 5 gallon containers.

Photinia (*Roseaceae*) fast-growing dense shrub that is evergreen and can grow to 10 to 15 feet tall. It can form a very dense hedge. Plantings will be from 5 gallon containers.

Downwind

South side of dairy - Beginning approximately 650 feet west of Road 124 and approximately 2,050 feet south of Avenue 164, extending west approximately 1,070 feet to near the easternmost hay barn.

East side of dairy - Beginning approximately 230 feet south of Avenue 164 and 600 feet west of Road 124, extending south approximately 700 feet. Beginning approximately 1,215 feet south of Avenue 164 and 600 feet west of Road 124, extending south approximately 750 feet.

1. Two (2) rows of trees, one (1) row of shrubs on the south side (downwind)
2. Two rows (trees), tall and medium 20 feet apart.
3. The trees in each row are spaced 25 feet from each other in the tall row and 15 feet from each other in the medium row in alternate spaces.
4. One (1) row of shrubs, eight (8) feet from the row of trees, five (5) to seven (7) feet apart depending on deciduous or evergreen.
5. Two rows of trees are nearest the dairy facilities, the third row (shrubs) is east of the trees, furthest from the facility.

Operation and Maintenance -

A. Replacement of dead trees or shrubs will be continued until the windbreak is functional.

B. Supplemental water will be provided as needed.

C. Windbreak will be pruned or thinned to maintain its function.

D. Trees will be inspected periodically and protected from adverse impacts including insects, diseases or competing vegetation.

References -

1. Windbreak/Shelterbelt Establishment, Code 380, NRCS, NHCP, January 2006

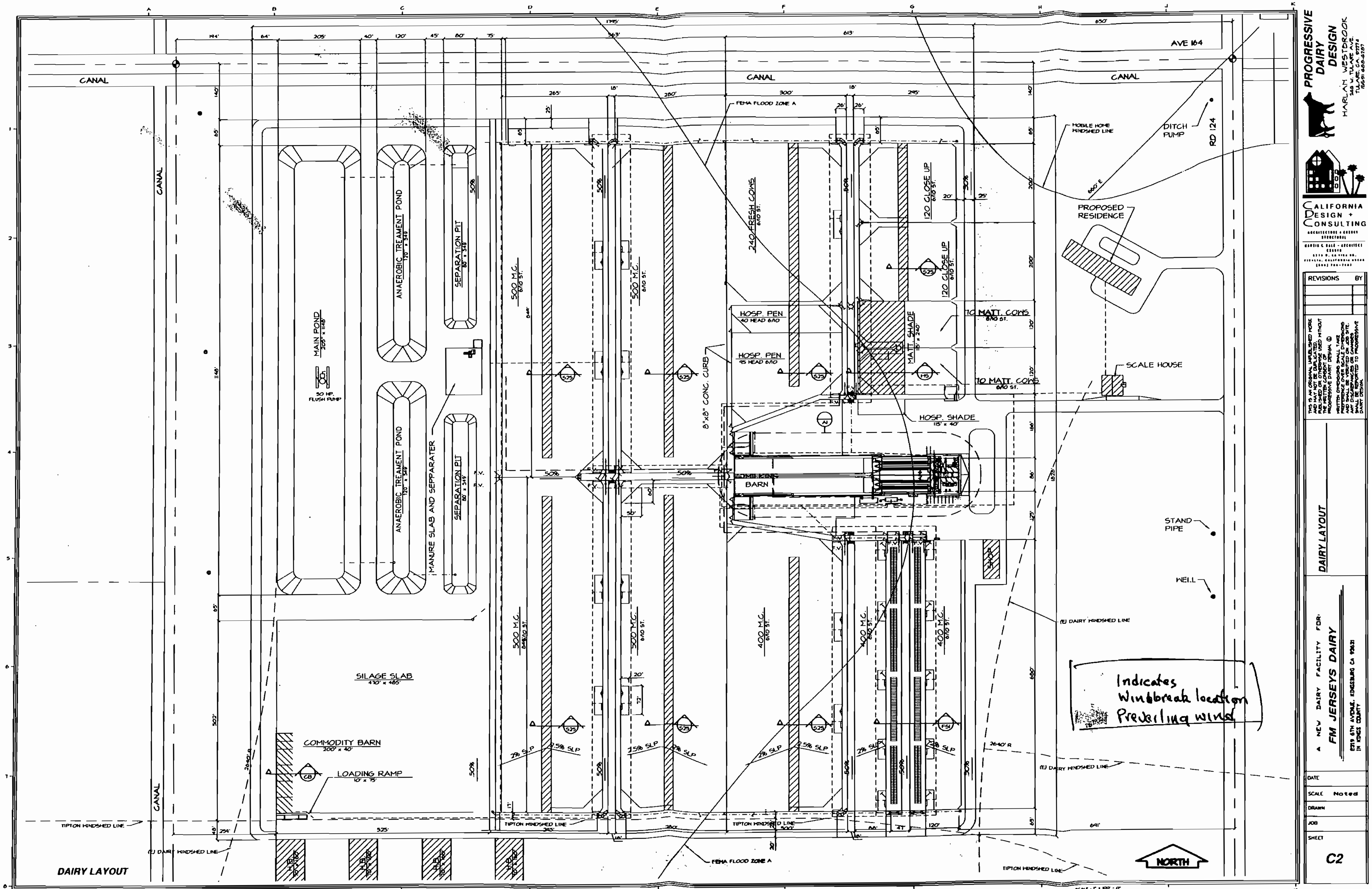
2. Vegetative Guide, MLRA 17, USDA Field Office Technical Guide Section II

3. Soil Survey Eastern Fresno Area, California, USDA, Soil Conservation Service, 1971

4. Fact Sheets for trees, Department of Horticulture web-site, North Carolina State University

5. WRAP Fugitive Dust Handbook , Countess Environmental, prepared for Western Governor's Association, November 15, 2004.

6. The Standard Cyclopedia of Horticulture, Volume III, 1928


PROGRESSIVE DAIRY DESIGN
HARLAN WESTBROOK
CALIFORNIA DESIGN + CONSULTING
REVISIONS BY
DAIRY LAYOUT
A NEW DAIRY FACILITY FOR:
FM JERSEYS DAIRY
DATE
SCALE Noted
DRAWN
JOB
SHEET
C2
AVE 164
CANAL
RD 124
DITCH PUMP
MOBILE HOME WINDSHED LINE
FEMA FLOOD ZONE A
PROPOSED RESIDENCE
SCALE HOUSE
STAND PIPE
WELL
MAIN POND
50 HP. FLUSH PUMP
ANAEROBIC TREAMENT POND
SEPARATION PIT
MANURE SLAB AND SEPPARATER
500 M.C.
240 FRESH COWS
120 CLOSE UP
HOSP. PEN
70 MATT. COWS
MATT. SHADE
8"x8" CONC. CURB
HOSP. SHADE
BARN
SHOP
400 M.C.
SILAGE SLAB
COMMODITY BARN
LOADING RAMP
TIPTON WINDSHED LINE
(E) DAIRY WINDSHED LINE
NORTH
DAIRY LAYOUT
Indicates
Windbreak location
Prevailing wind

Three Row Windbreak

1 square = 2 feet

(55'+-)

Western Cottonwood / Raywood Ash

Row 1

100'

25'

20'

Row 2

Pinus Eldorica / Kraufer Vesuvius Flg. Plum

15'

8'

Row 3

7'

5'

Photinia

Vitex

X = Deciduous

⊠ = Evergreen

Tree Spacing

Row 1 = 25'
Row 2 = 15'
Row 3 = 5' Evergreen
7' Deciduous

by Phillip Cox
L.E. Cooke Co.

APPENDIX E

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

San Joaquin Valley Air Pollution Control District
Risk Management Review

To:	Juscelino Siongco – Permit Services
From:	Cheryl Lawler – Technical Services
Date:	June 25, 2012
Facility Name:	FM Jerseys Dairy
Location:	Between Ave 160 & Ave 164, West of Rd 124, Tipton
Application #(s):	S-7533-1-0 thru 6-0
Project #:	S-1090443

A. RMR SUMMARY

RMR Summary					
Categories	**Dairy Milking Parlor (Unit 1-0)**	**Dairy Cow Housing (Unit 2-0)**	**Dairy Lagoons (Unit 3-0)**	**Emergency Diesel ICE (Unit 6-0)**	**Project & Facility Totals**
Prioritization Score	**0.27**[1]	6.49	5.23	N/A[2]	>1.0
Acute Hazard Index	N/A	0.33	**1.00**[4]	N/A[3]	1.00[4]
Chronic Hazard Index	N/A	0.09	0.03	N/A[3]	0.12
Maximum Individual Cancer Risk	N/A	**2.11E-06**	**1.63E-06**	**7.30E-07**	4.47E-06
T-BACT Required?	**No**	**Yes**	**Yes**	**No**	
Special Permit Conditions?	**No**	**No**	**Yes**	**Yes**	

[1]The unit passed on prioritization with a score of less than 1; therefore, no further analysis was required.
[2] Prioritization for this unit was not conducted since it has been determined that all diesel-fired IC engines will result in a prioritization score greater than 1.0.
[3] Acute and Chronic Hazard Indices were not calculated since there is no risk factor, or the risk factor is so low that the risk has been determined to be insignificant for this type of unit.
[4]H2S analysis was required for this unit which resulted in an Acute Hazard Index of 1.0. The facilitywide cumulative total for the Acute Hazard Index is now at its maximum allowed total of 1.0. No future projects are allowed for this facility without first re-examining this project.

Proposed Permit Conditions

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

Unit 3-0

1. The pH value cannot be any lower than 7.5.
2. The quarterly H2S concentration cannot exceed 3.82 mg/L.

Unit 6-0

1. Modified {1901} The PM10 emissions rate shall not exceed **0.15** g/hp-hr based on US EPA certification using ISO 8178 test procedure. [District Rule 2201]
2. {1898} The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102] N
3. Modified {1344} The engine shall be operated only for maintenance, testing, and required regulatory purposes, and during emergency situations. Operation of the engine for maintenance, testing, and required regulatory purposes shall not exceed **50** hours per year. [District NSR Rule and District Rule 4701]N

B. RMR REPORT

I. Project Description

Technical Services performed an Ambient Air Quality Analysis and a Risk Management Review for a new dairy which will consist of 3,200 milk cows, 640 dry cows, and 32 bulls. A new emergency diesel ICE is also part of this project (Unit 6-0).

II. Analysis

Technical Services performed prioritizations using the District's HEARTs database. Emissions calculated using District-developed spreadsheets for dairies were input into the HEARTs database. In accordance with the District's *Risk Management Policy for Permitting New and Modified Sources* (APR 1905-1, March 2, 2001), risks from the proposed project were prioritized using the procedures in the 1990 CAPCOA Facility Prioritization Guidelines and incorporated in the District's HEART's database.

For Unit 1-0 (milking parlor), the prioritization score was less than 1.0 (see RMR Summary Table). Therefore, no further analysis was necessary for this unit.

For Units 2-0 and 3-0 (cow housing and lagoons), the prioritization scores were each greater than one; therefore, a refined health risk assessment was required and performed for each unit. AERMOD was used, with area source parameters and meteorological data from Bakersfield to determine maximum dispersion factors at the nearest on-site residential and off-site business receptors. These dispersion factors were input into the HARP model to calculate the chronic and acute hazard indices and the carcinogenic risk for each unit.

No prioritization or further review was required for Units 4-0 and 5-0 (solid manure handling and feed storage & handling).

For Unit 6-0 (Diesel ICE), Technical Services performed a screening level health risk assessment using the District's Diesel Exhaust Risk Screening spreadsheet.

The following parameters were used for the review:

Analysis Parameters Diesel ICE						
Unit #s	**bhp-hr**	**PM_{10} g/hp-hr**	**Receptor (m)**	**Quad**	**Hours/Year**	**Load%**
6-0	1220	0.15	125	2	50	100
Location Type		Rural	**Receptor Type**		Residence	

Analysis Parameters S-7533, Project S-1090443			
Total Number of Cows & Bulls		3872	
Total Annual NH3 (lbs)	159,761	**Total Hourly NH3 (lbs)**	18.24
Total Annual PM10 (lbs)	4,929	**Total Hourly PM10 (lbs)**	0.56
Total Annual PM2.5 (lbs)*	739.4	**Total Hourly PM2.5 (lbs)***	0.08

*Per District policy, PM2.5 is 15 percent of the PM10 amounts.

In addition to the above, H2S emissions analysis was required for Unit 3-0 (lagoons). This analysis was performed using District approved programs and calculations, and resulted in an Acute Hazard Index of 1.0.

Technical Services also performed Ambient Air Quality Analysis for Unit 2-0 (cow housing). The modeling was performed for the criteria pollutants PM_{10} and $PM_{2.5}$ using AERMOD. The emission rates used were 4,929 lb PM_{10}/year and 739.4 lb $PM_{2.5}$/year. The results from the Criteria Pollutant Modeling are as follows:

PM_{10} Pollutant Modeling Results
Values are in $\mu g/m^3$

Category PM_{10}	24 Hours
Proposed Dairy	9.49
Interim Significance Level	10.4[1]
Result	Pass

[1]The District has decided on an interim basis to use a threshold for fugitive dust sources of 10.4 $\mu g/m^3$ for the 24-hour average concentration.

$PM_{2.5}$ Pollutant Modeling Results
Values are in $\mu g/m^3$

Category $PM_{2.5}$	24 Hours
Proposed Dairy	1.42
Interim Significance Level	2.5[1]
Result	Pass

[1]The District has decided on an interim basis to use a threshold for fugitive dust sources of 2.5 $\mu g/m^3$ for the 24-hour average concentration.

Ambient Air Quality Analysis was also performed for the Emergency Diesel ICE (Unit 6-0). The modeling was performed for criteria pollutants NOx, SOx, PM_{10}, and $PM_{2.5}$; as well as a RMR. The emission rates used for criteria pollutant modeling were 613 lb/yr NOx, 1 lb/yr SOx, 20 lb/yr PM_{10}, and 20 lb/yr $PM_{2.5}$.

The results from the Criteria Pollutant Modeling are as follows:

Criteria Pollutant Modeling Results*

Diesel ICE	1 Hour	3 Hours	8 Hours	24 Hours	Annual
CO	NA[1]	X	NA[1]	X	X
NO_x	NA[1]	X	X	X	Pass
SO_x	NA[1]	NA[1]	X	NA[1]	Pass
PM_{10}	X	X	X	NA[1]	Pass[2]
$PM_{2.5}$	X	X	X	NA[1]	Pass[2]

*Results were taken from the attached PSD spreadsheet.
[1]The project is an intermittent source as defined in APR-1920. In accordance with APR-1920, compliance with short-term (i.e., 1-hour, 3-hour, 8-hour, and 24-hour) standards is not required.
[2]The criteria pollutants are below EPA's level of significance as found in 40 CFR Part 51.165 (b)(2).

III. Conclusions

The ambient air quality impacts at the dairy do not exceed the District's 24-hour interim threshold for fugitive dust sources or cause/contribute significantly to a violation of the State or National AAQS.

Unit 1-0

The prioritization score for this unit is less than 1.0. In accordance with the District's Risk Management Policy, the unit is approved **without** Toxic Best Available Control Technology (T-BACT).

Unit 2-0

The acute and chronic indices are below 1.0; and the maximum individual cancer risk associated with the unit is **2.11E-06**, which is greater than the 1 in a million threshold. In accordance with the District's Risk Management Policy, the unit is approved **with** Toxic Best Available Control Technology (T-BACT).

Unit 3-0

The acute and chronic indices are below 1.0; and the maximum individual cancer risk associated with the unit is **1.63E-06**, which is greater than the 1 in a million threshold. In accordance with the District's Risk Management Policy, the unit is approved **with** Toxic Best Available Control Technology (T-BACT).

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 the proposed unit.

Unit 6-0

The cancer risk associated with the operation of the proposed diesel IC engine is less than 1.0 in a million. In accordance with the District's Risk Management Policy, the unit is approved **without** Toxic Best Available Control Technology (T-BACT) for PM10.

To ensure that human health risks will not exceed District allowable levels; the permit conditions listed on Page 2 of this report must be included for the proposed unit.

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

APPENDIX F

Draft ATCs (S-7533-1-0, -2-0, -3-0, -4-0, -5-0, and -6-0)

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-7533-1-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: FM JERSEYS DAIRY
MAILING ADDRESS: 16777 S "I" DRIVE
TULARE, CA 93274

LOCATION: BETWEEN AVE 160 AND AVE 164 W SIDE OF 124
TIPTON, CA

EQUIPMENT DESCRIPTION:
3200 COW MILKING OPERATION WITH ONE 80-STALL ROTARY MILK 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 milk parlor immediately prior to, immediately after, or during each milking. [District Rules 2201 and 4570]
5. Permittee shall provide verification that milk parlors are flushed or hosed prior to, immediately after, or during each milking. [District Rules 2201 and 4570]
6. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 1070 and 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-7533-1-0 : Nov 7 2012 4:02PM – SIONGCOJ : Joint Inspection NOT Required

7. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or *other approval documents* issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-7533-2-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: FM JERSEYS DAIRY
MAILING ADDRESS: 16777 S "I" DRIVE
TULARE, CA 93274

LOCATION: BETWEEN AVE 160 AND AVE 164 W SIDE OF 124
TIPTON, CA

EQUIPMENT DESCRIPTION:
COW HOUSING - 3200 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 3840 MATURE COWS (MILK AND DRY); 32 TOTAL SUPPORT STOCK (BULLS ONLY); AND FOUR FREESTALLS WITH FLUSH/VACUUM 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]
4. Permittee shall establish upwind windbreaks along the north perimeter (1,795 ft) and west perimeter (1,828 ft) of the dairy. Windbreaks shall consist of the following rows with the first row closest to the dairy: first row shall consist of the Pinus Eldarica trees, planted 15 feet apart and the second row shall consist of Photinia shrubs, planted 7 feet apart. Each row should be offset from the adjacent row. Spacing between rows shall be sufficient to accommodate cultivation equipment. This spacing shall not exceed 24 feet. An alternative windbreak proposal must be approved by the District. [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-7533-2-0 : Nov 7 2012 4:03PM – SIONGCOJ : Joint Inspection NOT Required

5. Permittee shall establish downwind windbreaks along the east perimeter (1,828 ft) and south perimeter (1,176 ft) with both windbreaks originating from the southeast corner of the dairy. Windbreaks shall consist of the following rows with the first row closest to the dairy: first row shall consist of the Raywood Ash trees, planted 25 feet apart, the second row shall consist of Pinus Eldarica trees, planted 15 feet apart, and the third row shall consist of Photinia shrubs, planted 7 feet apart. Each row should be offset from the adjacent row. Spacing between rows shall be sufficient to accommodate cultivation equipment. This spacing shall not exceed 24 feet. An alternative windbreak proposal must be approved by the District. [District Rule 2201]
6. Trees/shrubs that are initially planted as part of the windbreak shall have a minimum container size of five gallons. [District Rule 2201]
7. 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]
8. Density is the percentage of the background view that is obscured or hidden when viewing through the windbreak from 60 ft to 100 ft upwind of the rows. [District Rule 2201]
9. Permittee shall inspect and fill potholes in the freestall exercise pens and open corrals on a monthly basis. [District Rule 2201]
10. Permittee shall keep records or maintain an operating plan that requires monthly inspection of potholes in the freestall exercise pens and open corrals. [District Rule 2201]
11. Only firm, stable, and not easily eroded soils shall be used for the exercise pens. [District Rule 2201]
12. 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]
13. 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]
14. Permittee shall pave feedlanes 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]
15. Freestall feed lanes and walkways for milk cows shall be flushed or vacuumed four times per day and feed lanes and walkways in the corrals for the remaining animals flushed at least two times per day. [District Rules 2201 and 4570]
16. Permittee shall keep records or maintain an operating plan that requires freestall lanes to be flushed or vacuumed at least four times per day and feed lanes and walkways in the corrals for the remaining animals flushed at least two times per day. [District Rules 2201 and 4570]
17. Permittee shall scrape freestall exercise pens and open corrals once a week using a pull-type scraper in the morning hours except when prevented by wet conditions. [District Rule 2201]
18. Permittee shall keep records or maintain an operating plan that requires freestall exercise pens and open corrals to be scraped once a week using a pull-type scraper in the morning hours. [District Rule 2201]
19. {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]
20. {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]
21. {4499} Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rule 4570]
22. {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]
23. {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]

CONDITIONS CONTINUE ON NEXT PAGE

24. {4502} Permittee shall demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning or demonstrate that corrals are cleaned at least once *between April and July and* at least once between September and December. [District Rule 4570]

25. 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]

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

27. {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]

28. {4510} Permittee shall measure and document the depth of manure on the concrete lanes at least once every ninety (90) days. [District Rule 4570]

29. Permittee shall install all shade structures uphill of any slope in the corral. [District Rules 2201 and 4570]

30. {4518} Permittee shall manage corrals such that the manure depth in the corral does not exceed twelve (12) inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rule 4570]

31. {4519} Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rule 4570]

32. {4449} Permittee shall maintain a record of the number of animals of each species and production group at the facility and shall maintain quarterly records of any changes to this information. [District Rule 4570]

33. {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]

34. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-7533-3-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: FM JERSEYS DAIRY
MAILING ADDRESS: 16777 S "I" DRIVE
TULARE, CA 93274

LOCATION: BETWEEN AVE 160 AND AVE 164 W SIDE OF 124
TIPTON, CA

EQUIPMENT DESCRIPTION:
LIQUID MANURE HANDLING SYSTEM CONSISTING OF ONE PROCESSING PIT, ONE MECHANICAL SEPARATOR, TWO SETTLING BASINS, TWO ANAEROBIC TREATMENT LAGOONS (549X120X20 EACH), AND ONE STORAGE POND; MANURE IS APPLIED THROUGH FLOOD/FURROW IRRIGATION

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 use an anaerobic treatment lagoon designed according to NRCS Guideline No. 359. [District Rules 2201 and 4570]
5. Permittee shall maintain records, such as design specifications, calculations, including Minimum Treatment Volume (MTV), Hydraulic Retention Time (HRT) demonstrating that the anaerobic treatment lagoon meets the requirements listed in the NRCS Field Office Technical Guide Code 359. [District Rules 2201 and 4570]

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-7533-3-0 : Nov 7 2012 4:03PM – SIONGCOJ : Joint Inspection NOT Required

6. {4538} Permittee shall remove solids with a solid separator system, prior to the manure entering the lagoon. [District Rule 4570]
7. {4550} Permittee shall not allow liquid manure to stand in the fields for more than twenty-four (24) hours after irrigation. [District Rule 4570]
8. {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]
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. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: S-7533-4-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: FM JERSEYS DAIRY
MAILING ADDRESS: 16777 S "I" DRIVE
TULARE, CA 93274

LOCATION: BETWEEN AVE 160 AND AVE 164 W SIDE OF 124
TIPTON, CA

EQUIPMENT DESCRIPTION:
SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES WITH SOLID MANURE APPLICATION TO LAND AND HAULED OFFSITE

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-7533-4-0 : Nov 7 2012 4:03PM – SIONGCOJ : 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. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-7533-5-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: FM JERSEYS DAIRY
MAILING ADDRESS: 16777 S "I" DRIVE
TULARE, CA 93274

LOCATION: BETWEEN AVE 160 AND AVE 164 W SIDE OF 124
TIPTON, CA

EQUIPMENT DESCRIPTION:
FEED STORAGE AND HANDLING 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. {4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 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

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

Southern Regional Office • 34946 Flyover Court • Bakersfield, CA 93308 • (661) 392-5500 • Fax (661) 392-5585

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. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: S-7533-6-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: FM JERSEYS DAIRY
MAILING ADDRESS: 16777 S "I" DRIVE
TULARE, CA 93274

LOCATION: BETWEEN AVE 160 AND AVE 164 W SIDE OF 124
TIPTON, CA

EQUIPMENT DESCRIPTION:
1,220 BHP (INTERMITTENT) CUMMINS MODEL QSK23-G7 TIER 2 CERTIFIED DIESEL-FIRED EMERGENCY STANDBY IC ENGINE POWERING AN ELECTRICAL GENERATOR

CONDITIONS

1. {14} Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]
2. {15} No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]
3. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
4. {1898} The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102]
5. {4257} This engine shall be equipped with an operational non-resettable elapsed time meter or other APCO approved alternative. [District Rule 4702, 17 CCR 93115, and 40 CFR 60 Subpart IIII]
6. {4258} Only CARB certified diesel fuel containing not more than 0.0015% sulfur by weight is to be used. [District Rules 2201 and 4801, 17 CCR 93115, 40 CFR Part 60 Subpart IIII]
7. Emissions from this IC engine shall not exceed any of the following limits: 4.56 g-NOx/bhp-hr, 2.61 g-CO/bhp-hr, or 0.24 g-VOC/bhp-hr. [District Rule 2201, 17 CCR 93115, and 40 CFR Part 60 Subpart IIII]
8. Emissions from this IC engine shall not exceed 0.15 g-PM10/bhp-hr based on USEPA certification using ISO 8178 test procedure. [District Rules 2201 and 4102, 17 CCR 93115, and 40 CFR Part 60 Subpart IIII]
9. {4261} This engine shall be operated and maintained in proper operating condition as recommended by the engine manufacturer or emissions control system supplier. [District Rule 4702 and 40 CFR 60 Subpart IIII]

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-7533-6-0 : Nov 7 2012 4:03PM – SIONGCOJ : Joint Inspection NOT Required

10. {3478} During periods of operation for maintenance, testing, and required regulatory purposes, the permittee shall monitor the operational characteristics of the engine as recommended by the manufacturer or emission control system supplier (for example: check engine fluid levels, battery, cables and connections; change engine oil and filters; replace engine coolant; and/or other operational characteristics as recommended by the manufacturer or supplier). [District Rule 4702]

11. {3807} An emergency situation is an unscheduled electrical power outage caused by sudden and reasonably unforeseen natural disasters or sudden and reasonably unforeseen events beyond the control of the permittee. [District Rule 4702]

12. {3808} This engine shall not be used to produce power for the electrical distribution system, as part of a voluntary utility demand reduction program, or for an interruptible power contract. [District Rule 4702]

13. {3496} The permittee shall maintain monthly records of emergency and non-emergency operation. Records shall include the number of hours of emergency operation, the date and number of hours of all testing and maintenance operations, the purpose of the operation (for example: load testing, weekly testing, rolling blackout, general area power outage, etc.) and records of operational characteristics monitoring. For units with automated testing systems, the operator may, as an alternative to keeping records of actual operation for testing purposes, maintain a readily accessible written record of the automated testing schedule. [District Rule 4702 and 17 CCR 93115]

14. {4262} This engine shall be operated only for testing and maintenance of the engine, required regulatory purposes, and during emergency situations. Operation of the engine for maintenance, testing, and required regulatory purposes shall not exceed 50 hours per calendar year. [District Rule 4702, 17 CCR 93115 and 40 CFR Part 60 Subpart IIII]

15. {4263} The permittee shall maintain monthly records of the type of fuel purchased. [District Rule 4702 and 17 CCR 93115]

16. {3475} All records shall be maintained and retained on-site for a minimum of five (5) years, and shall be made available for District inspection upon request. [District Rule 4702 and 17 CCR 93115]