San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

JUN 16 2014

Jeff Foster
Foster Farms Dairy #4
2343 Hickman Rd
Hickman, CA 95323

Re: Notice of Preliminary Decision - Authority to Construct
Facility Number: N-5947
Project Number: N-1080303

Dear Mr. Foster:

Enclosed for your review and comment is the District's analysis of Foster Farms Dairy #4's application for an Authority to Construct for the expansion of an existing dairy operation from a maximum capacity of 745 milk cows and 120 dry cows to a maximum capacity of 3,061 milk cows and 459 dry cows, at 5372 S. Hickman Rd, Denair.

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

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

Sincerely,

Arnaud Marjollet
Director of Permit Services

AM:jka

Enclosures

cc: Mike Tollstrup, CARB (w/ enclosure) via email

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

Southern Region
34946 Flyover Court
Bakersfield, CA 93308-9725
Tel: 661-392-5500 FAX: 661-392-5585

www.valleyair.org www.healthyairliving.com

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

Facility Name:	Foster Farms Dairy #4	Date:	June 3, 2014
Mailing Address:	2343 Hickman Rd	Engineer:	Jonah Aiyabei
	Hickman, CA 95323	Lead Engineer:	Martin Keast
Contact Person:	Jeff Foster		
Telephone:	(209) 548-7640		
Application #s:	N-5947-6-1 through 10-1		
Project #:	N-1080303		
Deemed Complete:	May 22, 2014		

I. Proposal

Foster Farms Dairy #4 has requested Authority to Construct (ATC) permits to renovate and expand an existing dairy operation. The existing dairy operation houses a maximum of 745 milk cows and 120 dry cows. The applicant proposes to expand the dairy to a maximum capacity of 3,061 milk cows and 459 dry cows. The expansion will include the construction of a new milk barn with a 72-stall rotary milking parlor, four 660-head freestall barns and one 100-head maternity barn. In addition, the liquid manure treatment system will be upgraded with the installation of a mechanical separator, and the conversion of the existing system into an anaerobic treatment system.

Based on the number of new facilities to be constructed, the fixed capital cost of the expanded dairy will exceed 50% of the fixed capital cost of a comparable, entirely new dairy. As a result, the expanded dairy constitutes a reconstructed stationary source, per District Rule 2201, section 3.34. Pursuant to District Rule 2201, section 3.25.2, a reconstructed stationary source shall be considered a new stationary source and not a modification of an existing stationary source.

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.

The proposed dairy is a discretionary project subject to the requirements of the California Environmental Quality Act (CEQA). As a public agency with discretionary authority, the District must determine that the requirements of the California Environmental Quality Act (CEQA) have been properly satisfied prior to the issuance of any dairy permits. The project is located in Stanislaus County, which has discretionary approval authority on dairy

projects. Stanislaus County is therefore considered the Lead Agency, while the District will serve as a Responsible Agency in the CEQA review process. As a responsible agency, the District must decide on the adequacy of the environmental documents prepared by the Lead Agency, make appropriate findings, and file the required notices. The District has determined that the review conducted by Stanislaus County adequately addresses environmental concerns resulting from the project. The District has also made appropriate findings regarding the project, and will file a Notice of Determination with Stanislaus County upon issuance of the Authority to Construct (ATC) permits.

II. Applicable Rules

Rule 1070 Inspections (12/17/92)
Rule 2201 New and Modified Stationary Source Review Rule (4/21/11)
Rule 2410 Prevention of Significant Deterioration (6/16/11)
Rule 2520 Federally Mandated Operating Permits (6/21/01)
Rule 2550 Federally Mandated Preconstruction Review for Major Sources of Air Toxics
Rule 4101 Visible Emissions (2/17/05)
Rule 4102 Nuisance (12/17/92)
Rule 4550 Conservation Management Practices (CMP) (8/19/04)
Rule 4570 Confined Animal Facilities (CAF) (10/21/10)
CH&SC 41700 Health Risk Assessment
CH&SC 42301.6 School Notice
Senate Bill 700 (SB 700)
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 5372 S. Hickman Road in Denair. The equipment is not located within 1,000 feet of the outer boundary of any K-12 school. Therefore, the public notification requirement of California Health and Safety Code 42301.6 is not applicable to this project.

IV. Process Description

The primary function of a dairy is the production of milk, which is used to make products for human consumption. Production of milk requires a herd of mature dairy cows that are lactating. In order to produce milk, the cows must be bred and give birth. The gestation period for a cow is 9 months, and dairy cows are bred again 4 months after calving. Thus, a mature dairy cow produces a calf every 12 to 14 months, which is why there are various age categories of cows at a typical dairy.

The milk cows usually generate anywhere from 130 to 150 pounds of manure per day. Manure accumulates in confinement areas such as freestall barns and the milk barn. Manure is primarily deposited in areas where the herd is fed and given water. How the manure is collected, stored and treated depends on the manure management techniques chosen by the dairy operator.

Dairy manure may be collected and managed as a liquid, a semi-solid (slurry), or 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.

Milking Operation - Milk Barn:

The milk barn is a separate building, apart from the lactating cow confinement. The milk barn is designed to facilitate changing the groups of cows milked and to allow workers access to the cows during milking. A holding area confines the cows that are ready for milking. The holding area is covered with open sides and is part of the milk barn, which in turn, is located in the immediate vicinity of the cow housing. Foster Farms Dairy #4's milk barn will have one 80-stall rotary milking parlor. The milk barn has concrete floors sloped to a drain. Manure that is deposited in the milk barn will be sprayed into the drain using pressurized hoses after each milking. The manure is then carried through pipes to the liquid manure treatment system.

Cow Housing - Freestall Barns:

All cows will be housed in freestall barns. In freestall barns, cows are grouped in large pens with free access to feed bunks, waterers, and stalls for resting. A standard free-stall barn design has a feed alley in the center of the barn separating two feed bunks on each side. A variety of types of bedding materials are used for animal comfort and to prevent animal injury. In addition, loose dirt exercise pens adjoining the barns are provided. Manure from freestall barn feed lanes will be removed by flushing with water at least four times daily. Manure from the exercise pen surfaces will be removed by scraping weekly with a box-type scraper.

Liquid Manure Management – Solids Separation and Anaerobic Treatment:

Solids separation removes material from the waste stream that would prematurely fill the treatment lagoon and storage ponds. The efficiency of treatment would also be significantly lower without separation; resulting in more odors and potentially more VOC emissions from the liquid manure management system. Most of the separated solids are fibrous materials that lead to excessive sludge buildup or the formation of crusts on the surface of the storage ponds, both of which interfere with pumping operations. Separation reduces the land area required when designing a liquid manure treatment system since the volume to be treated is less. As a final benefit, the separated solids may be recycled and used for soil amendments, re-feeding, bedding, etc. Solid separation at Foster Farms Dairy #4 will be accomplished with the use of a mechanical separator.

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:

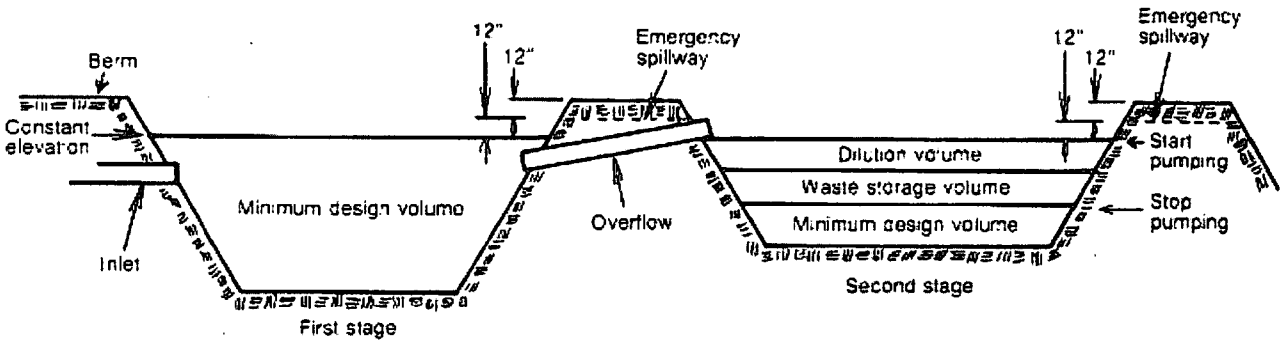
1) Minimum treatment volume - The minimum design volume must account for all potential sludge, treatment, precipitation, and runoff volumes;

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 anaerobic treatment lagoon system consists of two stages, a treatment lagoon (primary lagoon) and a storage pond (secondary lagoon). The effluent from the treatment lagoon overflows into the storage pond/secondary lagoon, which is designed for liquid storage. The liquid level of the storage pond/secondary lagoon fluctuates and can be emptied when necessary. Effluent from the storage pond is used for the irrigation of cropland.



Instead of a primary treatment lagoon and a separate storage pond, Foster Farms Dairy #4 will use one lagoon that meets the anaerobic treatment design requirements discussed above. Irrigation effluent will be drawn from the treatment lagoon, but a constant minimum volume must be maintained at all times. The lagoon will not be fully emptied or drawn down below a level of 7 feet, which corresponds to the dairy's required minimum treatment volume, in order to sustain the microbial activity required for anaerobic treatment. Ordinarily, liquid from the treatment pond will only be drawn down for a short period during crop irrigation season.

Solid Manure Management - Manure Stockpiles (Storage):

Solid manure from regular scraping of housing areas is stored in stockpiles. The stockpiles are usually located in the middle of the housing areas. The stockpiles are removed several times a year for application to land or shipment offsite. Separated solids may also be dried

and stockpiled until needed for use as freestall bedding, land application or offsite shipment.

Feed Handling and Storage - Commodity Barns, Silage Piles, and Total Mixed Rations (TMR):

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

In order to provide the right nutritional balance, silage is usually blended with other feed additives, such as oils, whey, seeds and grains, nut hulls, and various salts and minerals before it is fed to the cattle. These additives are usually stored in commodity barns to avoid exposure to weather.

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

V. Equipment Listing

N-5947-6-1: 3,061 COW MILKING OPERATION WITH ONE 72-STALL ROTARY PARLOR.

N-5947-7-1: COW HOUSING - 3,061 MILK COWS, NOT TO EXCEED A COMBINED TOTAL OF 3,520 MATURE COWS (MILK AND DRY COWS); AND 6 FREESTALL BARNS WITH A FLUSH SYSTEM.

N-5947-8-1: LIQUID MANURE HANDLING SYSTEM CONSISTING OF ONE MECHANICAL SEPARATOR AND PROCESSING PIT; ONE ANAEROBIC TREATMENT LAGOON, AND ONE STORAGE POND; MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION.

N-5947-9-1: SOLID MANURE HANDLING CONSISTING OF OPEN MANURE STOCK PILES; SOLID MANURE APPLICATION TO LAND AND OFFSITE HAULING.

N-5947-10-1: FEED STORAGE AND HANDLING CONSISTING OF COMMODITY BARNS AND SILAGE PILES.

VI. Emission Control Technology Evaluation

PM_{10}, VOC, and NH_3 are the major pollutants of concern from dairy operations. Gaseous pollutant emissions emanate from the ruminant digestive processes (enteric emissions), from the decomposition and fermentation of feed, and also from decomposition of organic material in manure. Volatile Organic Compounds (VOCs) are formed as intermediate metabolites when organic matter in manure degrades. Ammonia volatilization is the result of the microbial decomposition of nitrogenous compounds in manure. The quantity of enteric emissions depends directly on the number and types of cows. The quantity of emissions from manure decomposition depends on the amount of manure generated, which also depends on the number and types of cows. Therefore, the total herd size and composition is the critical factor in quantifying emissions from a dairy.

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

Milk Barn:

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

Cow Housing:

Freestall housing:

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

Frequent flushing:

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

Feeding Animals in Accordance with the NRC Guidelines:

All animals will be fed in accordance with National Research Council (NRC) guidelines

using routine nutritional analysis for rations. Feeding the cows in accordance with NRC guidelines minimizes undigested protein and other undigested nutrients in the manure, which would emit NH_3 and VOCs upon decomposition.

Liquid Manure Management System:

Solids Separation:
The liquid manure handling system includes mechanical separator 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.

Anaerobic Treatment Lagoon:

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. The proposed anaerobic treatment lagoon meets the required design requirements (see design check in Appendix E).

Covered Lagoon Anaerobic Digester:

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

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.

[1] 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)

Solid Manure Management System:

Based on the information currently available, emissions from solid manure applied to cropland are expected to be low. However, to ensure that any possible emissions are minimized, this dairy will be required to incorporate solid manure applied to cropland immediately after application. Immediate incorporation of the manure into the soil will reduce any volatilization of gaseous pollutants, including ammonia and VOC. Reduction in gaseous emissions is achieved by minimizing the amount of time that the manure is exposed to the atmosphere. Once manure has been incorporated into the soil, VOC is adsorbed onto particles of soil providing the opportunity for the VOC to be oxidized into carbon dioxide and water[2].

Feed Storage and Handling System:

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

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

VII. General Calculations

A. Assumptions

- Potential to Emit will be based on the dairy's maximum design capacity (i.e. maximum number and age categories of cows that can potentially be housed).
- Emissions from the lagoons and storage ponds are non-fugitive emissions and will therefore be counted towards the dairy's major source status determination. Emissions from the rest of the dairy operation (milking, housing, liquid manure land application, solid manure storage and handling, and feed storage and handling) are considered fugitive and will not be counted towards the major source status determination.
- 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.*
- All PM_{10} emissions from the dairy will be allocated to the cow housing permit unit.

[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)

- All H_2S emissions from the dairy will be associated with the lagoons and storage ponds.
- Because of the moisture content of the separated solids, PM_{10} emissions from solid manure handling are considered negligible.
- The PM_{10} emission factors 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 Ammonia (NH3) emission factors for milk cows are based on a District document entitled "Breakdown of Dairy VOC Emission Factor into Permit Units". The NH3 emission factors for the other categories of cows were calculated from the milk cow emission factor, based on the ratio of the quantity of manure generated by each category to the quantity of manure generated by milk cows.
- The VOC Emission Factors used in this evaluation are from the "APCO's Revision to the Dairy VOC Emission Factor", dated January 2010. These emission factors are controlled Emission Factors and contain mitigation measures from Rule 4570 (as adopted in 2010).
- For BACT analysis purposes, a permit unit may consist of more than one emissions unit, e.g. the liquid manure handling permit unit consists of 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 10% will be applied to the overall dairy EF.
- Flushing or hosing down the milking parlor immediately prior to, immediately after, or during each milking has the potential of reducing a significant amount of emissions since many of the compounds emitted from the fresh manure, such as alcohols (ethanol and methanol) and many Volatile Fatty Acids (VFAs), are highly soluble in water and the fresh excreted manure is almost immediately flushed out of the milk barn. However, a conservative control efficiency estimate of 75% will be applied at this time. This control efficiency does not apply to the enteric emissions generated from the cows themselves. Taking that into account, the overall control efficiency for the milk barn is approximately 16.7%. (EF from milk barn is = 0.9 lb/hd-yr. EF from fresh waste is equal to 0.2 lb/hd-yr. 75% of 0.2 lb/hd-yr = 0.15 lb/hd-yr. 0.15 lb/hd-yr/0.9 lb/hd-yr = 16.7% control).
- The feed lanes for all mature cows will be flushed four times a day. Flushing the feed lanes four times per day is expected to reduce emissions since manure degradation and decomposition in the feed lanes is reduced. Increasing the frequency of the flush will remove manure, which is a source of VOC emissions. Many of the compounds emitted from the fresh manure, such as alcohols (ethanol and methanol) and many Volatile Fatty Acids (VFAs), are highly soluble in water. Based on calculations in the

Final Dairy Permitting Advisory Group's (DPAG) Report - "Recommendations to the San Joaquin Valley Air Pollution Control Officer Regarding Best Available Control Technology for Dairies in the San Joaquin Valley" dated January 31, 2006 (http://www.valleyair.org/busind/pto/dpag/dpag_idx.htm), a 47% control will be applied to flushing the corral lanes four times per day, until better data becomes available. This control efficiency only applies to the manure and does not apply to the enteric emissions generated from the cows themselves. However, in order to be conservative, a 10% control efficiency will be applied at this time.

- An anaerobic treatment lagoon designed in accordance with the NRCS Guideline (359) has the potential of reducing significant amount of emissions, since the system is designed to promote the conversion of Volatile Solids (VS) into methane by methanogenic bacteria. Although VOC emission reductions are expected to be high, to be conservative, a control efficiency of 40% will be applied to this mitigation measure for both the lagoon(s) and land application until better data becomes available.
- Many of the mitigation measures required will also have a reduction in ammonia emissions, however, due to limited data, these reductions will not be quantified in this evaluation.

B. Emission Factors

The emission factors used for all calculations are as shown in Appendix B

C. Calculations

1. Pre-project Potential to Emit (PE1) and Post Project Potential to Emit (PE2) calculations

Since this is being treated as a new facility, PE1 = 0 for all pollutants. PE2 calculations are as shown in Appendix B.

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

Pursuant to Section 4.10 of District Rule 2201, the Post Project Stationary Source Potential to Emit (SSPE2) is the Potential to Emit (PE) from all units with valid Authorities to Construct (ATC) or Permits to Operate (PTO) at the Stationary Source and the quantity of emission reduction credits (ERC) which have been banked since September 19, 1991 for Actual Emissions Reductions that have occurred at the source, and which have not been used on-site. This facility does not have any banked ERCs.

Since this is being treated as a new facility, SSPE1 = 0 lb/yr for all pollutants.

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

Pursuant to Section 4.10 of District Rule 2201, the Post Project Stationary Source Potential to Emit (SSPE2) is the Potential to Emit (PE) from all units with valid Authorities to Construct (ATC) or Permits to Operate (PTO) at the Stationary Source and the quantity of emission reduction credits (ERC) which have been banked since September 19, 1991 for Actual Emissions Reductions that have occurred at the source, and which have not been used on-site. This facility does not have any banked ERCs.

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

Post-Project Stationary Source Potential to Emit (lb/year)							
Permit Unit	**NO_X**	**SO_X**	**PM_{10}**	**CO**	**VOC**	**NH_3**	**H_2S**
N-5947-6-1 Milking	0	0	0	0	1,224	419	0
N-5947-7-1 Cow Housing	0	0	4,101	0	32,912	74,372	0
N-5947-8-1 Liquid manure	0	0	0	0	4,832	16,137	389
N-5947-9-1 Solid Manure	0	0	0	0	1,553	9,319	0
N-5947-10-1 Feed	0	0	0	0	38,120	0	0
SSPE2	**0**	**0**	**4,101**	**0**	**78,641**	**100,247**	**389**

4. Major Source Determination

Rule 2201 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 in the following sections.

Milking Barn

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 and storage ponds will be used to determine if this facility is a major source.

The post-project emissions from the lagoons and storage ponds are as shown in Appendix B.

In addition, facilities N-5947, N-4683, and N-8554 have previously been determined to be part of the same stationary source for NSR purposes, pursuant to section 3.39 of District Rule 2201. The combined SSPE for all three facilities will therefore be used for major source determination purposes. The following table shows the non-fugitive SSPE for the stationary source:

Non-Fugitive SSPE (lb/year)					
Emissions unit	**NO_X**	**SO_X**	**PM_{10}**	**CO**	**VOC**
N-5947-8 Liquid manure	0	0	0	0	2,317
N-4683-4 Liquid manure	0	0	0	0	2,085
N-4683-6 Gas tank	0	0	0	0	283
N-8554	0	0	0	0	0
Non-Fugitive SSPE	**0**	**0**	**0**	**0**	**4,685**

Major Source Determination (lb/year)					
Category	**NO_X**	**SO_X**	**PM_{10}**	**CO**	**VOC**
Non-Fugitive SSPE	0	0	0	0	4,685
Major Source Threshold	20,000	140,000	140,000	200,000	20,000
Major Source?	No	No	No	No	No

As shown in the table above, this facility is not a major source.

Rule 2410 Major Source Determination:

The facility or the equipment evaluated under this project is not listed as one of the categories specified in 40 CFR 52.21 (b)(1)(i). Therefore the following PSD Major Source thresholds are applicable:

PSD Major Source Determination (tons/year)							
Category	**NO2**	**VOC**	**SO2**	**CO**	**PM**	**PM10**	**CO2e**
Estimated Facility PE before Project Increase	0	0	0	0	0	0	0
PSD Major Source Thresholds	250	250	250	250	250	250	100,000
PSD Major Source?	N	N	N	N	N	N	N

As shown above, the facility is not an existing major source for PSD for any pollutant.

5. Baseline Emissions (BE)

BE = Pre-project Potential to Emit for:

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

otherwise,

BE = Historic Actual Emissions (HAE), calculated pursuant to Section 3.23

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

6. 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 involved in this project, the project does not constitute an SB288 major modification.

7. 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 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).

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

Rule 2410 applies to pollutants for which the District is in attainment or for unclasssified, pollutants. The pollutants addressed in the PSD applicability determination are listed as follows:

- NO2 (as a primary pollutant)
- SO2 (as a primary pollutant)
- CO
- PM
- PM10
- Greenhouse gases (GHG): CO2, N2O, CH4, HFCs, PFCs, and SF6

The first step of this PSD evaluation consists of determining whether the facility is an existing PSD Major Source or not (See Section VII.C.5 of this document).

In case the facility is an existing PSD Major Source, the second step of the PSD evaluation is to determine if the project results in a PSD significant increase.

In case the facility is NOT an existing PSD Major Source but is an existing source, the second step of the PSD evaluation is to determine if the project, by itself, would be a PSD major source.

Potential to Emit for New or Modified Emission Units vs PSD Major Source Thresholds

As a screening tool, the project potential to emit from all new and modified units is compared to the PSD major source threshold, and if total project potential to emit from all new and modified units is below this threshold, no futher analysis will be needed.

The facility or the equipment evaluated under this project is not listed as one of the categories specified in 40 CFR 52.21 (b)(1)(i). Therefore the following PSD Major Source thresholds are applicable:

PSD Major Source Determination: Potential to Emit (tons/year)							
Category	**NO2**	**VOC**	**SO2**	**CO**	**PM**	**PM10**	**CO2e**
Total PE from New and Modified Units	0	1.2	0	0	0	0	19,779[3]
PSD Major Source threshold	250	250	250	250	250	250	100,000
New PSD Major Source?	N	N	N	N	N	N	N

As shown in the preceding table, the project potential to emit, by itself, does not exceed any of the PSD major source thresholds. Therefore Rule 2410 is not applicable and no further discussion is required.

9. Quarterly Net Emissions Change (QNEC)

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

VIII. Compliance

Rule 1070 Inspections

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

[3] See GHG calculations in Appendix B.

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 SB288 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 emission units – PE > 2 lb/day

As seen in Appendix B, the following new emissions units have PE > 2 lb/day, and are therefore subject to BACT for the pollutants indicated:

- Milking parlor: VOC
- Cow housing: PM10, VOC and NH3
- Liquid manure - lagoons: VOC, and NH3
- Liquid manure - land application: VOC and NH3
- Solid manure – storage: NH3
- Solid manure – land application: VOC and NH3
- Feed – silage: VOC
- Feed – TMR: VOC

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

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

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

As discussed in Section I above, there are no modified emissions units associated with this project. Therefore BACT is not triggered under this category.

d. SB 288/Federal Major Modification

As discussed in Section VII.C.7 above, this project does not constitute a SB 288 and/or Federal Major Modification for any emissions; therefore BACT is not triggered under this category.

2. Top-Down BACT Analysis

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

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

Milking parlor:

VOC: 1) Flush/Spray down milking parlor after each group of cows is milked

Cow Housing and TMR:

VOC: 1) Concrete feed lanes and walkways

2) Feed lanes and walkways flushed at least four times per day for mature cows and at least two times per day for support stock

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

4) All exercise pens 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

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

6) VOC mitigation measures required by District Rule 4570.

NH3: 1) Concrete feed lanes and walkways

2) Feed lanes and walkways flushed at least four times per day for mature cows and at least two times per day for support stock

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

4) All exercise pens 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

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

PM10: Freestall barn housing with concrete feed lanes and walkways

Liquid Manure Handling System:

Lagoon/Storage Pond:

VOC: 1) Two-stage anaerobic treatment lagoon designed according to NRCS guidelines

2) Installation of an anaerobic digester contingent upon the final dairy BACT guideline

NH_3: 1) Two-stage anaerobic treatment lagoon designed according to NRCS guidelines

2) Installation of an anaerobic digester contingent upon the final dairy BACT guideline

Land Application:

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

NH_3: 1) Irrigation of crops using liquid and slurry manure from a holding/storage pond after an Anaerobic Treatment Lagoon

Solid Manure:

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

2) Incorporation of manure promptly (within no more than 72 hours) upon land application

Silage:

VOC: 1) Rule 4570 mitigation measures

B. Offsets

Sources that are subject to federal NSR are required to offset the emissions they increase by providing emission reductions. This is generally done with emission reduction credits, or ERCs. There are strict federal requirements for ERCs that can

be used to offset emissions increases under NSR. The emission reductions must be (1) real, (2) permanent, (3) quantifiable, (4) enforceable, and (5) surplus. Over time, EPA policies and court determinations have established fairly rigorous definitions and tests for each of these terms.

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

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

C. Public Notification

1. Applicability

Public noticing is required for:

a. 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. Since this is not a new facility, public noticing is not required for this project for New Major Source purposes.

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

b. PE > 100 lb/day

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 shown in Appendix B, the PE2 for cow housing (NH3) and feed (VOC) is greater than 100 lb/day, hence public notice is triggered under this category.

c. Offset Threshold

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

Offsets Thresholds				
Pollutant	SSPE1 (lb/year)	SSPE2 (lb/year)	Offset Threshold	Public Notice Required?
NO_X	0	0	20,000 lb/year	No
SO_X	0	0	54,750 lb/year	No
PM_{10}	0	4,101	29,200 lb/year	No
CO	0	0	20,000 lb/year	No
VOC	0	78,641	20,000 lb/year	Yes
NH3	0	100,247	N/A	No
H2S	0	389	N/A	No

As shown in the table above, the offsets thresholds for VOC has been surpassed due to this project; therefore public noticing is triggered under this category.

d. 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}	4,101	0	4,101	20,000 lb/year	No
CO	0	0	0	20,000 lb/year	No
VOC	78,641	0	78,641	20,000 lb/year	Yes
NH_3	100,247	0	100,247	20,000 lb/year	Yes
H2S	389	0	389	20,000 lb/year	No

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

2. Public Notice Action

As discussed above, public noticing is required for this. Therefore, public notice documents will be submitted to the California Air Resources Board (CARB) and a public notice will be published in a local newspaper of general circulation in Stanislaus County prior to the issuance of the ATCs for the dairy expansion.

D. Daily Emission Limits (DELs)

Daily Emissions Limitations (DELs) and other enforceable conditions are required by Section 3.17 to restrict a unit's maximum daily emissions, to a level at or below the emissions associated with the maximum design capacity. Per Sections 3.17.1 and 3.17.2, the DEL must be contained in the latest ATC and contained in or enforced by the latest PTO and enforceable, in a practicable manner, on a daily basis. DELs are also required to enforce the applicability of BACT.

For dairies, the DEL is satisfied based on the number and types of cows at the dairy. The number and types of cows are listed in the permit equipment description for the Cow Housing (N-5947-2).

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

Cow Housing

- The total number of cows at this facility shall not exceed any of the following limits: 3,061 milk cows; not to exceed a combined total of 3,520 mature cows (milk and dry cows)

Liquid Manure Handling System

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

- The liquid manure handling system shall handle flush manure from no more than 3,061 milk cows, not to exceed a combined total of 3,520 mature cows (milk and dry). [District Rule 2201]

E. Compliance Assurance

1. Source Testing

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

2. Monitoring

Cow Housing:

Based on guidelines from the University of Idaho in a document entitled "*Dairy Odor Management and Control Practices*"[4] and the requirements of District Rule 4570, the following conditions will be placed on the permit to ensure that emissions from the dairy are minimized:

- Inspection for potholes and similar sources of emissions shall be performed on a monthly basis. A record of these inspections shall be maintained. [District Rule 2201]
- Firm, stable soil that is not easily eroded shall be used for the exercise pen and corral surfaces. [District Rule 2201]
- A supply of dry fill soil shall be kept on site in order to fill areas where erosion and gouging occurs. [District Rule 2201]
- Clean rainfall runoff shall be diverted around exercise pen and corral surfaces to reduce the amount of water that is potentially retained on these surfaces. [District Rule 2201]

3. Recordkeeping

Recordkeeping is required to demonstrate compliance with the public notification and daily emission limit requirements of Rule 2201. In general, recordkeeping for the milking parlor and the liquid manure handling system are satisfied with the records that must be kept to demonstrate compliance with the numbers and

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

types of cows listed in the permit equipment description for the cow housing. The following conditions will be placed on the ATC permits:

Cow Housing

The following condition will be placed on the ATC for the Cow Housing Permit:

- Permittee shall maintain a record of the number of animals of each production group at the facility and shall maintain quarterly records of any changes to this information. Such records may include DHIA monthly records, milk production invoices, ration sheets or periodic inventory records. [District Rules 2201 and 4570]

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

Liquid Manure Handling System

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

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

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

4. Reporting

No reporting is required to demonstrate compliance with Rule 2201.

F. Ambient Air Quality Analysis

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

The proposed location is in a non-attainment area for PM_{10} State standards. The increase in the ambient PM_{10} concentration due to the proposed project is shown on the table titled 'Calculated Contribution'. The levels of significance, from 40 CFR Part 51.165 (b)(2), as well as the District's Interim Significance Level for the State's

AAQS, are shown in the tables titled 'Significance Levels'.

Significance Levels					
Pollutant	Significance Levels ($\mu g/m^3$) – District's Interim Significance Level for the State's AAQS				
	Annual Avg.	24 hr Avg.	8 hr Avg.	3 hr Avg.	1 hr Avg.
PM_{10}	N/A	10.4	N/A	N/A	N/A

Calculated Contribution				
Pollutant	Calculated Contributions ($\mu g/m^3$)			
	24 hr Avg.	8 hr Avg.	3 hr Avg.	1 hr Avg.
PM_{10}	15.42	N/A	N/A	N/A

As shown in the preceding tables, modeling results indicated that the calculated increase in the ambient PM10 concentration due to the proposed dairy project exceed the District significance level. The project was therefore not approvable as proposed. However, the modeling results indicated that the exceedance occurred at a residential unit within the dairy's boundaries. The project proponent will be required to comply with the following occupancy limitation for the affected residential unit in order for the project to approved:

- The residence located at the 'existing office' site, approximately 100 feet West of the cow housing area, shall not be occupied by any persons under the age of 18 years or any persons that are not employees of the dairy.

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 Section 112(g) of the Clean Air Act (aministered locally through SJVAPCD Rule 2550, *Federally Mandated Preconstruction* d*Review for Major Sources of Air Toxics*), newly constructed facilities or reconstructed units or sources at existing facilities would be subject to preconstruction review requirements if they have the potential to emit hazardous air pollutants (air toxics) in "major" amounts (10 tons or more of an individual pollutant or 25 tons or more of a combination of pollutants) and the new units are not already subject to a standard promulgated under Section 112(d), 112(j), or 112(h) of the

Clean Air Act." Facilities or sources subject to Rule 2550 would be subject to stringent air pollution control requirements, referred to Maximum Achievable Control Technology.

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

Dairy Hazardous Air Pollutant Emissions		
HAP	**lb/milk cow-yr**	**Source**
Methanol	1.35	UC Davis - *VOC Emission from Dairy Cows and their Excreta,* 2005
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	0.08	Dr. Schmidt - *Dairy Emissions using Flux Chambers (Phase I & II)* & California State University Fresno (CSUF) - *Monitoring and Modeling of ROG at California Dairies*, 2005
Toluene	0.162	
Cadmium	0.009	Air Resources Board's Profile No. 423, Livestock Operations Dust
Hexavalent Chromium	0.004	
Nickel	0.026	
Arsenic	0.005	
Cobalt	0.003	

Dairy Hazardous Air Pollutant Emissions		
HAP	**lb/milk cow-yr**	**Source**
Lead	0.033	
Total	**1.828**	

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

HAP Emissions					
Category	**Number of cows**		**Emission Factor * lb/hd-yr**		**lb/yr (tons/yr)**
Milking cows	3,061	x	1.828	=	5,596 (2.8)
Dry cows	459	x	1.123	=	515 (0.3)
			Total:	=	6,111 (3.1)

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

As shown above, each individual HAP is expected to be below 10 tons per year, and total HAP emissions are expected to be below 25 tons per year. Therefore, this facility will not be a major air toxics source and the provisions of Rule 2550 do not apply.

There are several recently completed and ongoing research studies that will be considered in future revisions of the current emission factors for dairies. These studies have not been fully vetted or reviewed in the context of establishing standardized emission factors. For instance, although some studies indicate a high methanol emissions rate from fresh manure, the same studies also indicate that the flushing of manure may significantly reduce alcohol emissions, including methanol.

Future review of these studies may indeed result in a change in the current emission factors and/or control efficiencies for various practices and controls, but not until the scientific review process is complete and the District has had opportunity to consider public comment on any proposed changes.

Rule 4101 Visible Emissions

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

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

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

An on-field agricultural source is defined in Rule 8011, Section 3.35 as the following:

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

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

Rule 4102 Nuisance

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

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

California Health & Safety Code 41700 (Health Risk Assessment)

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

An HRA is not required for a project with a total facility prioritization score of less than 1.0. According to the Technical Services Memo for this project (Appendix D), the prioritization scores for cow housing and manure lagoons were greater than 1.0. Therefore, a health risk assessment was required to determine the short-term acute and long-term chronic exposure from these permit units. The health risk indices are as shown in the following table:

RMR Summary[5]					
Category	**Milk Barn**	**Cow Housing**	**Manure Lagoons**	**Project Totals**	**Facility Totals**
Prioritization Score	0.79	18.3	14.5	>1.0	>1.0
Acute Hazard Index	N/A	0.60	0.11	0.71	0.71
Chronic Hazard Index	N/A	0.49	0.03	0.52	0.52
Maximum Individual Cancer Risk (10^{-6})	N/A	8.97E-06	9.56E-07	9.93E-06	9.93E-06
T-BACT Required?	No	Yes	No		

[5] Note: the HRA Memo in Appendix D identifies the permit units as 1-0 through 5-0. Due to other developments in the projects, the permit units were re-numbered as 6-1 through 10-1 after the HRA had been finalized, but both sets of numbers refer to the same permit units.

T-BACT:

BACT for toxic emissions control (T-BACT) is required if the cancer risk exceeds 1.0 in one million. As demonstrated above, T-BACT is required for cow housing because the HRA indicates that the risk is above the District's thresholds for triggering T-BACT requirements.

T-BACT is satisfied with BACT for VOC, NH3 and PM10 (see Appendix C). Compliance with the District's Risk Management Policy is expected.

District policy APR 1905 also specifies that the increase in emissions associated with a proposed new source or modification not have acute or chronic indices, or a cancer risk greater than the District's significance levels (i.e. acute and/or chronic indices greater than 1 and a cancer risk greater than 10 in a million). As outlined by the HRA Summary in Appendix D of this report, the emissions increases for this project were determined to be less than significant.

Rule 4550 Conservation Management Practices (CMP)

This rule applies to agricultural operation sites located within the San Joaquin Valley Air Basin. The purpose of this rule is to limit fugitive dust emissions from agricultural operation sites. The facility currently has a valid CMP Plan (N-5947-CMPP-1). Continued compliance with District Rule 4550 is therefore expected.

Rule 4570 Confined Animal Facilities (CAF)

This rule applies to Confined Animal Facilities (CAF) located within the San Joaquin Valley Air Basin. The purpose of this rule is to limit emissions of Volatile Organic Compounds (VOC) from Confined Animal Facilities (CAF). The facility recently submitted an updated Rule 4570 Phase II application indicating the mitigation measures selected for compliance with the rule requirements. The application was submitted under project #N-1111054), and there are no mitigation measure changes proposed in the current project. The proposed measures discussed in the following sections:

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

- The name, business address, and phone number of the owners/operators responsible for the preparation and the implementation of the mitigation measures listed in the permit.
- The signature of the owners/operators attesting to the accuracy of the information provided and adherence to implementing the activities specified in the mitigation plan at all times and the date that the application was signed.

- A list of all mitigation measures shall be chosen from the application portions of Sections 5.5 or 5.6.

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

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

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

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

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

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

- The APCO, ARB, and EPA approve the temporary suspension of the mitigation measure for the time period requested by the owner/operator and a signed written copy of this determination shall be retained on site.

The following condition will be placed on each permit.

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

Section 7.0 Administrative Requirements

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

- Copies of all of the facility's permits
- Copies of all laboratory tests, calculations, logs, records, and other information required to demonstrate compliance with all applicable requirements of this rule, as determined by the APCO, ARB, EPA.
- Records of the number of animals of each species and production group at the facility on the permit issuance date. Quarterly records of any changes to this information shall also be maintained, (e.g. Dairy Herd Improvement Association records, animal inventories done for financial purposes, etc.)

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

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

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

Push feed so that it is within three (3) feet of feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals.

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

use of a feed trough or other structure designed to maintain feed within reach of the animals. [District Rule 4570] N

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

- {4458} Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rule 4570] N

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

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

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

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

Optional

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

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

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

Silage

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

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

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]

- {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]

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 manufacturer's 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, scrape or vacuum freestall lanes immediately prior to, immediately after or during each milking.

- {4487} Permittee shall flush, scrape or vacuum freestall lanes immediately prior to, immediately after or during each milking. [District Rule 4570] N

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

For a LARGE dairy only (1000 milk cows or larger) - Remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every seven (7) days.

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

- {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] N

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

Install 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] N

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

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

- {4521} Permittee shall measure and document the depth of manure at the fence line at least once every ninety (90) days. [District Rule 4570] N

Solid Manure

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

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

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

- {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

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]

Based on the preceding analysis, compliance with this rule is expected.

California Health & Safety Code 42301.6 (School Notice)

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

California Senate Bill 700 (SB 700)

Foster Farms Dairy #4 is an agricultural operation that raises dairy cows for the production of milk for human consumption. Pursuant to Senate Bill (SB) 700, all agriculture operations, including Confined Animal Facilities (CAF), with emissions greater than ½ the major source emissions threshold levels (5 tons/year of NO_X or VOC), are required to obtain a District permit.

The post-project emissions from this dairy exceed the 5 tons-VOC/year threshold and the dairy is classified as a large CAF by the California Air Resources Board (ARB). The dairy is currently under District permit requirements, as required by SB 700.

California Environmental Quality Act (CEQA)

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

- Inform governmental decision-makers and the public about the potential, significant environmental effects of proposed activities.

- Identify the ways that environmental damage can be avoided or significantly

reduced.

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

Stanislaus 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 certain impacts on air quality would be significant and unavoidable. The County approved the Project and adopted a Statement of Overriding Considerations (SOC), in accordance with CEQA Guidelines §15093(a), stating that economic, legal, social, technological, and other benefits resulting from the project will outweigh the unavoidable adverse environmental effects.

The District is a Responsible Agency for the project because of its discretionary approval power over the project via its Permits Rule (Rule 2010) and New Source Review Rule (Rule 2201), (CEQA Guidelines §15381) Rule 2010 requires operators of emission sources to obtain an Authority to Construct (ATC) and Permit to Operate (PTO) from the District. Rule 2201 requires that new and modified stationary sources of emissions mitigate their emissions using best available control technology (BACT) and for non-agricultural sources offsetting emissions when above certain thresholds (SB 700). As a responsible agency the District complies with CEQA by considering the EIR prepared by the Lead Agency, and by reaching its own conclusion on whether and how to approve the project involved (CEQA Guidelines §15096).

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

IX. Recommendation

Compliance with all applicable rules and regulations is expected. Pending a successful Public Noticing period, issue Authorities to Construct N-5947-6-1 through 10-1 subject to the permit conditions on the attached draft Authorities to Construct in Appendix F and file a Notice of Determination with Stanislaus County.

X. Billing Information

Annual Permit Fees			
Permit Number	**Fee Schedule**	**Fee Description**	**Annual Fee**
N-5947-6-1	3020-06	Milk Barn	$105.00
N-5947-7-1	3020-06	Cow Housing	$105.00
N-5947-8-1	3020-06	Liquid Manure Handling System	$105.00
N-5947-9-1	3020-06	Solid Manure Handling System	$105.00
N-5947-10-1	3020-06	Feed Storage and Handling	$105.00

XI. Appendices

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

APPENDIX A

Current Permit to Operate

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

Permit to Operate

FACILITY: N-5947 **EXPIRATION DATE:** 12/31/2015

LEGAL OWNER OR OPERATOR: FOSTER FARMS DAIRY #4
MAILING ADDRESS: 2343 HICKMAN RD
HICKMAN, CA 95323

FACILITY LOCATION: 5372 S HICKMAN ROAD
DENAIR, CA 95316

FACILITY DESCRIPTION: DAIRY FARM

The Facility's Permit to Operate may include Facility-wide Requirements as well as requirements that apply to specific permit units.

This Permit to Operate remains valid through the permit expiration date listed above, subject to payment of annual permit fees and compliance with permit conditions and all applicable local, state, and federal regulations. This permit is valid only at the location specified above, and becomes void upon any transfer of ownership or location. Any modification of the equipment or operation, as defined in District Rule 2201, will require prior District approval. This permit shall be posted as prescribed in District Rule 2010.

Seyed Sadredin
Executive Director / APCO

Arnaud Marjollet
Director of Permit Services

Jun 3 2014 8:09AM – AIYABEIJ

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: N-5947-6-0 **EXPIRATION DATE:** 12/31/2015

EQUIPMENT DESCRIPTION:
745 COW MILKING OPERATION WITH ONE 32 STALL PARALLEL MILKING PARLOR

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. Permittee shall implement and maintain all the mitigation measures contained in this permit no later than May 10, 2013. [District Rule 4570]
4. 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]
5. If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
6. Permittee shall flush or hose milk parlor immediately prior to, immediately after, or during each milking. [District Rule 4570]
7. Permittee shall provide verification that milk parlors are flushed or hosed prior to, immediately after, or during each milking. [District Rule 4570]
8. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]
9. 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]
10. Facilities N-5947, N-4683, and N-8554 are part of the same stationary source for NSR purposes. [District Rule 2201]

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

AUTHORITY TO CONSTRUCT

PERMIT NO: N-5947-6-2 **ISSUANCE DATE:** 03/03/2014

LEGAL OWNER OR OPERATOR: FOSTER FARMS DAIRY #4
MAILING ADDRESS: 2343 HICKMAN RD
HICKMAN, CA 95323

LOCATION: 5372 S HICKMAN ROAD
DENAIR, CA 95316

EQUIPMENT DESCRIPTION:
MODIFICATION OF 745 COW MILKING OPERATION WITH ONE 32 STALL PARALLEL MILKING PARLOR: REPLACE EXISTING MILKING PARLOR WITH A NEW 72-STALL ROTARY MILKING PARLOR

CONDITIONS

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

CONDITIONS CONTINUE ON NEXT PAGE

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

Seyed Sadredin, Executive Director / APCO

COPY

Arnaud Marjollet, Director of Permit Services
N-5947-6-2 : Jun 3 2014 3:14PM – KEASTMD : Joint Inspection NOT Required

6. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]
7. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]
8. This ATC shall be implemented prior to or concurrently with ATC 6-1. [District Rule 2201]
9. Facilities N-5947, N-4683, and N-8554 are part of the same stationary source for NSR purposes. [District Rule 2201]

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: N-5947-7-0 **EXPIRATION DATE:** 12/31/2015

EQUIPMENT DESCRIPTION:
COW HOUSING - 745 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 865 MATURE COWS (MILK AND DRY COWS); AND 4 FREESTALL BARNS WITH A FLUSH SYSTEM

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. Permittee shall implement and maintain all the mitigation measures contained in this permit no later than May 10, 2013. [District Rule 4570]
4. 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]
5. If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
6. Permittee shall 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]
7. Permittee shall flush, scrape or vacuum freestall lanes immediately prior to, immediately after or during each milking. [District Rule 4570]
8. Permittee shall maintain records sufficient to demonstrate that freestall lanes are flushed, scraped or vacuumed immediately prior to, immediately after or during each milking. [District Rule 4570]
9. 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 fourteen (14) days. [District Rule 4570]
10. 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 fourteen (14) days. [District Rule 4570]
11. Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rule 4570]
12. 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]
13. Permittee shall clean manure from corrals at least four (4) times per year with at least sixty (60) days between each cleaning, or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rule 4570]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

14. 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]
15. 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]
16. 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]
17. 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]
18. Permittee shall measure and document the depth of manure on the concrete lanes at least once every ninety (90) days. [District Rule 4570]
19. Shade structures shall be installed in any of the following ways: 1) constructed with a light permeable roofing material; 2) uphill of any slope in the corral; 3) installed so that the structure has a North/South orientation. OR Permittee shall clean manure from under corral shades at least once every fourteen (14) days, when weather permits access into the corral. [District Rule 4570]
20. Permittee shall knockdown fence line manure build-up prior to it exceeding a height of twelve (12) inches at any time or point. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rule 4570]
21. Permittee shall measure and document the depth of manure at the fence line at least once every ninety (90) days. [District Rule 4570]
22. Permittee shall maintain a record of the number of animals of each species and production group at the facility and shall maintain quarterly records of any changes to this information. [District Rule 4570]
23. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]
24. 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]
25. Facilities N-5947, N-4683, and N-8554 are part of the same stationary source for NSR purposes. [District Rule 2201]

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: N-5947-8-0 **EXPIRATION DATE:** 12/31/2015

EQUIPMENT DESCRIPTION:
LIQUID MANURE HANDLING SYSTEM CONSISTING OF TWO SETTLING BASINS; ONE STORAGE POND; MANURE LAND APPLIED THROUGH FLOOD IRRIGATION

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. Permittee shall implement and maintain all the mitigation measures contained in this permit no later than May 10, 2013. [District Rule 4570]
4. 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]
5. If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
6. Permittee shall remove solids with a solid separator system, prior to the manure entering the lagoon. [District Rule 4570]
7. Permittee shall not allow liquid manure to stand in the fields for more than twenty-four (24) hours after irrigation. [District Rule 4570]
8. 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. 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. 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]
11. Facilities N-5947, N-4683, and N-8554 are part of the same stationary source for NSR purposes. [District Rule 2201]

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: N-5947-9-0 **EXPIRATION DATE:** 12/31/2015

EQUIPMENT DESCRIPTION:
SOLID MANURE HANDLING CONSISTING OF OPEN MANURE STOCK PILES; SOLID MANURE APPLICATION TO LAND AND HAULED OFFSITE

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. Permittee shall implement and maintain all the mitigation measures contained in this permit no later than May 10, 2013. [District Rule 4570]
4. 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]
5. If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
6. Permittee shall incorporate all solid manure within seventy-two (72) hours of land application. [District Rule 4570]
7. Permittee shall maintain records to demonstrate that all solid manure has been incorporated within seventy-two (72) hours of land application. [District Rule 4570]
8. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]
9. 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]
10. Facilities N-5947, N-4683, and N-8554 are part of the same stationary source for NSR purposes. [District Rule 2201]

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: N-5947-10-0 **EXPIRATION DATE:** 12/31/2015

EQUIPMENT DESCRIPTION:
FEED STORAGE AND HANDLING CONSISTING OF COVERED FEED STORAGE OR COMMODITY BARN AND SILAGE PILES

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. Permittee shall implement and maintain all the mitigation measures contained in this permit no later than May 10, 2013. [District Rule 4570]
4. 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]
5. If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
6. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 4570]
7. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rule 4570]
8. Permittee shall push feed so that it is within three feet of feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals. [District Rule 4570]
9. 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]
10. Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rule 4570]
11. 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]
12. Permittee shall store grain in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rule 4570]
13. Permittee shall maintain records demonstrating grain is/was stored in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rule 4570]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

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

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

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

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

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

30. 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]

31. 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]

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

33. 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]

34. Facilities N-5947, N-4683, and N-8554 are part of the same stationary source for NSR purposes. [District Rule 2201]

APPENDIX B

Emissions Calculations

Pre-Project Dairy Information

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

All heifers and bulls should be entered together as Support Stock. However, if doing so will result in NSR/AAQA/RMR implications, it may be appropriate to enter each herd size individually and to add a permit condition specifying the maximum herd sizes.

For existing dairies, if the current PTO includes calves with the support stock, contact the facility to determine the maximum number of calves. Calves should be entered separately from support stock.

If unsure whether herd is housed in freestalls or open corrals, assume open corrals to be conservative.

If unsure whether manure is flushed or scraped, assume flushed to be conservative.

Pre-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals
Milk Cows					0
Dry Cows					0
Support Stock (Heifers and Bulls)					0
Large Heifers					0
Medium Heifers					0
Small Heifers					0
Bulls					0

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

Total Herd Summary	
Total Milk Cows	0
Total Mature Cows	0
Support Stock (Heifers and Bulls)	0
Total Calves	0
Total Dairy Head	0

Silage info may be found in the Rule 4570 Phase II application or, for existing dairies, in the Rule 4570 compliance engineering evaluation.

Pre-Project Silage Information

Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn			
Alfalfa			
Wheat			

Post-Project Dairy Information

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

All heifers and bulls should be entered together as Support Stock. However, if doing so will result in NSR implications, it may be appropriate to enter each herd size individually and to add a permit condition specifying the maximum herd sizes.

Calves should be entered seperately from support stock.

If unsure whether herd is housed in freestalls or open corrals, assume open corrals to be conservative.

If unsure whether manure is flushed or scraped, assume flushed to be conservative.

Post-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals
Milk Cows	3,061				3,061
Dry Cows	459				459
Support Stock (Heifers and Bulls)					0
Large Heifers					0
Medium Heifers					0
Small Heifers					0
Bulls					0

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

Total Herd Summary	
Total Milk Cows	3,061
Total Mature Cows	3,520
Support Stock (Heifers and Bulls)	0
Total Calves	0
Total Dairy Head	3,520

Silage info may be found in the Rule 4570 Phase II application or, for existing dairies, in the Rule 4570 compliance engineering evaluation.

Post-Project Silage Information

Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	1	22	110
Alfalfa	1	16	50
Wheat	1	22	110

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

VOC Mitigation Measures and Control Efficiencies

For existing facilities already subject to District Rule 4570, the information requested in the tables below may be taken directly from the identical tables in the facility's Rule 4570 Phase II application review/EE.

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

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

VOC Mitigation Measures and Control Efficiencies

		Total Control Efficiency	0.00%	30.75%
		Bedding Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%
☐	☐	Use non-manure-based bedding and non-separated solids based bedding for at least 90% of the bedding material, by weight, for freestalls (e.g. rubber mats, almond shells, sand, or waterbeds).	0%	0%
☐	☑	For a large dairy only (1,000 milk cows or larger) - Remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every 7 days.	0%	10%
☐	☐	For a medium dairy only (500 to 999 milk cows) - Remove manure that is not dry from individual cow freestall beds or reke, harrow, scrape, or grade freestall bedding at least once every 14 days.	0%	0%
		Total Control Efficiency	10.00%	19.00%
		Lanes Mitigations		
☐	☑	Feed according to NRC guidelines	0%	10%
☐	☑	Pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers. Note: No control efficiency at this time.	0%	0%
☐	☑	Flush, scrape, or vacuum freestall flush lanes immediately prior to or after, or during each milking; or flush or scrape freestall flush lanes at least 3 times per day.	0%	10%
☐	☐	Have no animals in exercise pens or corrals at any time.	0%	0%
		Total Control Efficiency	0.00%	19.00%

Liquid Manure Handling				
Measure Proposed?		**Mitigation Measure(s) per Emissions Point**	**VOC Control Efficiency (%)**	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Lagoons/Storage Ponds Mitigations		
☐	☑	Feed according to NRC guidelines	0%	10%
☐	☐	Use phototropic lagoon	0%	0%
☐	☑	Use an anaerobic treatment lagoon designed according to NRCS Guideline No. 359	0%	40%
☐	☑	Remove solids from the waste system with a solid separator system, prior to the waste entering the lagoon. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF.	0%	0%
☐	☐	Maintain lagoon pH between 6.5 and 7.5	0%	0%
		Total Control Efficiency	0.00%	46.00%
		Liquid Manure Land Application Mitigations		
☐	☑	Feed according to NRC guidelines	0%	10%
☐	☑	Only apply liquid manure that has been treated with an anaerobic or aerobic treatment lagoon, aerobic lagoon, or digester system	0%	40%
☐	☑	Allow liquid manure to stand in the fields for no more than 24 hours after irrigation. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF.	0%	0%
☐	☐	Apply liquid/slurry manure via injection with drag hose or similar apparatus	0%	0%
		Total Control Efficiency	0.00%	46.00%

Solid Manure Handling				
Measure Proposed?		**Mitigation Measure(s) per Emissions Point**	**VOC Control Efficiency (%)**	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Solid Manure Storage Mitigations		
☐	☑	Feed according to NRC guidelines	0%	10%
☐	☑	Within 72 hours of removal from housing, either a) remove dry manure from the facility, or b) cover dry manure outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed 24 hours per event.	0%	10%
		Total Control Efficiency	0.00%	19.00%
		Separated Solids Piles Mitigations		
☐	☑	Feed according to NRC guidelines	0%	10%
☐	☑	Within 72 hours of removal from the drying process, either a) remove separated solids from the facility, or b) cover separated solids outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed 24 hours per event.	0%	10%
		Total Control Efficiency	0.00%	19.00%
		Solid Manure Land Application Mitigations		
☐	☑	Feed according to NRC guidelines	0%	10%
☐	☑	Incorporate all solid manure within 72 hours of land application. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF. Note: No additional control given for rapid manure incorporation (e.g. BACT requirement).	0%	0%
☐	☐	Only apply solid manure that has been treated with an anaerobic treatment lagoon, aerobic lagoon or digester system.	0%	0%

VOC Mitigation Measures and Control Efficiencies

☐	☐	Apply no solid manure with a moisture content of more than 50%	0%	0%
		Total Control Efficiency	0.00%	10.00%

Silage and TMR				
Measure Proposed?		**Mitigation Measure(s) per Emissions Point**	**VOC Control Efficiency (%)**	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Corn/Alfalfa/Wheat Silage Mitigations		
☐	☑	1. Utilize a sealed feed storage system (e.g. Ag-Bag) for bagged silage, or 2. Cover the surface of silage piles, except for the area where feed is being removed from the pile, with a plastic tarp that is at least 5 mils thick (0.005 inches), multiple plastic tarps with a cumulative thickness of at least 5 mils (0.005 inches), or an oxygen barrier film covered with a UV resistant material within 72 hours of last delivery of material to the pile, and implement one of the following: a) build silage piles such that the averege bulk density is at least 44 lb/cu-ft for corn silage and 40 lb/cu-ft for other silage types, as measured in accordance with Section 7.10 of Rule 4570, b) when creating a silage pile, adjust filling parameters to assure a calculated average bulk density of at least 44 lb/cu-ft for corn silage and at least 40 lb/cu-ft for other silage types, using a spreadsheet approved by the District, c) harvest silage crop at > or = 65% moisture for corn; and >= 60% moisture for alfalfa/grass and other silage crops; manage silage material delivery such that no more than 6 inches of materials are uncompacted on top of the pile; and incorporate the applicable Theoretical Length of Chop (TLC) and roller opening for the crop being harvested. Implement two of the following: Manage Exposed Silage. a) manage silage piles such that only one silage pile has an uncovered face and the uncovered face has a total exposed surface area of less than 2,150 sq. ft., or b) manage multiple uncovered silage piles such that the total exposed surface area of all silage piles is less than 4,300 sq ft. Maintain Silage Working Face. a) use a shaver/facer to remove silage from the silage pile, or b) maintain a smooth vertical surface on the working face of the silage pile Silage Additive: a) inoculate silage with homolactic acid bacteria in accordance with manufacturer recommendations to achieve a concentration of at least 100,000 colony forming units per gram of wet forage or apply 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.	0%	39%
		Total Control Efficiency*	0.00%	39.00%

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

		TMR Mitigations		
☐	☑	Push feed so that it is within 3 feet of feedlane fence within 2 hrs of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the cows.	0%	10%
☐	☑	Begin feeding total mixed rations within 2 hrs of grinding and mixing rations. Note: If selected for dairies > 999 milk cows, control efficiency already included in EF.	0%	0%
☐	☑	Feed steam-flaked, dry rolled, cracked or ground corn or other ground cereal grains.	0%	10%
☐	☐	Remove uneaten wet feed from feed bunks within 24 hrs after then end of a rain event.	0%	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%	0%
		Total Control Efficiency	0.00%	19.00%

Ammonia Mitigation Measures and Control Efficiencies

Milking Parlor				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	NH3 Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Milking Parlor Floor Mitigations		
FALSE	TRUE	Feed according to NRC guidelines	0%	28%
		Total Control Efficiency	0%	28%

Cow Housing				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	NH3 Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Corrals/Pens Mitigations		
☐	☑	Feed according to NRC guidelines	0%	28%
☐	☑	Clean manure from corrals at least four times per year with at least 60 days between cleaning, or clean corrals at least once between April and July and at least once between September and December. **OR** Use lime or a similar absorbent material in the corral according to the manufacturer's recommendation to minimize moisture in the corrals. **OR** Apply thymol to the corral soil in accordance with the manufacturer's recommendation.	0%	50%
		Total Control Efficiency	0%	64%
		Bedding Mitigations		
☐	☑	Feed according to NRC guidelines	0%	28%
☐	☑	Use non-manure-based bedding and non-separated solids based bedding for at least 90% of the bedding material, by weight, for freestalls (e.g. rubber mats, almond shells, sand, or waterbeds). **OR** For a large dairy only (1,000 milk cows or larger) - Remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every 7 days. **OR** For a medium dairy only (500 to 999 milk cows) - Remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every 14 days.	0.0%	47.7%
		Total Control Efficiency	0.00%	62.34%
		Lanes Mitigations		
☐	☑	Feed according to NRC guidelines	0%	28%
		Total Control Efficiency	0%	28%

Liquid Manure Handling				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	NH3 Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Lagoons/Storage Ponds Mitigations		
☐	☑	Feed according to NRC guidelines	0%	28%
☐	☑	Use phototropic lagoon **OR** Remove solids from the waste system with a solid separator system, prior to the waste entering the lagoon.	0%	80%
		Total Control Efficiency	0.0%	85.6%
		Liquid Manure Land Application Mitigations		
☐	☑	Feed according to NRC guidelines	0%	28%
☐	☑	Only apply liquid manure that has been treated with an anaerobic treatment lagoon	0%	42%
		Total Control Efficiency	0.00%	58.24%

Solid Manure Handling				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	NH3 Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Solid Manure Land Application Mitigations		
☐	☑	Feed according to NRC guidelines	0%	28%
☐	☐	Incorporate all solid manure within 72 hours of land application. **AND** Only apply solid manure that has been treated with an anaerobic treatment lagoon, aerobic lagoon or digester system. **AND** Apply no solid manure with a moisture content of more than 50%	0%	0%
		Total Control Efficiency	0.00%	28.00%

lb/hd-yr Dairy Emissions Factors for Holstein Cows

			Milk Cows				Dry Cows				Large Heifers (15 to 24 months)				Medium Heifers (7 to 14 months)				Small Heifers (3 to 6 months)				Calves (0 - 3 months)				Bulls			
			Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled	
			<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2
Milking Parlor	VOC	Enteric Emissions in Milking Parlors	0.43	0.41	0.43	0.37	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
		Milking Parlor Floor	0.04	0.03	0.04	0.03	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
		Total	0.47	0.44	0.47	0.40	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
	NH3	Total	0.19	0.19	0.19	0.14	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
Cow Housing	VOC	Enteric Emissions in Cow Housing	3.89	3.69	3.89	3.32	2.33	2.23	2.33	2.01	1.81	1.71	1.81	1.54	1.23	1.17	1.23	1.05	0.69	0.65	0.69	0.58	0.32	0.31	0.32	0.28	1.10	1.04	1.10	0.94
		Corrals/Pens	10.00	6.60	10.00	4.57	5.40	3.59	5.40	2.49	4.20	2.76	4.20	1.91	2.85	1.88	2.85	1.30	1.60	1.04	1.60	0.72	0.75	0.50	0.75	0.35	2.55	1.67	2.55	1.18
		Bedding	1.05	1.00	0.95	0.81	0.57	0.54	0.51	0.44	0.44	0.42	0.40	0.34	0.30	0.28	0.27	0.23	0.17	0.16	0.15	0.13	0.08	0.08	0.07	0.06	0.27	0.25	0.24	0.20
		Lanes	0.84	0.80	0.84	0.65	0.45	0.44	0.45	0.35	0.35	0.33	0.35	0.27	0.24	0.23	0.24	0.18	0.13	0.13	0.13	0.10	0.06	0.06	0.06	0.05	0.21	0.20	0.21	0.16
		Total	15.78	12.09	15.67	9.35	8.76	6.80	8.70	6.29	6.81	5.22	6.76	4.06	4.62	3.56	4.59	2.77	2.59	1.98	2.56	1.64	1.22	0.96	1.21	0.74	4.13	3.16	4.10	2.46
	NH3	Enteric Emissions in Cow Housing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Corrals/Pens	41.90	41.90	41.90	15.08	21.20	21.20	21.20	7.63	11.00	11.00	11.00	3.96	7.90	7.90	7.90	2.84	6.00	6.00	6.00	2.16	1.80	1.80	1.80	0.65	15.30	15.30	15.30	5.51
		Bedding	6.30	6.30	6.30	2.37	3.20	3.20	3.20	1.20	1.70	1.70	1.70	0.64	1.20	1.20	1.20	0.45	0.90	0.90	0.90	0.34	0.30	0.30	0.30	0.11	2.30	2.30	2.30	0.87
		Lanes	5.10	5.10	5.10	3.67	2.60	2.60	2.60	1.87	1.30	1.30	1.30	0.94	1.00	1.00	1.00	0.72	0.70	0.70	0.70	0.50	0.20	0.20	0.20	0.14	1.90	1.90	1.90	1.37
		Total	53.30	53.30	53.30	21.13	27.00	27.00	27.00	10.71	14.00	14.00	14.00	5.54	10.10	10.10	10.10	4.02	7.60	7.60	7.60	3.00	2.30	2.30	2.30	0.90	19.50	19.50	19.50	7.74
Liquid Manure Handling	VOC	Lagoons/Storage Ponds	1.52	1.30	1.52	0.70	0.82	0.71	0.82	0.38	0.64	0.54	0.64	0.29	0.43	0.37	0.43	0.20	0.24	0.21	0.24	0.11	0.11	0.10	0.11	0.05	0.40	0.33	0.40	0.18
		Liquid Manure Land Application	1.64	1.40	1.64	0.76	0.89	0.76	0.89	0.41	0.69	0.58	0.69	0.32	0.47	0.40	0.47	0.22	0.26	0.22	0.26	0.12	0.12	0.11	0.12	0.06	0.42	0.35	0.42	0.19
		Total	3.16	2.70	3.16	1.46	1.71	1.47	1.71	0.79	1.33	1.13	1.33	0.61	0.90	0.77	0.90	0.42	0.51	0.43	0.51	0.23	0.24	0.21	0.24	0.11	0.82	0.68	0.82	0.37
	NH3	Lagoons/Storage Ponds	8.20	8.20	8.20	1.18	4.20	4.20	4.20	0.60	2.20	2.20	2.20	0.32	1.50	1.50	1.50	0.22	1.20	1.20	1.20	0.17	0.35	0.35	0.35	0.05	3.00	3.00	3.00	0.43
		Liquid Manure Land Application	8.90	8.90	8.90	3.72	4.50	4.50	4.50	1.88	2.30	2.30	2.30	0.96	1.70	1.70	1.70	0.71	1.30	1.30	1.30	0.54	0.37	0.37	0.37	0.15	3.23	3.23	3.23	1.35
		Total	17.10	17.10	17.10	4.90	8.70	8.70	8.70	2.48	4.50	4.50	4.50	1.28	3.20	3.20	3.20	0.93	2.50	2.50	2.50	0.72	0.72	0.72	0.72	0.20	6.23	6.23	6.23	1.78
Solid Manure Handling	VOC	Solid Manure Storage	0.16	0.15	0.16	0.12	0.09	0.08	0.09	0.07	0.07	0.06	0.07	0.05	0.05	0.04	0.05	0.03	0.03	0.02	0.03	0.02	0.01	0.01	0.01	0.01	0.04	0.04	0.04	0.03
		Separated Solids Piles	0.06	0.06	0.06	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02
		Solid Manure Land Application	0.39	0.33	0.39	0.30	0.21	0.18	0.21	0.16	0.16	0.14	0.16	0.12	0.11	0.09	0.11	0.08	0.08	0.05	0.08	0.05	0.03	0.03	0.03	0.02	0.10	0.08	0.10	0.07
		Total	0.61	0.54	0.61	0.47	0.33	0.29	0.33	0.26	0.26	0.23	0.26	0.20	0.17	0.15	0.17	0.13	0.10	0.09	0.10	0.07	0.05	0.04	0.05	0.04	0.16	0.14	0.16	0.12
	NH3	Solid Manure Storage	0.95	0.95	0.95	0.95	0.48	0.48	0.48	0.48	0.25	0.25	0.25	0.25	0.18	0.18	0.18	0.18	0.13	0.13	0.13	0.13	0.04	0.04	0.04	0.04	0.35	0.35	0.35	0.35
		Separated Solids Piles	0.38	0.38	0.38	0.38	0.19	0.19	0.19	0.19	0.10	0.10	0.10	0.10	0.07	0.07	0.07	0.07	0.05	0.05	0.05	0.05	0.02	0.02	0.02	0.02	0.14	0.14	0.14	0.14
		Solid Manure Land Application	2.09	2.09	2.09	1.50	1.06	1.06	1.06	0.76	0.55	0.55	0.55	0.40	0.39	0.39	0.39	0.28	0.30	0.30	0.30	0.22	0.09	0.09	0.09	0.06	0.78	0.76	0.76	0.55
		Total	3.42	3.42	3.42	2.83	1.73	1.73	1.73	1.43	0.90	0.90	0.90	0.75	0.64	0.64	0.64	0.53	0.48	0.48	0.48	0.40	0.15	0.15	0.15	0.12	1.26	1.25	1.26	1.04

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

		Silage Type	Uncontrolled	EF1	EF2
Feed Storage and Handling	VOC	Corn Silage	34,681	34,681	21,155
		Alfalfa Silage	17,456	17,456	10,649
		Wheat Silage	43,844	43,844	26,745
		TMR	13,056	13,056	10,575

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

PM_{10} Emission Factors (lb/hd-yr)

Type of Cow	Uncontrolled Dairy EF	Source
Cows in Freestalls	1.37	Based on a Summer 2003 study by Texas A&M ASAE at a West Texas Dairy
Milk/Dry in Corrals	5.46	Based on a Summer 2003 study by Texas A&M ASAE at a West Texas Dairy
Heifers/Bulls in Open Corrals	10.55	Based on a USDA/UC Davis report quantifying dairy and feedlot emissions in Tulare & Kern Counties (April '01)
Calf (under 3 mo.) open corrals	1.37	SJVAPCD
Calf on-ground hutches	0.343	SJVAPCD
Calf above-ground flushed	0.069	SJVAPCD
Calf above-ground scraped	0.206	SJVAPCD

The controlled PM10 emission factors will be calculated based on the specific PM10 mitigation measures, if any, for each freestall, corral, or calf hutch area.

Dairy Emission Factors

lb/hd-yr Dairy Emissions Factors for Jersey Cows																															
Note: Jersey cows will be assumed to generate 71% of the amount of VOC and NH3 emissions as a Holstein cow.			Milk Cows				Dry Cows				Large Heifers (16 to 24 months)				Medium Heifers (7 to 14 months)				Small Heifers (3 to 6 months)				Calves (0 - 3 months)				Bulls			
			Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled	
			<1000 milk cows	>1000 milk cows	EF1	EF2	<1000 milk cows	>1000 milk cows	EF1	EF2	<1000 milk cows	>1000 milk cows	EF1	EF2	<1000 milk cows	>1000 milk cows	EF1	EF2	<1000 milk cows	>1000 milk cows	EF1	EF2	<1000 milk cows	>1000 milk cows	EF1	EF2	<1000 milk cows	>1000 milk cows	EF1	EF2
Milking Parlor	VOC	Enteric Emissions in Milking Parlors	0.31	0.29	0.31	0.26	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
		Milking Parlor Floor	0.03	0.02	0.03	0.02	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
		Total	0.34	0.31	0.34	0.28	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
	NH3	Total	0.13	0.13	0.13	0.10	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
Cow Housing	VOC	Enteric Emissions in Cow Housing	2.76	2.62	2.76	2.36	1.68	1.58	1.68	1.43	1.29	1.22	1.29	1.09	0.87	0.83	0.87	0.75	0.49	0.46	0.49	0.41	0.23	0.22	0.23	0.20	0.78	0.74	0.78	0.66
		Corrals/Pens	7.10	4.69	7.10	3.25	3.83	2.55	3.83	1.77	2.98	1.96	2.98	1.36	2.02	1.33	2.02	0.92	1.14	0.74	1.14	0.51	0.53	0.36	0.53	0.25	1.81	1.19	1.81	0.82
		Bedding	0.75	0.71	0.67	0.58	0.40	0.39	0.36	0.31	0.31	0.30	0.28	0.24	0.21	0.20	0.19	0.16	0.12	0.11	0.11	0.09	0.06	0.06	0.05	0.04	0.19	0.18	0.17	0.14
		Lanes	0.60	0.57	0.60	0.46	0.32	0.31	0.32	0.25	0.25	0.24	0.25	0.19	0.17	0.16	0.17	0.13	0.10	0.09	0.10	0.07	0.04	0.04	0.04	0.03	0.15	0.14	0.15	0.12
		Total	11.20	8.58	11.13	6.64	6.21	4.83	6.17	3.76	4.83	3.71	4.80	2.88	3.29	2.53	3.26	1.97	1.84	1.40	1.83	1.09	0.86	0.67	0.86	0.52	2.93	2.24	2.91	1.74
	NH3	Enteric Emissions in Cow Housing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Corrals/Pens	29.75	29.75	29.75	10.71	15.05	15.05	15.05	5.42	7.81	7.81	7.81	2.81	5.61	5.61	5.61	2.02	4.26	4.26	4.26	1.53	1.26	1.26	1.26	0.46	10.86	10.86	10.86	3.91
		Bedding	4.47	4.47	4.47	1.68	2.27	2.27	2.27	0.86	1.21	1.21	1.21	0.45	0.85	0.85	0.85	0.32	0.64	0.64	0.64	0.24	0.21	0.21	0.21	0.08	1.63	1.63	1.63	0.61
		Lanes	3.62	3.62	3.62	2.61	1.85	1.85	1.85	1.33	0.92	0.92	0.92	0.66	0.71	0.71	0.71	0.51	0.50	0.50	0.50	0.36	0.14	0.14	0.14	0.10	1.35	1.35	1.35	0.97
		Total	37.84	37.84	37.84	15.00	19.17	19.17	19.17	7.60	9.94	9.94	9.94	3.93	7.17	7.17	7.17	2.85	5.40	5.40	5.40	2.13	1.63	1.63	1.63	0.64	13.85	13.85	13.85	5.50
Liquid Manure Handling	VOC	Lagoons/Storage Ponds	1.08	0.92	1.08	0.50	0.58	0.50	0.58	0.27	0.45	0.39	0.45	0.21	0.31	0.26	0.31	0.14	0.17	0.15	0.17	0.08	0.08	0.07	0.08	0.04	0.26	0.23	0.26	0.13
		Liquid Manure Land Application	1.16	0.99	1.16	0.54	0.63	0.54	0.63	0.29	0.49	0.42	0.49	0.22	0.33	0.28	0.33	0.15	0.19	0.16	0.19	0.08	0.09	0.08	0.09	0.04	0.30	0.25	0.30	0.13
		Total	2.24	1.92	2.24	1.04	1.21	1.04	1.21	0.56	0.94	0.80	0.94	0.43	0.64	0.55	0.64	0.29	0.36	0.30	0.36	0.16	0.17	0.15	0.17	0.08	0.56	0.48	0.56	0.26
	NH3	Lagoons/Storage Ponds	5.82	5.82	5.82	0.84	2.98	2.98	2.98	0.43	1.56	1.56	1.56	0.22	1.07	1.07	1.07	0.15	0.85	0.85	0.85	0.12	0.25	0.25	0.25	0.04	2.13	2.13	2.13	0.31
		Liquid Manure Land Application	6.32	6.32	6.32	2.64	3.20	3.20	3.20	1.33	1.83	1.83	1.83	0.68	1.21	1.21	1.21	0.50	0.92	0.92	0.92	0.39	0.26	0.26	0.26	0.11	2.29	2.29	2.29	0.98
		Total	12.14	12.14	12.14	3.48	6.18	6.18	6.18	1.76	3.39	3.39	3.39	0.91	2.27	2.27	2.27	0.66	1.78	1.78	1.78	0.51	0.51	0.51	0.51	0.15	4.42	4.42	4.42	1.28
Solid Manure Handling	VOC	Solid Manure Storage	0.11	0.11	0.11	0.09	0.06	0.06	0.06	0.05	0.05	0.04	0.05	0.04	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.03	0.02
		Separated Solids Piles	0.04	0.04	0.04	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
		Solid Manure Land Application	0.28	0.23	0.28	0.21	0.15	0.13	0.15	0.11	0.12	0.10	0.12	0.09	0.08	0.07	0.08	0.06	0.04	0.04	0.04	0.03	0.02	0.02	0.02	0.02	0.07	0.06	0.07	0.05
		Total	0.43	0.38	0.43	0.33	0.23	0.21	0.23	0.18	0.18	0.16	0.18	0.14	0.12	0.11	0.12	0.09	0.07	0.06	0.07	0.06	0.03	0.03	0.03	0.03	0.11	0.10	0.11	0.09
	NH3	Solid Manure Storage	0.67	0.67	0.67	0.67	0.34	0.34	0.34	0.34	0.18	0.18	0.18	0.18	0.13	0.13	0.13	0.13	0.09	0.09	0.09	0.09	0.03	0.03	0.03	0.03	0.25	0.25	0.25	0.25
		Separated Solids Piles	0.27	0.27	0.27	0.27	0.13	0.13	0.13	0.13	0.07	0.07	0.07	0.07	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.10	0.10	0.10	0.10
		Solid Manure Land Application	1.48	1.48	1.48	1.07	0.75	0.75	0.75	0.54	0.39	0.39	0.39	0.28	0.28	0.28	0.28	0.20	0.21	0.21	0.21	0.15	0.08	0.08	0.08	0.05	0.54	0.54	0.54	0.39
		Total	2.43	2.43	2.43	2.01	1.23	1.23	1.23	1.02	0.64	0.64	0.64	0.53	0.46	0.46	0.46	0.38	0.34	0.34	0.34	0.28	0.11	0.11	0.11	0.08	0.89	0.89	0.89	0.74

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

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

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

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

Pre-Project Potential to Emit - Cow Housing

Pre-Project Potential to Emit - Cow Housing: Freestalls

Freestall #(s)/ Name(s)	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
Total - Freestalls		0				0.0	0	0.0	0	0.0	0

Pre-Project Potential to Emit - Cow Housing: Corrals

Corral #(s)/ Name(s)	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
Total - Corrals		0				0.0	0	0.0	0	0.0	0

Pre-Project Potential to Emit - Cow Housing: Calf Hutches

Type of Hutches	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
On Ground											
Aboveground Flush											
Aboveground Scrape											
Total - Calf Hutches		0				0.0	0	0.0	0	0.0	0

Pre-Project Totals

Total # of Cows	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
0	0.0	0	0.0	0	0.0	0

Calculations:

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

Post-Project Potential to Emit - Cow Housing

Post-Project Potential to Emit - Cow Housing: Freestalls

Freestall #(s)/ Name(s)	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
1 - 4	milk cows	2,640	9.35	21.128328	1.17	67.6	24,684	152.8	55,779	8.4	3,076
5	milk cows	780	9.35	21.128328	1.17	20.0	7,293	45.2	16,480	2.5	909
6	milk cows	100	9.35	21.128328	1.17	2.6	935	5.8	2,113	0.3	117
Total - Freestalls		3,520				90.2	32,912	203.8	74,372	11.2	4,101

Post-Project Potential to Emit - Cow Housing: Corrals

Corral #(s)/ Name(s)	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
Total - Corrals		0				0.0	0	0.0	0	0.0	0

Post-Project Potential to Emit - Cow Housing: Calf Hutches

Corral #(s)/ Name(s)	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
On Ground											
Aboveground Flush											
Aboveground Scrape											
Total - Calf Hutches		0				0.0	0	0.0	0	0.0	0

Post-Project Potential to Emit - Cow Housing: New Freestalls at Existing Dairy

Freestall #(s)/ Name(s)	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
Total - Freestalls		0				0.0	0	0.0	0	0.0	0

Post-Project Potential to Emit - Cow Housing: New Corrals at Existing Dairy

Corral #(s)/ Name(s)	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
Total - Corrals		0				0.0	0.0	0.0	0.0	0.0	0.0

Post-Project Potential to Emit - Cow Housing: New Calf Hutches at Existing Dairy

Corral #(s)/ Name(s)	Type of Cow	# of Calves	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
On Ground											
Aboveground Flush											
Aboveground Scrape											
Total - Calf Hutches		0				0.0	0	0.0	0	0.0	0

Post-Project Totals

Total # of Cows	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
3,520	90.2	32,912	203.8	74,372	11.2	4,101

Calculations:

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

Pre-Project Potential to Emit (PE1)

Pre-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals
Milk Cows	0	0	0	0	0
Dry Cows	0	0	0	0	0
Support Stock (Heifers and Bulls)	0	0	0	0	0
Large Heifers	0	0	0	0	0
Medium Heifers	0	0	0	0	0
Small Heifers	0	0	0	0	0
Bulls	0	0	0	0	0

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

Silage Information

Feed Type	Maximum # Open Piles	Maximum Height (ft)	Maximum Width (ft)	Open Face Area (ft^2)
Corn	0	0	0	
Alfalfa	0	0	0	
Wheat	0	0	0	

Milking Parlor

Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	0.0	0	0.0	0

Cow Housing

Cow	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Total	0.0	0	0.0	0	0.0	0

Liquid Manure Handling

Cow	VOC		NH3		H2S*	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	0.0	0	0.0	0	1	361
Dry Cows	0.0	0	0.0	0	0.1	28
Support Stock (Heifers and Bulls)	0.0	0	0.0	0	0	0
Large Heifers	0.0	0	0.0	0	0	0
Medium Heifers	0.0	0	0.0	0	0	0
Small Heifers	0.0	0	0.0	0	0	0
Calves	0.0	0	0.0	0	0	0
Bulls	0.0	0	0.0	0	0	0
Total	0.0	0	0.0	0	1.1	389

Solid Manure Handling

Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	0.0	0	0.0	0
Dry Cows	0.0	0	0.0	0
Support Stock (Heifers and Bulls)	0.0	0	0.0	0
Large Heifers	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0
Calves	0.0	0	0.0	0
Bulls	0.0	0	0.0	0
Total	0.0	0	0.0	0

Feed Handling and Storage

	Daily PE (lb-VOC/day)	Annual PE (lb-VOC/yr)
Corn Emissions	0.0	0
Alfalfa Emissions	0.0	0
Wheat Emissions	0.0	0
TMR	0.0	0
Total	0.0	0

Calculations for milking parlor:

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

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

Calculations for cow housing:

See detailed calculations under Cow Housing Calculations worksheet.

Calculations for liquid manure and solid manure handling:

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

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

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

Calculations for silage emissions:

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

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

Calculation for TMR emissions:

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

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

Calves are not included in TMR calculation.

Notes:

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

Total Daily Pre-Project Potential to Emit (lb/day)

Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cow Housing	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Liquid Manure	0.0	0.0	0.0	0.0	0.0	0.0	1.1
Solid Manure	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feed Handling	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	0.0	0.0	0.0	0.0	0.0	1.1

Major Source Emissions (lb/yr)

Permit	NOx	SOx	PM10	CO	VOC
Milk Parlor	0	0	0	0	0
Cow Housing	0	0	0	0	0
Liquid Manure	0	0	0	0	0
Solid Manure	0	0	0	0	0
Feed Handling	0	0	0	0	0
Total	0	0	0	0	0

Total Annual Pre-Project Potential to Emit (lb/yr)

Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	0	0	0
Cow Housing	0	0	0	0	0	0	0
Liquid Manure	0	0	0	0	0	0	389
Solid Manure	0	0	0	0	0	0	0
Feed Handling	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	389

Post-Project Potential to Emit (PE2)

Post-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals
Milk Cows	3,061	0	0	0	3,061
Dry Cows	459	0	0	0	459
Support Stock (Heifers and Bulls)	0	0	0	0	0
Large Heifers	0	0	0	0	0
Medium Heifers	0	0	0	0	0
Small Heifers	0	0	0	0	0
Bulls	0	0	0	0	0

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

Silage Information

Feed Type	Maximum # Open Piles	Maximum Height (ft)	Maximum Width (ft)	Open Face Area (ft^2)
Corn	1	22	110	1,832
Alfalfa	1	16	50	645
Wheat	1	22	110	1,832

Milking Parlor

Cow	VOC		NH3	
Milk Cows	lb/day	lb/yr	lb/day	lb/yr
Total	3.4	1,224	1.1	419

Cow Housing

	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Total	90.2	32,912	203.8	74,372	11.2	4,101

Liquid Manure Handling

Cow	VOC		NH3		H2S	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	12.2	4,469	41.1	14,999	1	361
Dry Cows	1.0	363	3.1	1,138	0.1	28
Support Stock (Heifers and Bulls)	0.0	0	0.0	0	0	0
Large Heifers	0.0	0	0.0	0	0	0
Medium Heifers	0.0	0	0.0	0	0	0
Small Heifers	0.0	0	0.0	0	0	0
Calves	0.0	0	0.0	0	0	0
Bulls	0.0	0	0.0	0	0	0
Total	13.2	4,832	44.2	16,137	1.1	389

Solid Manure Handling

Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	3.9	1,439	23.7	8,663
Dry Cows	0.3	115	1.8	656
Support Stock (Heifers and Bulls)	0.0	0	0.0	0
Large Heifers	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0
Calves	0.0	0	0.0	0
Bulls	0.0	0	0.0	0
Total	4.2	1,553	25.5	9,319

Feed Handling and Storage

	Daily PE (lb-VOC/day)	Annual PE (lb-VOC/yr)
Corn Emissions	11.4	4,164
Alfalfa Emissions	1.0	369
Wheat Emissions	14.4	5,264
TMR	77.6	28,323
Total	104.4	38,120

Calculations for milking parlor:

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

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

Calculations for cow housing:

See detailed calculations under Cow Housing Calculations worksheet.

Calculations for liquid manure and solid manure handling:

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

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

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

Calculations for silage emissions:

Annual PE = (EF2) x (area ft²) x (0.0929 m²/ft²) x (8,760 hr/yr) x (60 min/hr) x 2.20E-9 lb/µg

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

Calculation for TMR emissions:

Annual PE = (# cows) x (EF2) x (0.658 m²) x (525,600 min/yr) x (2.20E-9 lb/µg)

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

Calves are not included in TMR calculation.

Total Daily Post-Project Potential to Emit (lb/day)

Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0.0	0.0	0.0	0.0	3.4	1.1	0.0
Cow Housing	0.0	0.0	11.2	0.0	90.2	203.8	0.0
Liquid Manure	0.0	0.0	0.0	0.0	13.2	44.2	1.1
Solid Manure	0.0	0.0	0.0	0.0	4.2	25.5	0.0
Feed Handling	0.0	0.0	0.0	0.0	104.4	0.0	0.0
Total	0.0	0.0	11.2	0.0	215.4	274.6	1.1

Major Source Emissions (lb/yr)

Permit	NOx	SOx	PM10	CO	VOC
Milk Parlor	0	0	0	0	0
Cow Housing	0	0	0	0	0
Liquid Manure	0	0	0	0	2,317
Solid Manure	0	0	0	0	0
Feed Handling	0	0	0	0	0
Total	0	0	0	0	2,317

Total Annual Post-Project Potential to Emit (lb/yr)

Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	1,224	419	0
Cow Housing	0	0	4,101	0	32,912	74,372	0
Liquid Manure	0	0	0	0	4,832	16,137	389
Solid Manure	0	0	0	0	1,553	9,319	0
Feed Handling	0	0	0	0	38,120	0	0
Total	0	0	4,101	0	78,642	100,247	389

Uncontrolled GHG Emission Factors (lbs/hd-yr)						
Animal Type	CH4 (Anaerobic Treatment Lagoon)	CH4 (Lagoon)	CH4 (Manure Spreading)**	CH4 (Solid Manure Storage)**	CH4 (Enteric)**	CO2 Equivalent Multiplier for CH4
Milk Cows	513	307.8	0	0	0	21
Dry Cows	513	307.8	0	0	0	21
Support Stock*	110.4	110.4	0	--	0	21
Large Heifers	110.4	110.4	0	--	0	21
Medium Heifers	110.4	110.4	0	--	0	21
Small Heifers	110.4	110.4	0	--	0	21
Calves	--	--	--	--	--	--
Bulls*	110.4	110.4	0	--	0	21

Uncontrolled GHG Emission Factors (lbs/hd-yr)					
Animal Type	N2O (Anaerobic Treatment Lagoon)	N2O (Manure Spreading)	N2O (Solid Manure Storage)**	N2O (Enteric)	CO2 Equivalent Multiplier for N2O
Milk Cows	1.5	0	0	0	310
Dry Cows	1.5	0	0	0	310
Support Stock*	1.4	0	--	0	310
Large Heifers	1.4	0	--	0	310
Medium Heifers	1.4	0	--	0	310
Small Heifers	1.4	0	--	0	310
Calves	--	0	--	0	--
Bulls*	1.4	0	--	0	310

Notes:

*Emission factors for Support Stock and Bulls are assumed to be the same as Large Heifers.

**Fugitive emissions from dairies (non-lagoon) shall be excluded in determining if a source is a major source for PSD purposes.

Calculations:

CO2e from Lagoons = # Cows (hd) x CH4/N2O Lagoon (lb/hd-yr) x Multiplier ÷ 2000 lb/ton

CO2e from Non-Lagoons = # Cows (hd) x [CH4/N2O Manure Spreading (lb/hd-yr) + CH4/N2O Solid Manure Storage (lb/hd-yr) + CH4/N2O Enteric (lb/hd-yr)] x Multiplier ÷ 2000 lb/ton

Pre-Project CO2e Emissions

Pre-Project Lagoon CO2e Emissions from CH4 (short tons/yr)				
Animal Type	Number of Cows with Manure Flushed to Lagoon	EF CH4 Lagoons (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (short tons/yr)
Milk Cows	0	307.8	21	0
Dry Cows	0	307.8	21	0
Support Stock	0	110.4	21	0
Large Heifers	0	110.4	21	0
Medium Heifers	0	110.4	21	0
Small Heifers	0	110.4	21	0
Calves	0	--	--	0
Bulls	0	110.4	21	0

Pre-Project Non-Lagoons CO2e Emissions from CH4 (short tons/yr)						
Animal Type	Number of Cows	EF CH4 Manure Spreading (lb/hd yr)	EF CH4 Solid Manure Storage (lb/hd-yr)	EF CH4 Enteric (lb/hd-yr)	CO2e Multiplier	CO2e Non-Lagoons (short tons/yr)
Milk Cows	0	0.0	0.0	0.0	21	0
Dry Cows	0	0.0	0.0	0.0	21	0
Support Stock	0	0.0	--	0.0	21	0
Large Heifers	0	0.0	--	0.0	21	0
Medium Heifers	0	0.0	--	0.0	21	0
Small Heifers	0	0.0	--	0.0	21	0
Calves	0	--	--	--	--	0
Bulls	0	0.0	--	0.0	21	0

Pre-Project Lagoon CO2e Emissions from N2O (short tons/yr)				
Animal Type	Number of Cows	EF N2O Anaerobic Treatment Lagoon (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (short tons/yr)
Milk Cows	0	0.0	310	0
Dry Cows	0	0.0	310	0
Support Stock	0	0.0	310	0
Large Heifers	0	0.0	310	0
Medium Heifers	0	0.0	310	0
Small Heifers	0	0.0	310	0
Calves	0	0.0	--	0
Bulls	0	0.0	310	0

Pre-Project Non-Lagoons CO2e Emissions from N2O (short tons/yr)						
Animal Type	Number of Cows	EF N2O Manure Spreading (lb/hd yr)	EF N2O Solid Manure Storage (lb/hd-yr)	N2O Enteric (lb/hd-yr)	CO2e Multiplier	CO2e Non-Lagoons (short tons/yr)
Milk Cows	0	0.0	0.0	0.0	310	0
Dry Cows	0	0.0	0.0	0.0	310	0
Support Stock	0	0.0	--	0.0	310	0
Large Heifers	0	0.0	--	0.0	310	0
Medium Heifers	0	0.0	--	0.0	310	0
Small Heifers	0	0.0	--	0.0	310	0
Calves	0	0.0	--	0.0	--	0
Bulls	0	0.0	--	0.0	310	0

Total Pre-Project CO2e Emissions (short tons/yr)			
Animal Type	CO2e from CH4	CO2e from N2O	Total
Milk Cows	0	0	0
Dry Cows	0	0	0
Support Stock	0	0	0
Large Heifers	0	0	0
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	0

Post-Project CO2e Emissions

Post-Project Lagoon CO2e Emissions from CH4 (short tons/yr)				
Animal Type	Number of Cows with Manure Flushed to Lagoon	EF CH4 Anaerobic Treatment Lagoon (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (short tons/yr)
Milk Cows	3061	513.0	21	16,488
Dry Cows	459	513.0	21	2,472
Support Stock	0	110.4	21	0
Large Heifers	0	110.4	21	0
Medium Heifers	0	110.4	21	0
Small Heifers	0	110.4	21	0
Calves	0	--	--	0
Bulls	0	110.4	21	0

Post-Project Non-Lagoons CO2e Emissions from CH4 (short tons/yr)						
Animal Type	Number of Cows	EF CH4 Manure Spreading (lb/hd yr)	EF CH4 Solid Manure Storage (lb/hd-yr)	EF CH4 Enteric (lb/hd-yr)	CO2e Multiplier	CO2e Non-Lagoons (short tons/yr)
Milk Cows	3,061	0.0	0.0	0.0	21	0
Dry Cows	459	0.0	0.0	0.0	21	0
Support Stock	0	0.0	--	0.0	21	0
Large Heifers	0	0.0	--	0.0	21	0
Medium Heifers	0	0.0	--	0.0	21	0
Small Heifers	0	0.0	--	0.0	21	0
Calves	0	--	--	--	--	0
Bulls	0	0.0	--	0.0	21	0

Post-Project Lagoon CO2e Emissions from N2O (metric tons/yr)				
Animal Type	Number of Cows	EF N2O Anaerobic Treatment Lagoon (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (metric tons/yr)
Milk Cows	3061	1.5	310	712
Dry Cows	459	1.5	310	107
Support Stock	0	1.4	310	0
Large Heifers	0	1.4	310	0
Medium Heifers	0	1.4	310	0
Small Heifers	0	1.4	310	0
Calves	0	--	--	0
Bulls	0	1.4	310	0

Post-Project Non-Lagoons CO2e Emissions from N2O (short tons/yr)						
Animal Type	Number of Cows	EF N2O Manure Spreading (lb/hd yr)	EF N2O Solid Manure Storage (lb/hd-yr)	EF N2O Enteric (lb/hd-yr)	CO2e Multiplier	CO2e Non-Lagoons (short tons/yr)
Milk Cows	3,061	0.0	0.0	0.0	310	0
Dry Cows	459	0.0	0.0	0.0	310	0
Support Stock	0	0.0	--	0.0	310	0
Large Heifers	0	0.0	--	0.0	310	0
Medium Heifers	0	0.0	--	0.0	310	0
Small Heifers	0	0.0	--	0.0	310	0
Calves	0	0.0	--	0.0	--	0
Bulls	0	0.0	--	0.0	310	0

Total Post-Project CO2e Emissions (short tons/yr)			
Animal Type	CO2e from CH4	CO2e from N2O	Total
Milk Cows	16,488	712	17,200
Dry Cows	2,472	107	2,579
Support Stock	0	0	0
Large Heifers	0	0	0
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	19,779

Change in CO2e Emissions

Change in Project GHG Emissions			
Animal Type	Pre-Project CO2e (short tons/yr)	Post-Project CO2e (short tons/yr)	Change (short tons/yr)
Milk Cows	0	17,200	17,200
Dry Cows	0	2,579	2,579
Support Stock	0	0	0
Large Heifers	0	0	0
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	19,779

APPENDIX C

BACT Analysis

Top-Down BACT Analysis

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

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

I. Pollutants Emitted from Dairies

1. PM_{10} Emissions

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

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

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

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

of exposure to wind[5].

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[6]. VOC emissions from manure and the associated field application site can be minimized by a properly designed and operated stabilization process (such as an anaerobic treatment lagoon). In contrast, VOC emissions will be higher from storage tanks, ponds, overloaded anaerobic lagoons, and the land application sites associated with these systems.

3. Ammonia Emissions

When sulfur dioxide and nitrogen oxides are present ammonia is a precursor for the secondary formation of $PM_{2.5}$ in the atmosphere. Ammonia reacts with sulfuric and nitric acids, which are produced from sulfur dioxide and nitrogen oxides in the ambient air, to form ammonium sulfate, ammonium nitrate, and other fine particulates[7]. Exposure to high levels of ammonia can cause irritation to the skin, throat, lungs, and eyes.

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

The potential for ammonia volatilization exists wherever manure is present, and ammonia

[5] Emissions From Animal Feeding Operations – Draft, pgs. 2-11 to 2-13
[6] EPA Document "Emissions from Animal Feeding Operations" (Draft, August 15, 2001), pg. 2-10
[7] Workshop Review Draft for EPA Regional Priority AFO Science Question Synthesis Document - Air Emission Characterization and Management, pg. 2

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[8].

II. Top Down BACT Analysis for the Milking Parlor

BACT Analysis for VOC Emissions from the Milking Parlor:

a. Step 1 - Identify all control technologies

Since specific VOC emission control efficiencies have not been identified in the literature for dairy milking parlors, the control efficiencies listed below 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

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

the captured VOCs will be eliminated by thermal incineration[9]; 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 and 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 milking parlor will be captured by the mechanical ventilation system and that a properly functioning biofilter will eliminate 80% of the captured VOCs[10]; 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 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 into the air. 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 parlor 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 = 75% x 22% =16.5%.

[9] OAQPS Control Cost Manual, 4th Edition, EPA 450/3-90-006, January 1990, page 3-8.
[10] 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."

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)
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 effectiveness threshold. The temperature required for catalytic incineration is 600 °F. The temperature required for thermal incineration is 1,400 °F. Since thermal incineration requires a greater amount of fuel, the following analysis for catalytic incineration also demonstrates that thermal incineration will 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 parlor 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 air exchanges per hour in the winter and 60 to 90 room air exchanges per hour in the summer[11]. For calculation purposes, an average airflow rate of 35 room air exchanges will assumed for the new milking parlor.

According to the information submitted, the milk barn will occupy approximately 30,000 sq. ft in area. It will be conservatively assumed that ¼ of the milk barn area is enclosable for emissions control purposes (i.e. exclude holding area, offices, personnel areas, storage, etc). It will also be assumed that the enclosed space will have an average ceiling height of 20 feet. The total airflow rate is calculated as follows:

(¼ x 30,000 sq. ft x 20 ft) x 35/hr = 5,250,000 ft^3/hr

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

Fuel Requirement for Thermal Incineration:

The gas leaving the milking parlor 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

Natural Gas Requirement = (5,250,000 scf/hr)(0.0194 Btu/scf)(600 °F - 100 °F)(1-0.7)
= **15,277,500 Btu/hr**

Fuel Cost for Thermal Incineration:

The cost for natural gas shall be based upon the average industrial price reported by the Energy Information Administration (EIA), taken from the EIA website at http://tonto.eia.doe.gov/dnav/ng/ng_sum_lsum_dcu_SCA_m.htm. The most recent average price reported is for December 2013.

Average cost for natural gas = $7.14/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:

15,277,500 Btu/hr x 1 MMBtu/10^6 Btu x 12 hr/day x 365 day/year x $7.14/MMBtu = **$477,776/year**

VOC Emission Reductions for Thermal Incineration

The additional VOC emission reductions for the milking parlor are calculated as follows:

[Uncontrolled Milk Parlor VOC Emissions (lb/yr)] x [Capture Efficiency] x [Thermal Incineration Control Efficiency]

= 1,224 lb/yr[12] x 0.95 x 0.98

= 1,140 lb/yr

Cost of VOC Emission Reductions

Cost of reductions = ($477,776/year)/((1,140 lb-VOC/year)(1 ton/2000 lb))
= **$838,204/ton of VOC reduced**

[12] Refer to Appendix B for uncontrolled emissions calculations.

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

Cost of Biofiltration

The cost estimate for a biofiltration system is taken from the United States EPA Report "Using Bioreactors to Control Air Pollution". 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 air 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 air exchanges will be assumed for the milking parlor.

The maximum airflow rate entering the biofilter is calculated as follows:

7,500 sq. ft x 20 ft x 60/hr x 1 hr/60 min = 150,000 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. Since the estimated flow rate for the milk barn is toward the lower end of the spectrum, a median cost of $19.71 per cfm will be assumed in this cost analysis.

The capital cost of the biofilter is calculated as follows:

$19.71 cfm x 150,000 cfm = $2,956,500

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 = $[\$2,956,500 \times 0.1(1.1)^{10}]/[(1.1)^{10}-1]$
= **$481,157/year**

VOC Emission Reductions for Biofiltration

The additional VOC emission reductions for the milking parlor are calculated as follows:

[Uncontrolled Milking Parlor VOC Emissions (lb/yr)] x [Capture Efficiency] x [Biofilter Control Efficiency]

= 1,224 lb/yr[13] x 0.95 x 0.80

= 930 lb/yr

Cost of VOC Emission Reductions

Cost of reductions = ($481,157/year)/((930 lb-VOC/year)(1 ton/2000 lb))
= **$1,034,746/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-effectiveness 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

[13] Refer to Appendix B for uncontrolled emissions calculations.

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

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

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

a. Step 1 - Identify all control technologies

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

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

1) Enclosed freestalls vented to an incinerator (≈ 93%; 95% Capture and 98% Control)
2) Enclosed freestalls vented to a biofilter (≈ 76%; 95% Capture and 80% Control)
3) Feed and Manure Management Practices (≈ 22%)
   - Concrete feed lanes and walkways
   - Feed lanes and walkways flushed at least four 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)
   - All exercise pens 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
   - Scraping of exercise pens every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions
   - Rule 4570 mitigation measures

Description of Control Technologies

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

In a freestall barn, cows are grouped in large pens with free access to feed bunks, water, and stalls for resting. In the mild climate of the San Joaquin Valley, the typical freestall barn is an open structure (roof but no sides). The primary freestall design consists of a roof that provides shade with all sides open to allow air to flow through, which in turn keeps the cows cool. No enclosed freestall barns that were installed at a California dairy could be identified. However, partially enclosed freestall barns are available. These include tunnel-ventilated freestall barns, which are fairly common in the southern and eastern parts of the United States, and greenhouse barns. Greenhouse barns use a lightweight, galvanized steel tube frame to support one or two layers of a commercial-grade plastic film as covering. The most common use for these structures is as heated chambers for growing plants. Although the potential to enclose cows in a barn exist, the feasibility of reasonably collecting the biogas through a stack, chimney, or vent remains in question considering the extremely large amounts of airflow going through the barns needed to keep the cows cool. The airflow requirements will be even higher in the San Joaquin valley, where temperatures reach in excess of 110 degrees in the dry summer. Although the feasibility of such a technology is in question, it will be considered in this analysis. If the gases can be properly captured and sent to a control device, then those gases may be either incinerated or treated in a biofilter (see biofilter discussed in the option below). It is assumed that 95% of the gasses emitted from the freestall barns will be captured by the mechanical ventilation system and that 98% of the captured VOCs will be eliminated by thermal incineration[26]; therefore the total control for VOCs from the freestall barns = 95% x 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; therefore, the total control for VOCs from the cow housing permit unit = 95% x 80% = 76%.

3) Feed and Manure Management Practices

Concrete feed lanes and walkways

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

Increased flushing of 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.

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[14], 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

[14] "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).

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: 47% x 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[15]. This undigested protein also produces ammonia emissions. The level of microbial action in the manure corresponds to the level of organic nitrogen content in the manure; the lower the level of nitrogen the lower the level of microbial action and the lower the production of ammonia and VOCs.

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

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

Scraping of exercise pens with a pull-type scraper

Frequent scraping the freestall exercise pens will reduce the amount of manure on the pen 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.

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) Enclosed freestalls vented to an incinerator (≈ 93%; 95% Capture, 98% Control)
2) Enclosed freestalls vented to a biofilter (≈ 76%; 95% Capture, 80% Control)
3) Feed and Manure Management Practices (≈ 22%)
    - Concrete feed lanes and walkways
    - Feed lanes and walkways flushed at least four 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)
    - All exercise pens 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.
    - Scraping of exercise pens every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions
    - Rule 4570 mitigation measures.

d. Step 4 - Cost Effectiveness Analysis

Thermal & Catalytic Incineration:

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

Required Airflow Rate of the Freestall Barns

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

Minimum Ventilation Rates for Dairy Cows (cfm/cow)			
Category	**Winter**	**Mild Weather**	**Summer**
Baby Calf	15	50	100
Heifer (2-12 months)	20	60	130

Minimum Ventilation Rates for Dairy Cows (cfm/cow)			
Category	**Winter**	**Mild Weather**	**Summer**
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[16].

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 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).

After the proposed modifications, the dairy will house a maximum of 3,061 milk cows and 459 dry cows. The cows will be housed in freestall barns. Each barn will house approximately 660 cows.

The total required airflow rate for each barn is calculated as follows:

660 cows x 335 cfm/cow x 60 min/hr
= 13,266,000 ft^3/hr

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 = $(flow)(Cp_{Air})(\Delta T)(1\text{-}HEF)$

Where:

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

[16] 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)

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:

= (13,266,000 scf/hr)(0.0194 Btu/scf - °F)(600 °F - 100 °F)(1-0.7)
= **38,604,060 Btu/hr**

Fuel Cost for Thermal Incineration:

The cost for natural gas shall be based upon the average industrial price reported by the Energy Information Administration (EIA), taken from the EIA website at http://tonto.eia.doe.gov/dnav/ng/ng_sum_lsum_dcu_SCA_m.htm. The most recent average price reported is for December 2013.

Average cost for natural gas = $7.14/MMBtu

The oxidizer is assumed to operate 24 hours per day and 365 days per year. The fuel costs to operate the incinerator are calculated as follows:

38,604,060 Btu/hr x 1 MMBtu/10^6 Btu x 24 hr/day x 365 day/year x $7.14/MMBtu
= **$2,414,545/year**

VOC Emission Reductions for Thermal Incineration:

The annual VOC Emission Reductions for housing 660 cows in an enclosed freestall barn and venting the barn to an incinerator are calculated as follows:

[660/3,520] x [Uncontrolled Cow Housing VOC Emissions (lb/yr)] x [Capture Efficiency] x [Thermal Incinerator Control Efficiency]

= [660/3,520] x 32,912 lb/yr[17] x 0.95 x 0.98

= 5,745 lb/yr

Cost of VOC Emission Reductions:

Cost of reductions = ($2,414,545/year)/((5,745 lb-VOC/year)(1 ton/2000 lb))
= **$840,573/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.

[17] Refer to Appendix B for uncontrolled emissions calculations.

Biofiltration:

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

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

Cost of Biofiltration:

The cost estimate for a biofiltration system is taken from the United States EPA Report "Using Bioreactors to Control Air Pollution"[18]. The cost is largely dependent on the airflow rate that the filter must handle. According to University of Minnesota, Biofilters used to treat ventilating air exhausted from a livestock building should be sized to treat the maximum ventilation rate, which is typically the warm weather rate. The EPA report gives a range of $2.35 - $37.06 per cfm for the initial construction of a biofilter. As shown above, the University of Minnesota's publication "Improving Mechanical Ventilation in Dairy Barns" gives the following summer ventilation rates for dairy cattle[18]: mature cow - 1,000 cfm; heifer (12-24 mo.) – 180 cfm; heifer (2-12 mo.) – 130 cfm; and baby calves - 100 cfm.

After the proposed modifications, the dairy will house a maximum of 3,061 milk cows and 459 dry cows. The cows will be housed in freestall barns. Each barn will house approximately 660 cows.

The total maximum entering the Biofilter from each barn is calculated as follows:

660 cows x 1,000 cfm/cow
= 660,000 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. Since the estimated flow rate is toward the higher end of the spectrum, the lowest cost of $2.35 per cfm will be assumed in this cost analysis.

The capital cost of the biofilter is calculated as follows:

[18] "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

$2.35 cfm x 660,000 cfm = $1,551,000

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)

$$A = [\$1,551,000 \times 0.1(1.1)^{10}]/[(1.1)^{10}-1]$$
$$= \textbf{\$252,418/year}$$

VOC Emission Reductions for Biofiltration:

The annual VOC Emission Reductions for housing 660 cows in an enclosed freestall barn and venting the barn to a Biofilter are calculated as follows:

[660/3,520] x [Uncontrolled Cow Housing VOC Emissions (lb/yr)] x [Capture Efficiency] x [Biofilter Control Efficiency]

= [660/3,520] x 32,912 lb/yr[19] x 0.95 x 0.80

= 4,690 lb/yr

Cost of VOC Emission Reductions:

Cost of reductions = ($252,418/year)/((4,690 lb-VOC/year)(1 ton/2000 lb))
= **$107,641/ton of VOC reduced**

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

Feed and Manure Management Practices:

- Concrete feed lanes and walkways
- Feed lanes and walkways flushed at least four times per day

[19] Refer to Appendix B for uncontrolled emissions calculations.

- All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.
- All exercise pens 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
- Scraping of exercise pens every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions
- Rule 4570 mitigation measures

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

e. Step 5 - Select BACT

The facility is proposing to use concrete feed lanes and walkways; flush the feed lanes and walkways four times per day; adequately slope exercise pens to promote drainage; feed all animals in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations; and scrape exercise pens every two weeks with a pull-type scraper except during wet conditions.

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

2. BACT Analysis for NH_3 Emissions:

a. Step 1 - Identify all control technologies

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

The following management practices have been identified as possible control options for the NH_3 emissions from the cow housing permit unit and have been proposed by the applicant:

1) Feed and Manure Management Practices

- Concrete feed lanes and feed walkways
- Feed lanes and walkways flushed at least four times per day
- All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations
- All exercise pens 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
- Scraping of exercise pens every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions

Description of Control Technologies:

1) Feed and Manure Management Practices

Concrete feed lanes and walkways:

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

Increased flushing of 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.

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.

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

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

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

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

Scraping of exercise pens with a pull-type scraper:

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) Feed and Manure Management Practices
   - Concrete feed lanes and feed walkways
   - Feed lanes and walkways flushed or scraped/vacuumed four times per day
   - All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations
   - All exercise pens 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
   - Scraping of exercise pens every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The facility is proposing to use concrete feed lanes and walkways; flush the feed lanes and walkways at least four times per day; adequately slope open exercise pens to promote drainage; feed all animals in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations; and scrape exercise pens every two weeks using a pull-type scraper except during wet conditions.

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.

3. BACT Analysis for PM_{10} Emissions from Freestall Barns:

a. Step 1 - Identify all control technologies

The following options were identified as controls for PM_{10} emissions:

1) Design and Management Practices
   - Freestall barn housing
   - Concrete feed lanes and walkways
   - Frequent flushing

Description of Control Technologies:

All of the additional milk cows will be housed in freestall barns. Freestall barn housing is an effective PM10 control measure because cows will spend majority of their time on paved surfaces under the barn rather than on loose dirt. Additionally, misters used for cooling cows, as well as frequent flushing of the freestall lanes, create a moist environment that significantly decreases particulate matter emissions.

b. Step 2 - Eliminate technologically infeasible options

All the proposed control measures are technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

1) Design and Management Practices

- Freestall barn housing
- Concrete feed lanes and walkways
- Frequent flushing

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The facility is proposing to house all the additional milk cows in freestall barns. The proposed control measures satisfy BACT for PM10 emission.

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

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

a. Step 1 - Identify all control technologies

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

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

1) Aerobic Treatment Lagoon – mechanical aeration to achieve a dissolved oxygen concentration of 2.0 mg/L (≈ 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 applicable 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[1].

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) Aerobic Treatment Lagoon – mechanical aeration to achieve a dissolved Oxygen concentration of 2.0 mg/L (≈ 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 effectiveness threshold.

Energy Requirement for Complete Aeration:

In order to effectively calculate the costs of this control option, the energy requirement for complete aeration must be determined. 1.5 to 2.5 pounds of Oxygen is required to digest 1 pound of Biological Oxygen Demand (BOD_5) with additional oxygen required for conversion of Ammonia to nitrate (nitrification)[20]. It is generally accepted that at least twice the BOD should be provided for complete aeration[21]. 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 removal of BOD and an additional 3 lbs (1.4 kg) for oxidation of 70% of the Nitrogen[22]. Based on the data gathered in a UC Davis study on aerator performance for wastewater lagoons, aeration efficiencies for mechanical aerators range from 0.10 to 0.68 kg of Oxygen provided per kW-hr of energy consumed[23]. For this analysis it will be assumed that twice the BOD is required for complete aeration and that mechanical aerators will provide 1.0 kg of Oxygen per kW-hr. This efficiency is very conservative since it is greater than the efficiency of the most efficient aerator tested in the UC Davis study (0.68 kg-O_2/kW-hr) and more than twice the efficiency of the most efficient aerator tested that had been installed in dairy lagoons (0.49 kg-O_2/kW-hr). Additionally, the efficiency tests were performed in clean water and lower aeration efficiencies are expected in liquid dairy manure that contains a significant amount of solids. The yearly energy requirement per cow is calculated as follows:

2 x (1.1 kg/cow-day) ÷ (1.0 kg/kW-hr) x (365 day/year) = 803 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 the milk cows', the BOD loading from the large heifers will be 73% of the milk cows'; and the BOD loading from the small and medium heifers will be 35% of the milk cows'[24].

[20] An Assessment of Technologies for Management and Treatment of Dairy Manure in California's San Joaquin Valley, December 2005, page 34 (http://www.arb.ca.gov/ag/caf/dairypnl/dmtfaprprt.pdf)

[21] See http://www.extension.org/faq/27574 and http://www.omafra.gov.on.ca/english/engineer/facts/04-033.htm

[22] 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

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

[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)

As previously stated, the dairy will house a maximum of 3,061 milk cows and 459 dry cows. The quantity of electricity required for complete aeration of the lagoon system is calculated below:

(3,061 milk cows x 803 kW/cow-year) + (459 dry cows x 0.8 x 803 kW/cow-year)
= 2,752,845 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 2013, from the Energy Information Administration (EIA) Website: http://www.eia.doe.gov/cneaf/electricity/epm/table5_6_b.html.

Average Cost for electricity = $0.099/kW-hr.

The electricity costs for complete aeration are calculated as follows:

2,752,845 kW-hr/year x $0.099/kW-hr
= $272,532/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. Therefore, these emissions reductions will also be included in the analysis. The annual VOC Emission Reductions for the lagoon, storage pond, and liquid manure land application unit are calculated as follows:

[Uncontrolled Lagoon/Storage Pond Emissions (lb/y)] x [Complete Aeration Control Efficiency]
= 8,053 lb/yr[25] x 0.95
= 7,650 lb/yr

Cost of VOC Emission Reductions:

Cost of reductions = ($272,532/year)/((7,650 lb-VOC/year)(1 ton/2000 lb))
= $71,250/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.,

[25] Liquid manure Emissions shown in Appendix B include 40% control for anaerobic treatment, hence uncontrolled emissions = 4,832 lb/yr /0.6 = 8,053 lb/yr.

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.

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

Anaerobic Treatment Lagoon:

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

e. Step 5 - Select BACT

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

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

2. BACT Analysis for NH_3 Emissions from the Lagoon & Storage Ponds

a. Step 1 - Identify all control technologies

A cost effectiveness threshold has not been established for NH_3. Therefore, only options that meet the District's definition of Achieved-in-Practice controls will be considered 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., 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.

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 NH_3 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 NH_3 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 NH_3. 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 NH_3 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 NH_3 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

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

a. Step 1 - Identify all control technologies

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

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

1) Aerobic Treatment Lagoon – mechanical aeration to achieve a dissolved oxygen concentration of 2.0 mg/L (≈ 95%)
2) Covered Lagoon Anaerobic Digester with treated waste discharged into a secondary lagoon or storage pond. (≈ 60%) (Note: not applicable unless required by the final Dairy BACT Guideline)
3) Anaerobic Treatment Lagoon designed to meet Natural Resources Conservation Service (NRCS) standards (≈ 40%)
4) 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), water, nitrates, sulfates and inert biomass (sludge). The process of aerobic digestion is sometimes referred to as nitrification

(especially when discussing NH_3 transformation). Complete aerobic digestion (100% aeration) removes nearly all malodors and also virtually eliminates VOCs, H_2S, and NH_3 emissions from liquid waste. Because these compounds would be removed from the liquid manure, emissions from liquid manure land application would also be eliminated.

Sufficient Oxygen must be provided to sustain the aerobic microorganisms in completely aerated lagoons. Lagoons can be considered completely aerobic if sufficient Oxygen is provided to achieve a Dissolved Oxygen (DO) content of 2.0 mg/L or more. Oxygen is typically provided by mechanical aerators. These aerators may float on the lagoon surface or be submerged in the lagoon. Aeration can also be performed by injection of tiny air bubbles into the lagoon water, mixing of the lagoon water, or spraying of the water into the air. According to Dr. Ruihong Zhang, a researcher at the University of California, Davis, at least 95% VOC control can be achieved if the 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

As previously discussed, 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.

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 VOCs that remain from incomplete digestion of the volatile solids in the incoming wastewater. The small amounts of undigested solids that remain after digestion are removed from the digester as sludge. A properly designed and operated anaerobic digester will result in volatile solids reductions of at least 60%. Since the quantity of VOC emitted is proportional to the quantity of volatile solids, a corresponding 60% control will be applied for this control measure.

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 Natural Resources Conservation Service (NRCS) California Field Office Technical Guide Code 359 - Waste Treatment Lagoon specifies criteria for the design of anaerobic treatment lagoons. A properly designed anaerobic treatment lagoon will reduce the volatile solids 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 quantity of VOC emitted is proportional to the quantity of volatile solids, a corresponding control efficiency of at least 50% is expected. However, in order to be conservative, a 40% control will be applied.

4) Injection of Liquid and Slurry Manure

Liquid and slurry manure is used to irrigate fodder crops for the dairy. 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 due to leaching and runoff of excess nutrients. 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 before the crop is planted and for a brief period during the initial growth stages. This is because a tractor must be used to pull a cultivator with the liquid and slurry manure shanks. Once the crop has grown to a certain height, it is no longer possible for the tractor to get into the field due to the potential of damaging the crop.

b. Step 2 - Eliminate technologically infeasible options

Option 4 - Injection of Liquid and Slurry Manure:

The Dairy Permitting Advisory Group (DPAG) found that injection of flushed manure was not a feasible BACT option in their report of BACT options for dairies in the San Joaquin Valley[26]. Injection is typically restricted to slurry manure that has been vacuumed from the cow housing or that has been removed from settling basins and/or weeping walls. Because the liquid manure handling system at Foster Farms Dairy #4 includes the use of solids separation, there are no significant sources of slurry manure at this dairy.

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

[26] 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)

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 treated waste discharged into a secondary lagoon or storage pond. (≈ 60%) (Note: not applicable unless required by the Dairy BACT Guideline)

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

Covered Lagoon Anaerobic Digester:

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

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

Anaerobic Treatment Lagoon:

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

e. Step 5 - Select BACT

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

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

2. BACT Analysis for 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 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, 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 Ammonia emissions from the liquid manure land application. No other control technologies that meet the definition of Achieved-in-Practice have been identified.

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

Description of Control Technologies:

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

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

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

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

Additionally, District Rule 2201 defines BACT as including the most stringent emission limitation or control technique, including process and equipment changes, that has been found by the APCO to be cost effective and technologically feasible for such class or category of sources or for a specific source. The District has found that the mitigation measures required by District Rule 4570 are technologically feasible for confined animal facilities and the applicant has proposed these options. Although District Rule 4570 is only intended to reduce VOC emissions, many of these measures also reduce ammonia emissions. Therefore, in addition to the BACT requirements determined in the Top-Down BACT Analysis above, implementation of the mitigation measures that the applicant has selected to comply with Rule 4570 will also be required as part of BACT for NH_3 emissions from liquid manure land application.

VI. Top Down BACT Analysis for the Solid Manure

1. BACT Analysis for VOC Emissions from Solid 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 solid manure handling, the control efficiencies listed are based on the control efficiencies of similar processes and engineering judgment.

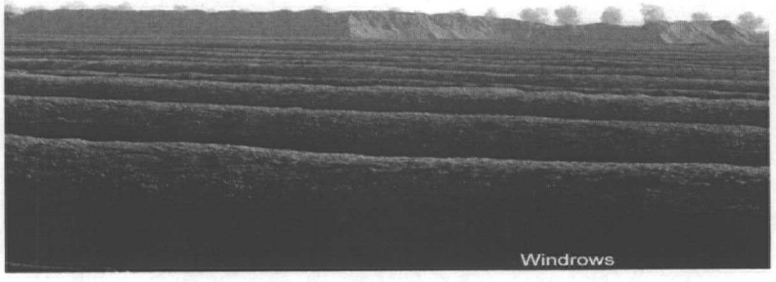
The following options were identified as possible controls for VOC emissions from Solid Manure Handling and Land Application:

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) 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[27]. 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[28].

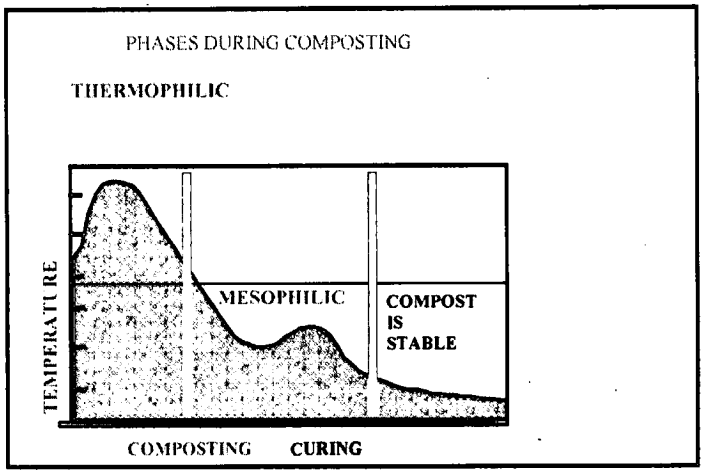
VOC emissions from composting:

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.

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

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

curing phases of composting[29].



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[30]: 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).

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[31]. 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.

[29] Page 9-10, SCAQMD Final Staff Report for Proposed Rules 1133, 1133.1, and 1133.2.
[30] Proposed SCAQMD Rule 1133 (Pages 1-6)
[31] University of Nebraska-Lincoln

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[32].

An odor and emissions study done at the City of Philadelphia biosolids co-composting facility by the Department of Water[33] 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

[32] Technology Assessment for SCAQMD proposed Rule 1133 Page 3-2
[33] 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.

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 these composting applications reported an initial control efficiency of 65 percent for VOC but was later improved to achieve an 80 percent control efficiency). This specific field example along with other available data presented in SCAQMD's Technology Assessment Report demonstrates that a well-designed, well-operated, and well-maintained biofilter is capable of achieving 80% control efficiency for VOC and ammonia[34].

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

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

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.

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

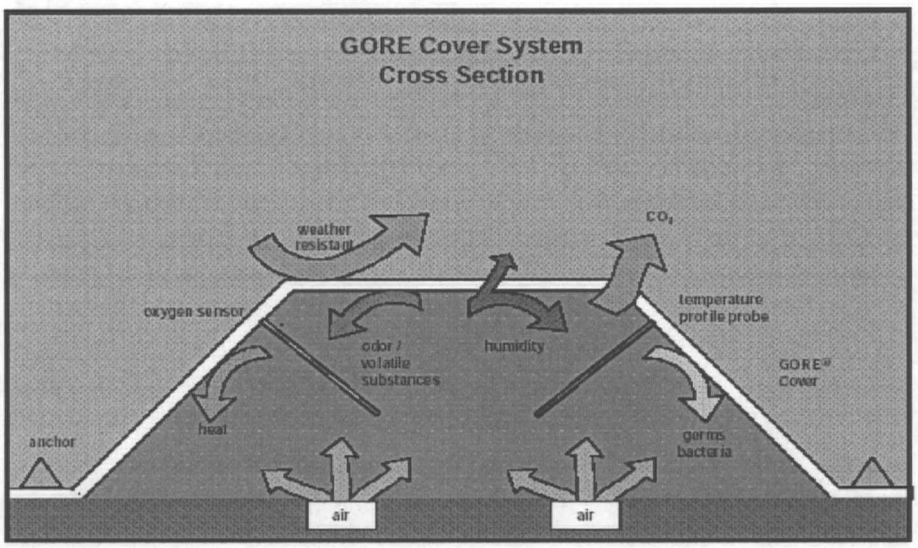
Gore Cover

The Gore Cover, manufactured by Gore Creative Technologies Worldwide, utilizes positive aeration and a specially designed cover to create an enclosed system that controls odors, microorganisms and creates a consistent product unaffected by outside environmental conditions. Medium pressure aerators connect to aeration pipes on the floor or aeration ducts in the floor. Stainless steel probes inserted into the pile monitor oxygen and temperature parameters. The data is relayed to and stored in a computer. This data controls the aerators to keep pile conditions consistent. The Gore Cover system can significantly reduce odors by the controlled use of a semi permeable membrane that is permeable to oxygen but impermeable to large molecules. The cover protects the pile from weather conditions, but allows release of CO_2. These controlled

conditions allow consistent product to be produced without risk of damp pockets, resulting in anaerobic conditions and, therefore increased odors.

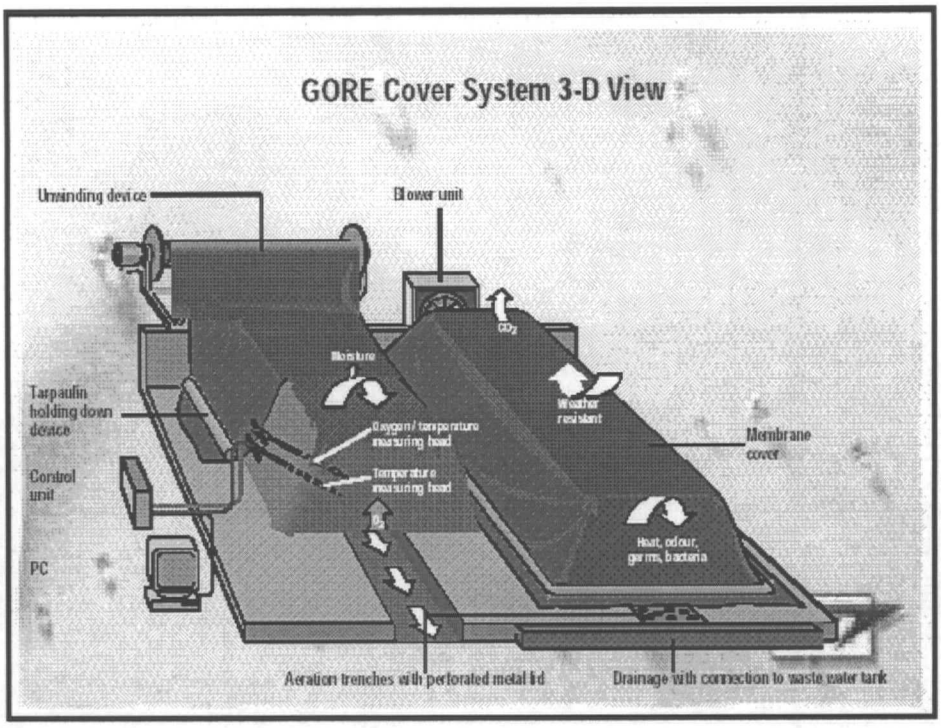
In addition to the membrane, which covers the organic material during composting, the system includes a concrete floor and wall, blowers for aeration, and a winder for efficient movement of the cover. The system also requires consistent management including preparation of materials to achieve a homogenous 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 Middle 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 per 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 mercaptan. 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) Immediate 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[35].

Based on estimates in the Final DPAG Report - "Recommendations to the San Joaquin Valley Air Pollution Control Officer Regarding Best Available Control Technology for

[35] 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)

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 ≥ 80% destruction efficiency for both active and curing phases (or a combination of controls) (≈ 86.6%)[36]
2) Open Negatively Aerated Static Pile vented to biofilter ≥ 80% destruction efficiency for both active and curing phases (or a combination of controls) (≈ 84.6%)[37]
3) Land Application with Immediate Incorporation (≈ 43.5%)
4) Enclosed Negatively Aerated Static Pile (≈ 33.2%)[38]
5) Open Negatively Aerated Static Pile (ASP) (≈ 23.2%)[39]
6) Open Windrow Composting (0%)

d. Step 4 - Cost Effectiveness Analysis

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; Option 5) Open ASP; and Option 6) Open Windrow

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.

[36] 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%

[37] 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%

[38] 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%.

[39] 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 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[40].

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[41].

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

As previously discussed, windrow composting cannot be considered cost effective because it is associated with significant VOC emissions (i.e. control efficiency assumed to be 0%).

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

[40] Final Staff report for proposed Rule 1133, 1133.1, and 1133.2)
[41] 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)

Option 3) 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 dry cows and heifers 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 Storage & 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 protein by the animal and the minimum carryover of nitrogen into the manure, which will reduce ammonia emissions from solid manure.

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

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

Additionally, District Rule 2201 defines BACT as including the most stringent emission limitation or control technique, including process and equipment changes; that has been found by the APCO to be cost effective and technologically feasible for such class or category of sources or for a specific source. The District has found that the mitigation measures required by District Rule 4570 are technologically feasible for confined animal facilities and the applicant has proposed these options. Although District Rule 4570 is only intended to reduce VOC emissions, many of these measures also reduce ammonia emissions. Therefore, in addition to the BACT requirements determined in the Top-Down BACT Analysis above, implementation of the mitigation measures that the applicant has selected to comply with Rule 4570 will also be required as part of BACT for NH_3 emissions from solid manure handling and land application.

VII. Top Down BACT Analysis for Silage

1. BACT Analysis for VOC Emissions from Silage:

a. Step 1 - Identify all control technologies

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

1) Fully Enclosed Silage Vented to a Control Device
2) Management Practices

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 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) 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 silage management practices included in District Rule 4570.

APPENDIX D

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

San Joaquin Valley Air Pollution Control District
Risk Management Review

To:	Jonah Aiyabei – Permit Services
From:	Cheryl Lawler – Technical Services
Date:	July 10, 2009
Facility Name:	Foster Farms Dairy #4
Location:	5372 S. Hickman Road, Denair
Application #(s):	N-5947-1-0, 2-0, 3-0, 4-0, & 5-0
Project #:	N-1080303

A. RMR SUMMARY

RMR Summary					
Categories	**Dairy Milking Parlor (Unit 1-0)**	**Dairy Cow Housing (Unit 2-0)**	**Dairy Lagoons (Unit 3-0)**	**Project Totals**	**Facility Totals**
Prioritization Score	**0.79***	18.3	14.5	2.48	>1.0
Acute Hazard Index	N/A	0.60	0.11	0.71	0.71
Chronic Hazard Index	N/A	0.49	0.03	0.52	0.52
Maximum Individual Cancer Risk	N/A	**8.97E-06**	**9.56E-07**	9.93E-06	9.93E-06**
T-BACT Required?	**No**	**Yes**	**No**		
Special Permit Conditions?	**No**	**No**	**No**		

*This unit passed prioritization with a score less than 1; therefore, no further analysis was required.
**The facility's Maximum Individual Cancer Risk has almost reached its maximum allowed limit of 10 in a million. No further projects will be allowed unless all previous projects are first revisited.

B. RMR REPORT

I. Project Description

Technical Services performed an Ambient Air Quality Analysis and a Risk Management Review (RMR) for a major expansion to an existing dairy. The number of cows will be increased by 2,321 milk cows and 369 dry cows. New dairy facilities will also be constructed.

II. Analysis

For the RMR, 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.

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

Units' 2-0 and 3-0 (cow housing and lagoon emissions) 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 Modesto 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 (manure stock piles and feed storage & handling).

The following parameters were used for the review:

Analysis Parameters N-5947, Project N-1080303			
Total Increase of Cows		2690	
Total Increase of NH3 (lb/yr)	181,902	**Total Increased NH3 (lb/hr)**	20.77
Total Increase of PM10 (lb/yr)	3,685	**Total Increased PM10 (lb/hr)**	0.42

In addition to the RMR, Technical Services performed modeling for the criteria pollutant PM_{10} using AERMOD. The emission rate used was 3,685 lb PM_{10}/year. The results from the Criteria Pollutant Modeling are as follows:

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

Category	24 Hours
Proposed Dairy Increase	15.42
Interim Significance Level	10.4[1]
Result	**FAIL**

[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.

The project as proposed is denied because the 24-hour PM10 concentration at the "existing office/residence" location is greater than the 10.4 Interim Significance Level for fugitive dust sources.

However, if the following condition is put on the permits for this project, the project will then become approvable:

1. **The residence located at the "existing office" site located approximately 100 feet from proposed cow housing on the west side cannot be occupied by children under the age of 18 or any other non-employees of the dairy.**

III. Conclusions

Although the toxic risks for all units were below the de minis levels as shown below, **the project as proposed is denied** due to the results of the Ambient Air Quality Analysis.

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 **8.97E-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 **9.56E-07**, which is less than the 1 in a million threshold. In accordance with the District's Risk Management Policy, the unit is approved **without** Toxic Best Available Control Technology (T-BACT).

Ambient Air Quality Analysis

The ambient air quality impacts from increased PM_{10} emissions at the dairy **do exceed** the District's 24-hour interim threshold for fugitive dust sources. **Therefore, the project as currently proposed fails.**

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 E

Anaerobic Treatment Lagoon Design Check

Lagoon Design Check in Accordance with NRCS Guideline #359

Proposed Lagoon Volume

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

Primary Treatment Lagoon Dimensions

Length	800	ft
Width	347	ft
Depth	7	ft
Slope	1	ft

Primary Lagoon Volume	**1,887,454 ft3**

Lagoon Design Check in Accordance with NRCS Guideline #359

Net Volatile Solids loading Calculation

Net Volatile Solids (VS) Loading of Treatment Lagoons									
Breed: Holstein Type of Cow	**Number of Animals**	x	VS Excreted[1] (lb/day)	x	% Manure in Flush[2]	x	(1 - % VS Removed in Separation[3])	=	**Net VS Loading (lb/day)**
Milk Cows	3,061	x	17	x	71%	x	(1 – 50%)	=	**18,473**
Dry Cow	459	x	9.2	x	48%	x	(1 – 50%)	=	**1,013**
Heifer (15 to 24 months)		x	7.1	x	48%	x	(1 – 50%)	=	**0**
Heifer (7 to 14 months)		x	4.9	x	48%	x	(1 – 50%)	=	**0**
Heifer (3 to 6 months)		x	2.7	x	48%	x	(1 – 50%)	=	**0**
Calf (under 3 months)		x	1.0	x	100%	x	(1 – 50%)	=	**0**
Bulls		x	9.2	x	48%	x	(1 – 50%)	=	**0**
Total for Dairy									**19,487**

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

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

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

Lagoon Design Check in Accordance with NRCS Guideline #359

Minimum Treatment Volume Calculation

MTV = TVS/VSLR

Where:

MTV = Minimum Treatment Volume (ft^3)

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

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

Minimum Treatment Volume in Primary Lagoon					
Breed: Holstein Type of Cow	**Net VS Loading (lb/day)**		**VSLR (lb/ft3-day)[1]**		**MTV (ft^3)**
Milk Cows	18,473	÷	0.011	=	**1,679,376**
Dry Cow	1,013	÷	0.011	=	**92,134**
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	0	÷	0.011	=	**0**
Total for Dairy					**1,771,510**

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

Lagoon Design Check in Accordance with NRCS Guideline #359

Sludge Accumulation Volume

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

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

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

SAV = VPL - MTV

Where:

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

SAV =	VPL	-	MTV	
SAV =	**1,887,454**	**1,771,510 =**		**115,945 (ft3)**

Lagoon Design Check in Accordance with NRCS Guideline #359

Hydraulic Retention Time (HRT) Calculation

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

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

HRT = MTV/HFR

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

The Hydraulic Flow Rate is Calculated below

Type	# of cows		Amount of Manure*			HFR	
Milk Cows	3,061	x	2.40	ft^3	=	7,346	ft^3/day
Dry Cows	459	x	1.30	ft^3	=	597	ft^3/day
Heifers (15-24 mo)	0	x	0.78	ft^3	=	-	ft^3/day
Heifers (7-14 mo)	0	x	0.78	ft^3	=	-	ft^3/day
Heifers (3-6 mo)	0	x	0.30	ft^3	=	-	ft^3/day
Calves	0	x	0.15	ft^3	=	-	ft^3/day
Bulls	0	x	1.30	ft^3	=	-	ft^3/day
Total	3,520					**7,943**	**ft^3/day**
Fresh water per milk cow used in flush at milk parlor			**50**	gal/day			

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

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

Formula:

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

Total HFR:

⇨

50 gal	3061 ~~milk cows~~	x	ft3	+	7,943	ft3
~~milk cow *~~ day			7.48 gal			day

=	28,404.3	ft3/day

Formula:

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

HRT:

⇨

1,771,510 ~~ft3~~	day	=	=	62.3675943	days
	28,404.3 ~~ft3~~				

APPENDIX F

Draft ATCs

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: N-5947-6-1

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: FOSTER FARMS DAIRY #4
MAILING ADDRESS: 2343 HICKMAN RD
HICKMAN, CA 95323

LOCATION: 5372 S HICKMAN ROAD
DENAIR, CA 95316

EQUIPMENT DESCRIPTION:
3,061 COW MILKING OPERATION WITH ONE 72-STALL ROTARY PARLOR.

CONDITIONS

1. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
4. Permittee shall flush or hose down milk parlor immediately prior to, immediately after, or during each milking. [District Rules 2201 and 4570]
5. {4485} Permittee shall provide verification that milk parlors are flushed or hosed prior to, immediately after, or during each milking. [District Rule 4570]
6. {4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

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

Seyed Sadredin, Executive Director / APCO

Arnaud Marjollet, Director of Permit Services

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]
8. This ATC shall be implemented after or concurrently with ATC 6-2. [District Rule 2201]
9. Facilities N-5947, N-4683, and N-8554 are part of the same stationary source for NSR purposes. [District Rule 2201]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: N-5947-7-1 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: FOSTER FARMS DAIRY #4
MAILING ADDRESS: 2343 HICKMAN RD
HICKMAN, CA 95323

LOCATION: 5372 S HICKMAN ROAD
DENAIR, CA 95316

EQUIPMENT DESCRIPTION:
COW HOUSING - 3,061 MILK COWS, NOT TO EXCEED A COMBINED TOTAL OF 3,520 MATURE COWS (MILK AND DRY COWS); AND 6 FREESTALL BARNS WITH A FLUSH SYSTEM.

CONDITIONS

1. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
4. Permittee shall pave feedlanes for a width of at least 8 feet along the corral side of the feedlane fence. [District Rules 2201 and 4570]
5. Permittee shall flush feed lanes and walkways at least four times per day. [District Rules 2201and 4570]
6. Permittee shall keep records or maintain an operating plan that requires feed lanes and walkways to be flushed at least four times per day. [District Rules 2201 and 4570]

CONDITIONS CONTINUE ON NEXT PAGE

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

Seyed Sadredin, Executive Director / APCO

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Arnaud Marjollet, Director of Permit Services
N-5947-7-1 : Jun 3 2014 9:57AM – AIYABEIJ : Joint Inspection NOT Required

7. {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]
8. {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]
9. {4499} Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rule 4570]
10. {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]
11. {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]
12. {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]
13. Permittee shall implement all of the following emission control measures: 1) slope the surfaces of the exercise pens/corrals at least 3% where the available space for each animal is 400 square feet or less and at least 1.5% where the available space for each animal is more than 400 square feet per animal; 2) maintain exercise pens/corrals to ensure proper drainage and prevent water from standing more than forty-eight hours; and 3) scrape exercise pen/corral surfaces every two weeks using a pull-type scraper during morning hours, except when prevented by wet weather. [District Rules 2201 and 4570]
14. Permittee shall maintain sufficient records to demonstrate that: 1) exercise pens/corrals are adequately sloped; 2) exercise pens/corrals are maintained to ensure proper drainage preventing water from standing for more than forty-eight hours; and 3) exercise pen/corral surfaces are scraped every two weeks. [District Rules 2201 and 4570]
15. {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]
16. {4510} Permittee shall measure and document the depth of manure on the concrete lanes at least once every ninety (90) days. [District Rule 4570]
17. {4513} Shade structures shall be installed in any of the following ways: 1) constructed with a light permeable roofing material; 2) uphill of any slope in the corral; 3) installed so that the structure has a North/South orientation. OR Permittee shall clean manure from under corral shades at least once every fourteen (14) days, when weather permits access into the corral. [District Rule 4570]
18. {4520} Permittee shall knockdown fence line manure build-up prior to it exceeding a height of twelve (12) inches at any time or point. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rule 4570]
19. {4521} Permittee shall measure and document the depth of manure at the fence line at least once every ninety (90) days. [District Rule 4570]
20. Inspection for potholes and similar sources of emissions shall be performed on a monthly basis. A record of these inspections shall be maintained. [District Rule 2201]
21. Firm, stable soil that is not easily eroded shall be used for the exercise pen/corral surfaces. [District Rule 2201]
22. A supply of dry fill soil shall be kept on site in order to fill areas where erosion and gouging occurs. [District Rule 2201]
23. Clean rainfall runoff shall be diverted around exercise pen and corral surfaces to reduce the amount of water that is potentially retained on these surfaces. [District Rule 2201]
24. The total number of cows at this facility shall not exceed any of the following limits: 3,061 milk cows; not to exceed a combined total of 3,520 mature cows (milk and dry cows). [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

25. {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]

26. {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]

27. The residence located at the 'existing office' site, approximately 100 feet West of the cow housing area, shall not be occupied by any persons under the age of 18 years or any persons that are not employees of the dairy. [District Rule 2201]

28. {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]

29. Facilities N-5947, N-4683, and N-8554 are part of the same stationary source for NSR purposes. [District Rule 2201]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: N-5947-8-1

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: FOSTER FARMS DAIRY #4
MAILING ADDRESS: 2343 HICKMAN RD
HICKMAN, CA 95323

LOCATION: 5372 S HICKMAN ROAD
DENAIR, CA 95316

EQUIPMENT DESCRIPTION:
LIQUID MANURE HANDLING SYSTEM CONSISTING OF ONE MECHANICAL SEPARATOR AND PROCESSING PIT; ONE ANAEROBIC TREATMENT LAGOON (800'X347'), AND ONE STORAGE POND; MANURE IS LAND APPLIED THROUGH FLOOD 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. The liquid manure handling system shall handle flush manure from no more than 3,061 milk cows; not to exceed a combined total of 3,520 mature cows (milk and dry cows). [District Rule 2201]
5. All liquid manure shall be treated in an anaerobic treatment lagoon that is designed and operated according to the Natural Resources Conservation Service (NRCS) technical guide No. 359. A minimum liquid manure depth of 7 feet shall be retained in the lagoon at all times. [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

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Seyed Sadredin, Executive Director / APCO

DRAFT

Arnaud Marjollet, Director of Permit Services

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6. Permittee shall maintain design specifications, calculations, including Minimum Treatment Volume (MTV), Hydraulic Retention Time (HRT) demonstrating that the anaerobic treatment lagoon meets the requirements listed in the NRCS Field Office Technical Guide Code 359. [District Rule 2201]
7. Permittee shall remove solids with a solid separator system, prior to the manure entering the lagoon. [District Rules 2201 and 4570]
8. {4550} Permittee shall not allow liquid manure to stand in the fields for more than twenty-four (24) hours after irrigation. [District Rule 4570]
9. {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]
10. {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]
11. Installation of an anaerobic digester may be required for this operation contingent upon the final Dairy BACT Guideline. If the final Dairy BACT Guideline requires the installation of an an anaerobic digester for this operation, the permittee shall install the system in accordance with the timeframes and procedures established by the APCO. [District Rule 2201]
12. {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]
13. Facilities N-5947, N-4683, and N-8554 are part of the same stationary source for NSR purposes. [District Rule 2201]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: N-5947-9-1 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: FOSTER FARMS DAIRY #4
MAILING ADDRESS: 2343 HICKMAN RD
HICKMAN, CA 95323

LOCATION: 5372 S HICKMAN ROAD
DENAIR, CA 95316

EQUIPMENT DESCRIPTION:
SOLID MANURE HANDLING CONSISTING OF OPEN MANURE STOCK PILES; SOLID MANURE APPLICATION TO LAND AND OFFSITE HAULING.

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

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Seyed Sadredin, Executive Director / APCO

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Arnaud Marjollet, Director of Permit Services
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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. Permittee shall incorporate all solid manure into soil within 24 hours of land application. [District Rules 2201 and 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]
11. Facilities N-5947, N-4683, and N-8554 are part of the same stationary source for NSR purposes. [District Rule 2201]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: N-5947-10-1 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: FOSTER FARMS DAIRY #4
MAILING ADDRESS: 2343 HICKMAN RD
HICKMAN, CA 95323

LOCATION: 5372 S HICKMAN ROAD
DENAIR, CA 95316

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. Permittee shall feed all animals according to National Research Council (NRC) guidelines. Feed rations shall include at least 6% cottonseed, or upon District approval, an equivalent substitute. [District Rules 2201 and 4570]
5. {4455} Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

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Seyed Sadredin, Executive Director / APCO

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Arnaud Marjollet, Director of Permit Services
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6. {4456} Permittee shall push feed so that it is within three feet of feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals. [District Rule 4570]

7. {4457} Permittee shall maintain an operating plan/record that requires feed to be pushed within three feet of feedlane fence within two hours of putting out the feed, or use of a feed trough or other structure designed to maintain feed within reach of the animals. [District Rule 4570]

8. {4458} Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rule 4570]

9. {4459} Permittee shall maintain an operating plan/record of when feeding of total mixed rations began within two hours of grinding and mixing rations. [District Rule 4570]

10. {4460} Permittee shall store grain in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rule 4570]

11. {4461} Permittee shall maintain records demonstrating grain is/was stored in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rule 4570]

12. {4462} Permittee shall feed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. [District Rule 4570]

13. {4463} Permittee shall maintain records to demonstrate animals are fed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rule 4570]

14. {4468} For bagged silage/feedstuff, permittee shall utilize a sealed feed storage system (e.g., ag bag). [District Rule 4570]

15. {4469} Permittee shall cover all silage piles, except for the area where feed is being removed from the pile, with a plastic tarp that is at least five (5) mils (0.005 inches) thick, multiple plastic tarps with a cumulative thickness of at least 5 mils (0.005 inches), or an oxygen barrier film covered with a UV resistant material. Silage piles shall be covered within seventy-two (72) hours of last delivery of material to the pile. Sheets of material used to cover silage shall overlap so that silage is not exposed where the sheets meet. [District Rule 4570]

16. {4470} Permittee shall maintain records of the thickness and type of cover used to cover each silage pile. Permittee shall also maintain records of the date of the last delivery of material to each silage pile and the date each pile is covered. [District Rule 4570]

17. {4471} Permittee shall select and implement one of the following mitigation measures for building each silage pile at the facility: Option 1) build the silage pile such that the average bulk density is at least 44 lb/cu ft for corn silage and 40 lb/cu ft for other silage types, as measured in accordance with Section 7.11 of District Rule 4570; Option 2) Adjust filling parameters when creating the silage pile to achieve an average bulk density of at least 44 lb/cu ft for corn silage and at least 40 lb/cu ft for other silage types as determined using a District-approved spreadsheet; or Option 3) build silage piles using crops harvested with the applicable minimum moisture content, maximum Theoretical Length of Chop (TLC), and roller opening identified in District Rule 4570, Table 4.1, 1.d and manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. Records of the option chosen as a mitigation measure for building each silage pile shall be maintained. [District Rule 4570]

18. {4472} For each silage pile that Option 1 (Measured Bulk Density) is chosen as a mitigation measure for building the pile, records of the measured bulk density shall be maintained. [District Rule 4570]

19. {4473} For each silage pile that Option 2 (Bulk Density Determined by Spreadsheet) is chosen as a mitigation measure for building the pile, records of the filling parameters entered into the District-approved spreadsheet to determine the bulk density shall be maintained. [District Rule 4570]

20. {4474} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall harvest corn used for the pile at an average moisture content of at least 65% and harvest other silage crops for the pile at an average moisture content of at least 60%. [District Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

21. {4475} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records of the average percent moisture of crops harvested for silage shall be maintained. [District Rule 4570]

22. {4476} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall adjust setting of equipment used to harvest crops for the pile to incorporate the following parameters for Theoretical Length of Chop (TLC) and roller opening, as applicable: 1) Corn with no processing: TLC not exceeding 1/2 inch, 2) Processed Corn: TLC not exceeding 3/4 inch and roller opening of 1-4 mm, 3) Alfalfa/Grass: TLC not exceeding 1.0 inch, 4) Other silage crops: TLC not exceeding 1/2 inch. [District Rule 4570]

23. {4477} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records that equipment used to harvest crops for the pile was set to the required TLC and roller opening for the type of crop harvested shall be maintained. [District Rule 4570]

24. {4478} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rule 4570]

25. {4479} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall maintain a plan that requires that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rule 4570]

26. {4480} Permittee shall select and implement at least two of the following mitigation measures for management of silage piles at the facility: Option 1) manage silage piles such that only one silage pile has an uncovered face and the total exposed surface area is less than 2,150 square feet, or manage multiple uncovered silage piles such that the total exposed surface area of all uncovered silage piles is less than 4,300 square feet; Option 2) use a shaver/facer to remove silage from the silage pile, or shall use another method to maintain a smooth vertical surface on the working face of the silage pile; or Option 3) inoculate silage with homolactic lactic acid bacteria in accordance with manufacturer recommendations to achieve a concentration of at least 100,000 colony forming units per gram of wet forage, apply propionic acid, benzoic acid, sorbic acid, sodium benzoate, or potassium sorbate at the rate specified by the manufacturer to reduce yeast counts when forming silage piles, or apply other additives at rates that have been demonstrated to reduce alcohol concentrations in silage and/or VOC emissions from silage and have been approved by the District and EPA. Records of the options chosen for managing each silage pile shall be maintained. [District Rule 4570]

27. {4481} If Option 1 (Limiting Exposed Area of Silage) is chosen as a mitigation measure for managing silage piles, the permittee shall calculate and record the maximum (largest part of pile) total exposed area of each silage pile. Records of the maximum calculated area shall be maintained. [District Rule 4570]

28. {4482} For each silage pile that Option 2 (Shaver/Facer or Smooth Face) is chosen as a mitigation measure for building the pile, the permittee shall maintain records that a shaver/facer was used to remove silage from the pile or shall visually inspect the pile at least daily to verify that the working face was smooth and maintain records of the visual inspections. [District Rule 4570]

29. {4483} For each silage pile that Option 3 (Silage Additives) is chosen as a mitigation measure for building the pile, records shall be maintained of the type additive (e.g. inoculants, preservative, other District & EPA-approved additive), the quantity of the additive applied to the pile, and a copy of the manufacturers instructions for application of the additive. [District Rule 4570]

30. {4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]

31. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

32. Facilities N-5947, N-4683, and N-8554 are part of the same stationary source for NSR purposes. [District Rule 2201]