San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

JUL 10 2012

Eric Veldhuis
Veldhuis North Dairy
12465 Lee Rd
Ballico, CA 95303

Re: Notice of Preliminary Decision - Authority to Construct
Project Number: N-1063725

Dear Mr. Veldhuis:

Enclosed for your review and comment is the District's analysis of Veldhuis North Dairy's application for an Authority to Construct for a 3,200 milk cow (5,340 total head) dairy operation, at 12465 Lee Rd in Ballico.

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

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

Sincerely,

David Warner
Director of Permit Services

DW:jka

Enclosures

Seyed Sadredin
Executive Director/Air Pollution Control Officer

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

Central Region (Main Office)
1990 E. Gettysburg Avenue
Fresno, CA 93726-0244
Tel: (559) 230-6000 FAX: (559) 230-6061
www.valleyair.org

Southern Region
2700 M Street, Suite 275
Bakersfield, CA 93301-2373
Tel: (661) 326-6900 FAX: (661) 326-6985

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

JUL 10 2012

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

Re: Notice of Preliminary Decision - Authority to Construct
Project Number: N-1063725

Dear Mr. Tollstrup:

Enclosed for your review and comment is the District's analysis of Veldhuis North Dairy's application for an Authority to Construct for a 3,200 milk cow (5,340 total head) dairy operation, at 12465 Lee Rd in Ballico.

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

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

Sincerely,

David Warner
Director of Permit Services

DW:jka

Enclosure

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
www.valleyair.org

Southern Region
2700 M Street, Suite 275
Bakersfield, CA 93301-2373
Tel: (661) 326-6900 FAX: (661) 326-6985

Merced Sun-Star
Merced Sun-Star

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

NOTICE IS HEREBY GIVEN that the San Joaquin Valley Unified Air Pollution Control District solicits public comment on the proposed issuance of Authority to Construct to Veldhuis North Dairy for a 3,200 milk cow (5,340 total head) dairy operation, at 12465 Lee Rd in Ballico.

The analysis of the regulatory basis for this proposed action, Project #N-1063725, is available for public inspection at http://www.valleyair.org/notices/public_notices_idx.htm and the District office at the address below. Written comments on this project must be submitted within 30 days of the publication date of this notice to **DAVID WARNER, DIRECTOR OF PERMIT SERVICES, SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT, 1990 EAST GETTYSBURG AVENUE, FRESNO, CA 93726.**

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

Facility Name:	Veldhuis North Dairy	Date:	May 31, 2012
Mailing Address:	12465 Lee Road	Engineer:	Jonah Aiyabei
	Ballico, CA 95303	Lead Engineer:	Martin Keast
Contact Person:	Eric Veldhuis		
Telephone:	(209) 394-5117		
Application #s:	N-7056-1-0 through 11-0		
Project #:	N-1063725		
Deemed Complete:	June 9, 2010		

I. Proposal

Veldhuis North Dairy has requested Authority to Construct (ATC) permits for a new 3,200 milk cow (5,340 total head) dairy. The new dairy is associated with a pre-existing 1,500 head heifer ranch which will be permitted under a separate permit application.

The process of establishing the dairy operation started before farming operations became subject to District permit requirements on January 1, 2004 (pursuant to Senate Bill 700). The process continued after January 1, 2004, until the dairy became operational later in 2005. The District conducted a commencement of construction determination (Appendix A) and established that all of the dairy's emission units meet the criteria to be considered new (i.e. construction commenced after January 1, 2004) and should therefore obtain Authority to Construct permits and be subject to all applicable New Source Review (NSR) requirements.

The proposed operation will also include one emergency standby diesel-fired IC engine and five diesel-fired irrigation engines.

The project will result in an increase in VOC, NH_3, PM_{10}, and H2S emissions at the site, including increases of more than 2.0 lb/day from the milking operation, cow housing, and the liquid manure handling system. Therefore, BACT is triggered for VOC, NH_3, PM_{10}, and H2S emissions from these permit units.

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 Merced County, which has discretionary approval authority on dairy projects. Merced 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 Environmental Impact Report (EIR) (State Clearinghouse (SCH) No. 2000101015) prepared by Merced 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 Merced County upon issuance of the Authority to Construct (ATC) permits.

II. Applicable Rules

Rule 1070 Inspections (12/17/92)
Rule 2010 Permits Required (12/17/92)
Rule 2201 New and Modified Stationary Source Review Rule (4/21/11)
Rule 2520 Federally Mandated Operating Permits (6/21/01)
Rule 2550 Federally Mandated Preconstruction Review for Major Sources of Air Toxics (6/18/98)
Rule 4001 New Source Performance Standards (4/14/99)
Rule 4002 National Emissions Standards for Hazardous Air Pollutants (5/20/04)
Rule 4101 Visible Emissions (2/17/05)
Rule 4102 Nuisance (12/17/92)
CH&SC 41700 Health Risk Assessment
Rule 4201 Particulate Matter Concentration (12/17/92)
Rule 4550 Conservation Management Practices (CMP) (8/19/04)
Rule 4570 Confined Animal Facilities (CAF) (6/15/06)
Rule 4701 Internal Combustion Engines - Phase 1 (8/21/03)
Rule 4702 Internal Combustion Engines - Phase 2 (1/18/07)
Rule 4801 Sulfur Compounds (12/17/92)
California Code of Regulations (CCR), Title 17 (Public Health), Division 3 (Air Resources), Chapter 1 (Air Resources Board), Subchapter 7.5 (Air Toxic Control Measures), Measure 93115 (Stationary Diesel Engines)
CH&SC 42301.6 School Notice
Senate Bill 700 (SB 700)
California Environmental Quality ACT (CEQA)

III. Project Location

The facility is located at 12465 Lee Rd in Ballico, Merced County. The equipment is not located within 1,000 feet of the outer boundary of a K-12 school. Therefore, the public notification requirement of California Health and Safety Code 42301.6 is not applicable to this project.

IV. Process Description

The primary function of Veldhuis North Dairy is the production of milk, which is used to make various products for human consumption. Production of milk requires a herd of mature dairy cows that are lactating. In order to produce milk, the cows must be bred and give birth. The gestation period for a cow is 9 months, and dairy cows are bred again 4 months after calving. Thus, a mature dairy cow produces a calf every 12 to 14 months, which is why there will be different ages and types of cows at the dairy, including calves, heifers, lactating cows, dry cows, and mature bulls.

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

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

Cow Housing

Lactating cows, dry cows, bred heifers and mature bulls will be housed in freestall barns with flushed manure lanes. In freestall barns, cows are grouped in large pens with free access to feed bunks, water, and stalls for resting. A standard freestall barn design has a feed alley in the center of the barn separating two feed bunks on each side.

The rest of the heifers will be housed in open corrals with flushed lanes. An open corral is a large open area where cows are confined with unlimited access to feed and water. The open corrals at this dairy include structures that provide shade for the cows.

Special Needs Housing

The special needs area serves the gestating cows at the dairy or any cows that are in need of medical condition. This area acts as a veterinary area. It is also the area in which cows are given special attention as they progress from dry cow, a mature cow that is gestating and not lactating, to maternity, to milking status or until their health improves.

Milking Parlor

The milking parlor is a separate building, apart from the lactating cow confinement. The milking parlor is designed to facilitate changing the groups of cows milked and to allow workers access to the cows during milking. A holding area confines the cows that are ready for milking. The holding area is covered with open sides and is part of the milking parlor, which in turn, is located in the immediate vicinity of the cow housing. The milking parlor has concrete floors sloped towards a drainage system. Manure that is deposited in the milking parlor is sprayed or flushed into the drainage using fresh water after each milking. The effluent from the milking parlor is carried through pipes into the liquid manure treatment system.

Liquid Manure Management System

The liquid manure management system includes solids separation (settling basins) and an anaerobic treatment and storage lagoon.

Solids Separation

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

Settling basins are structures designed to separate solids from liquid manure by sedimentation. The inflow of manure is restricted to allow some of the solids to settle out. The liquid from the settling basins will gradually drain to the treatment lagoon. Solids remaining in the settling basins are left to dry and then are removed. The separated solids will either be immediately incorporated into cropland or stored for use as fertilizer or bedding in the freestalls. Settling basins remove at least 50% of solids prior to the manure entering the treatment lagoon[1].

Anaerobic Treatment Lagoon

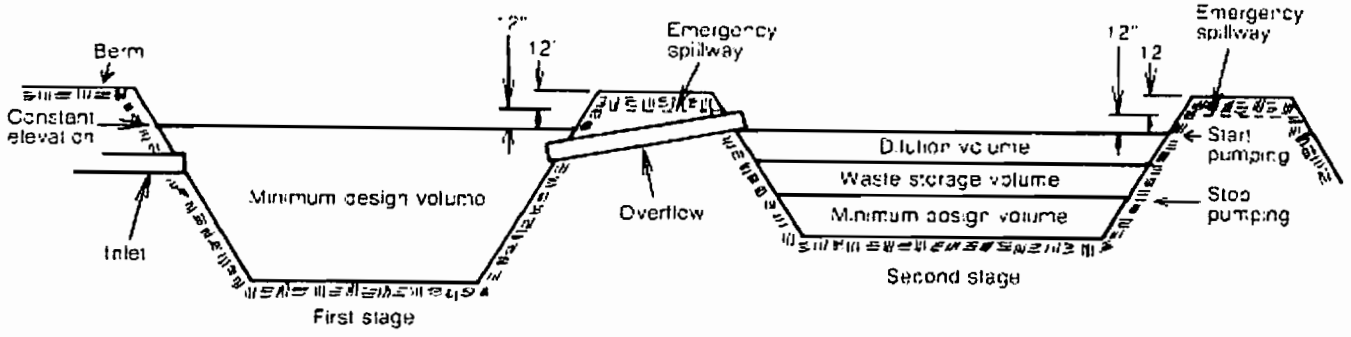
An anaerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of manure by microbes in the absence of oxygen. This process of anaerobic decomposition results in the preferential conversion of organic compounds in the manure into methane, carbon dioxide, and 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

[1] 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.

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 usually 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, Veldhuis North Dairy 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 corresponding to the dairy's required minimum treatment volume in order to sustain the microbial activity required for anaerobic treatment.

Solid manure Management System - Manure Stock Piles (Storage)

Solid manure scraped from unpaved corral areas is dried and stockpiled for use as fertilizer at a later time. The separated solids are dried and used as fertilizer or as bedding in the freestalls.

V. Equipment Listing

N-7056-1-0: 3,200 COW MILKING OPERATION WITH ONE 90-STALL (PARALLEL) MILKING PARLOR.

N-7056-2-0: COW HOUSING - 3,200 MILK COWS, NOT TO EXCEED A COMBINED TOTAL OF 3,740 MATURE COWS (MILK AND DRY), AND 1,600 TOTAL SUPPORT STOCK (HEIFERS, CALVES, AND BULLS).

N-7056-3-0: LIQUID MANURE HANDLING SYSTEM CONSISTING OF 6 SETTLING BASINS, ONE ANAEROBIC TREATMENT/STORAGE LAGOON (2,352'X180'X22'), AND LAND APPLICATION OF LIQUID MANURE THROUGH FLOOD IRRIGATION.

N-7056-4-0: SOLID MANURE HANDLING CONSISTING OF MANURE STOCKPILES AND LAND APPLICATION.

N-7056-5-0: FEED HANDLING AND STORAGE CONSISTING OF SILAGE PILES.

N-7056-6-0: 550 HP CUMMINS MODEL VTA171063 DIESEL-FIRED EMERGENCY STANDBY IC ENGINE POWERING AN ELECTRICAL GENERATOR.

N-7056-7-0: 220 HP VOLVO MODEL TAD941VE (S/N: D9A2A2009012391) TIER 2 DIESEL-FIRED IC ENGINE POWERING A WELL PUMP.

N-7056-8-0: 187 HP JOHN DEERE MODEL 6081HF0706 (S/N: RG6081H254713) TIER 2 DIESEL-FIRED IC ENGINE POWERING A WELL PUMP.

N-7056-9-0: 205 HP JOHN DEERE MODEL 6081HF070L (S/N: RG6081H230540) TIER 2 DIESEL-FIRED IC ENGINE POWERING A WELL PUMP.

N-7056-10-0: 74 HP JOHN DEERE MODEL 4045TF270B (S/N: PE4045T408066) TIER 2 DIESEL-FIRED IC ENGINE POWERING AN IRRIGATION PUMP.

N-7056-11-0: 168 HP JOHN DEERE MODEL 6081HF275 (S/N: PE608H536336) TIER 2 DIESEL-FIRED IC ENGINE POWERING A WELL PUMP.

VI. Emission Control Technology Evaluation

PM_{10}, VOC, NH_3, and H2S are the major pollutants of concern from dairy operations. Gaseous pollutant emissions from a dairy are due to the ruminant digestive processes (enteric emissions), the decomposition and fermentation of feed, and the decomposition of organic material in dairy manure. Volatile Organic Compounds (VOCs) are formed as intermediate metabolites when organic matter in manure degrades. Ammonia volatilization is the result of the microbial decomposition of nitrogenous compounds in manure. H2S emission result from the anaerobic decomposition of sulfates 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 are discussed below:

Milking Parlor

Flushing with fresh water is the primary method used to wash out the manure from the milking parlor after each group of cows is milked. Since the milking parlor is frequently flushed, it is not a significant source of particulate matter emissions. Manure, which is a source of VOC emissions, is removed from the milking parlor many times a day by flushing after each milking. Because of ammonia's high affinity for and solubility in water, volatilization of ammonia from

the milking parlor will also be reduced by flushing after each milking.

Paved Surfaces and Frequent Flushing

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

Manure 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 freestall barns will be flushed four times per day and the lanes and walkways in the corrals for the heifers will be flushed twice per day.

Open Corral Shade Structures and Weekly Scraping

Providing shade for the animals in open corrals reduces movement and unnecessary activity during hot weather, which reduces PM_{10} emissions. The surfaces of the corrals will be scraped in the morning hours on a weekly basis except during wet conditions. Frequent scraping of the corrals will reduce the amount of dry manure on the corral surfaces that may be pulverized by the cows' hooves and emitted as PM_{10}. This practice will also reduce the chances of anaerobic conditions developing in the manure pack of the corral surface, potentially reducing VOC emissions.

Feeding Heifers at or Near Dusk

Young cattle naturally exhibit an increased level of play and activity in the evening hours, especially during hot and dry weather. This increased level of activity results in disturbance of loose dust and particulate matter, which is subsequently entrained into the atmosphere. If however the young cattle are fed at dusk, unwanted activity and resultant emissions can be significantly reduced since feeding naturally takes priority over play.

Windbreaks

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

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

- In order to reach a density of 65%, three rows are required consisting of the following:

Row	Type of tree/shrub	Spacing[2]	Height
First Row	Low shrubs Tall shrubs	3' to 5' apart 8' to 12' apart	5' +
Second Row	Tall shrubs or medium size trees	8' to 12' apart	8'-25'
Third Row	Large Evergreens	Varies	35' +

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

An upwind windbreak/shelterbelt will be established along the Northwest lagoon of the dairy.

The applicant has proposed to plant two rows of evergreen trees (Italian Cypress). The applicant will maintain an irrigation system for greater survivability and rapid growth of the trees and shrubs. The following conditions will be placed on the permit:

- Permittee shall establish windbreaks along the entire Eastern and Southern boundaries of the open corral housing areas. Windbreaks shall consist of two rows of Italian Cypress trees, planted 9 feet apart. Each row should be offset from the adjacent row. Spacing between rows shall be sufficient to accommodate cultivation equipment, but shall not exceed 24 feet. An alternative windbreak proposal must be approved by the District. [District Rule 2201] N

Additional Requirements:

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

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

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

Feeding Animals in Accordance with the NRC Guidelines

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

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

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. Refused feed will be removed from the feed lanes on a daily basis to minimize gaseous emissions from decomposition. The surface area of silage exposed to the atmosphere will be minimized by enclosing silage or covering it with tarps, except for the face of the pile from which feed is being withdrawn.

Liquid Manure Handling System - 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 B).

Covered Lagoon Anaerobic Digester:

Pursuant to Section 5.3 of the Settlement Agreement (9/20/2004) between the District and the Western United Dairyman and the Alliance of Western Milk Producers Inc., installation of an anaerobic digester will only be required if this technology is proven effective in reducing emissions and is required by the final Dairy BACT Guideline.[3] The applicant has agreed to install a lagoon cover if it is required. 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.

Solids Separation

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

Liquid Manure Land Application

Liquid manure from the lagoon will be applied to the dairy's forage production land through flood 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.

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

Rapid Incorporation of Solid Manure Applied to Land:

Based on the information currently available, emissions from solid manure applied to cropland are expected to be small. However, to ensure that any possible emissions are minimized, this dairy will be required to incorporate solid manure applied to cropland immediately (within two hours) after application. Immediate incorporation of the manure into the soil will reduce any volatilization of gaseous pollutants, including ammonia and VOC. Reduction in gaseous emissions is achieved by minimizing the amount of time that the manure is exposed to the atmosphere. Once manure has been incorporated into the soil, VOC is absorbed onto particles of soil providing the opportunity for the VOC to be oxidized into carbon dioxide and water[4].

Feed Handling and Storage:

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

VII. General Calculations

A. Assumptions

- Potential to Emit for the dairy will be based on the maximum design capacity of the number and types of cows that can be housed.
- Only emissions from the lagoons/storage ponds and IC engines will be used to determine if the facility is a major source since these units are considered to be the only sources of non-fugitive emissions, as discussed in section VII.C.5.
- 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.
- All H_2S emissions from the dairy will be allocated to the lagoon/storage pond portion of the liquid manure handling permit unit.
- Because of the moisture content of the separated solids, PM_{10} emissions from solid manure handling are considered negligible.
- The PM_{10} emission factors for the dairy animals are based on a District document entitled "Dairy and Feedlot PM_{10} Emissions Factors", which compiled data from studies performed by Texas A & M ASAE and a USDA/UC Davis report quantifying dairy and feedlot emissions.
- The NH3 emission factors for milk cows are based on a District document entitled

[4] 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)

"Breakdown of Dairy VOC Emission Factor into Permit Units". The NH3 emission factors for the other cows were developed by taking the ratio of manure generated by the different types of cows to the milk cow and multiplying it by the milk cow emission factor.

- The basis of the Emission Factors used in this evaluation is from the "APCO's Revision to the Dairy VOC Emission Factor", dated January 2010. These emission factors are controlled Emission Factors and contain mitigation measures from Rule 4570 (as adopted in 2010).
- For BACT analysis purposes, each permit unit at a dairy will also be treated as an emissions unit, except for the liquid manure handling permit unit. For BACT analysis purposes, the liquid manure handling permit unit will contain two emissions units: lagoons/storage ponds and liquid manure land application.
- Feeding animals in accordance with the National Research Council (NRC) guidelines is a feed formulation practice used to improve animal health and productivity. This typically limits the overfeeding of certain feed that have the potential of increasing emissions. This mitigation measure has the potential of reducing a significant amount of emissions, however, since there is not much data available, a conservative control efficiency of 5% will be applied to the overall dairy EF.
- Flushing or hosing down the milking parlor immediately prior to, immediately after, or during each milking has the potential of reducing a significant amount of emissions since many of the compounds emitted from the fresh manure, such as alcohols (ethanol and methanol) and many Volatile Fatty Acids (VFAs), are highly soluble in water and the fresh excreted manure is almost immediately flushed out of the milk barn. However, a conservative control efficiency estimate of 75% will be applied at this time. This control efficiency does not apply to the enteric emissions generated from the cows themselves. Taking that into account, the overall control efficiency for the milk barn is approximately 16.7%. (EF from milk barn is = 0.9 lb/hd-yr. EF from fresh waste is equal to 0.2 lb/hd-yr. 75% of 0.2 lb/hd-yr = 0.15 lb/hd-yr. 0.15 lb/hd-yr/0.9 lb/hd-yr = 16.7% control).
- 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.

The following assumptions are applicable to the diesel-fired IC engines:

- Density of diesel fuel: 7.1 lb/gal
- EPA F-factor (adjusted to 60 °F): 9,051 dscf/MMBtu
- Fuel heating value: 137,000 Btu/gal
- BHP to Btu/hr conversion: 2,542.5 Btu/bhp-hr
- Thermal efficiency of engine: commonly ≈ 35%
- PM10 fraction of diesel exhaust: 0.96 (CARB, 1988)
- N-7056-6-0: 550 hp Tier 2; maximum operation of 100 hours/yr
- N-7056-7-0: 220 hp Tier 2; maximum operation of 1,440 hours/yr
- N-7056-8-0: 187 hp Tier 2; maximum operation of 600 hours/yr
- N-7056-9-0: 205 hp Tier 2; maximum operation of 800 hours/yr
- N-7056-10-0: 74 hp Tier 2; maximum operation of 800 hours/yr
- N-7056-11-0: 168 hp Tier 2; maximum operation of 800 hours/yr

B. Emission Factors

Ammonia:

The following emission factors will be used to calculate Ammonia emissions:

Dairy Ammonia Emissions Factors (lb/hd-yr)				
		Milk Cows	**Dry Cows**	**Support Stock**
Milking Parlor	Milking Parlor Floor	0.19	-	-
	Milking Parlor Total	**0.19**	-	-
Cow Housing	Corrals/Pens	41.9	21.2	11.0
	Bedding	6.3	3.2	1.7
	Lanes	5.1	2.6	1.3
	Cow Housing Total	**53.3**	**27.0**	**14.0**

Dairy Ammonia Emissions Factors (lb/hd-yr)				
		Milk Cows	**Dry Cows**	**Support Stock**
Liquid Manure Handling	Lagoons/Storage Ponds	8.2	4.2	2.2
	Liquid Manure Land Application	8.9	4.5	2.3
	Liquid Manure Handling Total	**17.1**	**8.7**	**4.5**
Solid Manure Handling	Solid Manure Storage	0.95	0.48	0.25
	Separated Solids Piles	0.38	0.19	0.10
	Solid Manure Land Application	2.09	1.06	0.55
	Solid Manure Handling Total	**3.42**	**1.73**	**0.90**

PM_{10}:

The following emission factors will be used to calculate PM10 emissions:

Cow Housing				
Category	Uncontrolled EF (lb-PM_{10}/hd-yr)	Control(s)	Controlled EF Calculation	Controlled EF (lb-PM_{10}/hd-yr)
Milk cows, dry cows, bulls and bred heifers in freestalls	1.37[5]	Upwind winbreaks (10%) Weekly Scraping using Pull-Type Equipment in morning (15%)	1.37x(1-0.1)(1-0.15) =	**1.05**
Heifers in open corrals	10.55[6]	Downwind windbreaks (12.5%) Shade Structures (8.3%) Weekly Scraping using Pull-Type Equipment in morning (15%) Feeding Heifers Near Dusk (10%)	10.55 x (1-0.125)(1-0.083)(1-0.15)(1-0.10)=	**6.47**

VOC:

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

[5] Based on a Summer 2003 study by Texas A&M ASAE at a West Texas Dairy

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

Milking Parlor

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

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

Cow Housing

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

Corrals/Pens Mitigations		
Apply	**Mitigation**	**CE (%)**
1	Feed according to National Research Council (NRC) guidelines.	5
1	BACT: Flush lanes four times per day for mature cows and two times per day for support stock (10%) Rule 4570 equivalent measure: Scrape, vacuum, or flush concrete lanes in corrals at least once every day for mature cows and every seven (7) days for support stock, or clean concrete lanes such that the depth of manure does not exceed twelve (12) inches at any point or time (10%).	10
1	Install shade structure such that they are constructed with a light permeable roofing material NOTE: If selected, for dairies greater than	5

Corrals/Pens Mitigations		
Apply	**Mitigation**	**CE (%)**
	999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.	
	Total CE	18.8

Bedding Mitigations		
Apply	**Mitigation**	**CE (%)**
1	Feed according to National Research Council (NRC) guidelines. NOTE: Control efficiency already partially included in EF2	5
1	For a large dairy only (1000 milk cows or larger) – Remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every seven (7) days.	10
	Total CE	14.5

Lanes Mitigations		
Apply	**Mitigation**	**CE (%)**
1	Feed according to National Research Council (NRC) guidelines. NOTE: Control efficiency already partially included in EF2	5
1	Flush, scrape, or vacuum freestall flush lanes immediately prior to or after, or during each milking; or flush or scrape freestall flush lanes at least three (3) times per day.	10
	Total CE	14.5

Liquid Manure Handling

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

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

Solid Manure Handling

Solid Manure Storage Mitigations		
Apply	**Mitigation**	**CE (%)**
1	Feed according to National Research Council (NRC) guidelines. NOTE: Control efficiency already partially included in EF2	5
1	Within 72 hours of removal from housing, either a) remove dry manure from the facility, or b) cover dry manure outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed 24 hours per event.	10
	Total CE	14.5

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

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

N-6746-5: Silage & TMR

Corn/Alfalfa/Wheat Silage Mitigations		
Apply	**Mitigation**	***CE (%)**
1	1. Utilize a sealed feed storage system (e.g. Ag-Bag) for bagged silage. < or > 2. Cover the surface of silage piles, except for the area where feed is being removed from the pile, with a plastic tarp that is at least 5 mils thick (0.005 inches), multiple plastic tarps with a cumulative thickness of at least 5 mils (0.005 inches), or an oxygen barrier film covered with a UV resistant material within 72 hours of last delivery of material to the pile, and Implement one of the following: a) build silage piles such that the average bulk density is at least 44 lb/cu-ft for corn silage and 40 lb/cu-ft for other silage types, as measured in accordance with Section 7.10 of Rule 4570, b) when creating a silage pile, adjust filling parameters to assure a calculated average bulk density of at least 44 lb/cu ft for corn silage and at least 40 lb/cu-ft for other silage types, using a spreadsheet approved by the District; c) harvest silage crop at > or = 65% moisture for corn; and > = 60% moisture for alfalfa/grass and other silage crops; manage silage material delivery such that no more than 6 inches of materials are uncompacted on top of the pile; and incorporate the applicable Theoretical Length of Chop (TLC) and roller opening for the crop being harvested Manage exposed silage Implement two of the following: <u>Manage Exposed Silage</u>. a) manage silage piles such that only one silage pile has an uncovered face and the uncovered face has a total exposed surface area of less than 2,150 sq. ft., or b) manage	39

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

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

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

Emission Factors (lb-VOC/hd-yr)				
		Milk Cow	**Dry Cow**	**Support Stock***
Milking Parlor	Enteric Emissions in Milking Parlors	0.37	-	-
	Milking Parlor Floor	0.03	-	-
	Milking Parlor Total	**0.4**	-	-
Cow Housing	Enteric Emissions in Cow Housing	3.51	2.12	1.62
	Corrals/Pens	5.36	2.92	2.24
	Bedding	0.86	0.46	0.36
	Lanes	0.68	0.38	0.28
	Cow Housing Total	**10.41**	**5.88**	**4.50**
Liquid Manure Handling	Lagoons/Storage Ponds	0.74	0.40	0.31
	Liquid Manure Land Application	1.33	0.72	0.55
	Liquid Manure Handling Total	**2.07**	**1.12**	**0.86**
Solid Manure Handling	Solid Manure Storage	0.13	0.07	0.05
	Separated Solids Piles	0.06	0.03	0.03
	Solid Manure Land Application	0.31	0.17	0.13
	Solid Manure Handling Total	**0.50**	**0.27**	**0.21**

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

Silage and TMR (Total Mixed Ration) EF2		
Type of Silage	**VOC EF (µg/m^2-min)**	**Source**
Corn Silage[1]	21,155	SJVAPCD
Alfalfa Silage[1]	10,649	SJVAPCD
Wheat Silage[1]	26,745	SJVAPCD
TMR[2]	10,575	SJVAPCD

[1] Assuming pile is completely covered except for the front face
[2] Assuming rations are fed within 48 hours

IC Engines:

The SOx emission factor for diesel engines is based on the Sulfur content of the diesel fuel used, as shown in the following calculation:

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

Only ultra-low sulfur diesel with a Sulfur content of 15 ppmv is permitted in California.

The emission factors for NOx, PM10, CO, and VOC as shown in the following tables for each engine:

6-0: 550 HP CUMMINS MODEL VTA171063 TIER 2 EMERGENCY STANDBY ENGINE		
Pollutant	Emission Factor (g/bhp-hr)	Source
NO_X	3.79	Carl Moyer Program
PM_{10}	0.088	Carl Moyer Program
CO	2.6	Tier 2 Certification Maximum
VOC	0.12	Carl Moyer Program

7-0: 220 HP VOLVO MODEL TAD941VE TIER 2 DIESEL-FIRED IC ENGINE.		
Pollutant	Emission Factor (g/bhp-hr)	Source
NO_X	4.25	Certification
PM_{10}	0.119	Certification
CO	0.6	Certification
VOC	0.12	Carl Moyer Program

8-0: 187 HP JOHN DEERE MODEL 6081HF0706 TIER 2 DIESEL-FIRED IC ENGINE.		
Pollutant	Emission Factor (g/bhp-hr)	Source
NO_X	4.55	Certification
PM_{10}	0.112	Certification
CO	0.6	Certification
VOC	0.12	Carl Moyer Program

9-0: 205 HP JOHN DEERE MODEL 6081HF070L TIER 2 DIESEL-FIRED IC ENGINE.		
Pollutant	Emission Factor (g/bhp-hr)	Source
NO_X	4.55	Certification
PM_{10}	0.112	Certification
CO	0.6	Certification
VOC	0.12	Carl Moyer Program

10-0: 74 HP JOHN DEERE MODEL 4045TF270B TIER 2 DIESEL-FIRED IC ENGINE		
Pollutant	Emission Factor (g/bhp-hr)	Source
NO_X	4.40	Certification
PM_{10}	0.231	Certification
CO	0.7	Certification
VOC	0.23	Carl Moyer Program

11-0: 168 HP JOHN DEERE MODEL 6081HF275 TIER 2 DIESEL-FIRED IC ENGINE		
Pollutant	Emission Factor (g/bhp-hr)	Source
NO_X	4.40	Certification
PM_{10}	0.134	Certification
CO	0.4	Certification
VOC	0.19	Carl Moyer Program

C. Calculations

1. Pre-Project Potential to Emit (PE1)

Since this is a new source, PE1 = 0 for all pollutants and for all emission units.

2. Post Project Potential to Emit (PE2)

Ammonia:

The Ammonia emissions for the proposed project are as summarized in the following calculation tables:

Milking Parlor				
Category	**Number**	**Emission Factor**	**Annual Emissions (lb/yr)**	**Daily Emissions (lb/day)**
Milk cows	3,200	0.19	608	1.7

Cow Housing				
Category	**Number**	**Emission Factor**	**Annual Emissions (lb/yr)**	**Daily Emissions (lb/day)**
Milk cows	3,200	53.3	170,560	467.3
Dry cows	540	27.0	14,580	39.9
Support stock	1,600	14.0	22,400	61.4
		Total:	**207,540**	**568.6**

Liquid Manure Lagoons/Storage Ponds				
Category	**Number**	**Emission Factor**	**Annual Emissions (lb/yr)**	**Daily Emissions (lb/day)**
Milk cows	3,200	8.2	26,240	71.9
Dry cows	540	4.2	2,268	6.2
Support stock	1,600	2.2	3,520	9.6
		Total:	**32,028**	**87.7**

Liquid Manure Land Application				
Category	**Number**	**Emission Factor**	**Annual Emissions (lb/yr)**	**Daily Emissions (lb/day)**
Milk cows	3,200	8.9	28,480	78.0
Dry cows	540	4.5	2,430	6.7
Support stock	1,600	2.3	3,680	10.1
		Total:	**34,590**	**94.8**

Solid Manure				
Category	**Number**	**Emission Factor**	**Annual Emissions (lb/yr)**	**Daily Emissions (lb/day)**
Milk cows	3,200	3.42	10,944	30.0
Dry cows	540	1.73	934	2.6
Support stock	1,600	0.90	1,440	3.9
		Total:	**13,318**	**36.5**

PM_{10}:

Cow Housing				
Category	**Number**	**Emission Factor**	**Annual Emissions (lb/yr)**	**Daily Emissions (lb/day)**
Mature cows & bred heifers in freestalls	3,946	1.05	4,143	11.4
Heifers in open corrals	1,394	6.47	9,019	24.7
		Total:	**13,162**	**36.1**

VOC:

The VOC emissions for the proposed project are as summarized in the following calculation tables:

Milking Parlor				
Category	**Number**	**Emission Factor**	**Annual Emissions (lb/yr)**	**Daily Emissions (lb/day)**
Milk cows	3,200	0.4	1,280	3.5

Cow Housing				
Category	**Number**	**Emission Factor**	**Annual Emissions (lb/yr)**	**Daily Emissions (lb/day)**
Milk cows	3,200	10.41	33,312	91.3
Dry cows	540	5.88	3,175	8.7
Support stock	1,600	4.5	7,200	19.7
		Total:	**43,687**	**119.7**

Liquid Manure Lagoons/Storage Ponds				
Category	**Number**	**Emission Factor**	**Annual Emissions (lb/yr)**	**Daily Emissions (lb/day)**
Milk cows	3,200	0.74	2,368	6.5
Dry cows	540	0.4	216	0.6
Support stock	1,600	0.31	496	1.4
		Total:	**3,080**	**8.5**

Liquid Manure Land Application				
Category	**Number**	**Emission Factor**	**Annual Emissions (lb/yr)**	**Daily Emissions (lb/day)**
Milk cows	3,200	1.33	4,256	11.7
Dry cows	540	0.72	389	1.1
Support stock	1,600	0.55	880	2.4
		Total:	**5,525**	**15.2**

Solid Manure				
Category	**Number**	**Emission Factor**	**Annual Emissions (lb/yr)**	**Daily Emissions (lb/day)**
Milk cows	3,200	0.5	1,600	4.4
Dry cows	540	0.27	146	0.4
Support stock	1,600	0.21	336	0.9
		Total:	**2,082**	**5.7**

VOC Emissions - Feed Storage and Handling

Silage:

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

Corn Area = 1 x 25 ft x ((140 ft + (140 ft / (0.1667 x (140 ft /25 ft) + 1.111 ft))) / 2)
= 2,606 ft^2

Wheat Area = 1 x 25 ft x ((140 ft + (140 ft / (0.1667 x 140 ft /25 ft) + 1.111 ft)) / 2)
= 2605.9466 ft^2

Corn Emissions = emission factor x area x 0.0929 m^2/ft^2 x 8,760 hr/yr x 60 min/hr x 2.20E-9 lb/µg
= 21,155 x 2,606x 0.0929 x 8760 x 60 x 2.20E-9 lb/µg
= 5,922 lb/yr

Wheat Emissions = emission factor x area x 0.0929 m^2/ft^2 x 8,760 hr/yr x 60 min/hr x 2.20E-9 lb/µg
= 26,745 x 2605.9466 x 0.0929 x 8760 x 60 x 2.20E-9 lb/µg
= 7,487 lb/yr

TMR:

TMR emissions = [# of cows] x [emission factor] x [area] x [min/yr] x [lb/µg]
= **5,340** x 10,575 µg/m^2-min x 0.658 m^2 x 525,600 min/yr x 2.20E-9 lb/µg
= 42,966 lb/yr

Total:

Annual PE2 = 5,922 lb/yr + 7,487 lb/yr + 42,966 lb/yr = **56,375 lb/yr**

Daily PE2 = 56,375 lb/yr ÷ 365 days/yr = **154.5 lb/day**

Hydrogen Sulfide (H_2S):

H_2S is produced as a result of the decomposition of sulfur compounds under anaerobic conditions, primarily in the lagoons and storage ponds. Several studies have indicated that the average ammonia emissions from lagoons and ponds treating or storing liquid manure are more than ten times greater than the H_2S emissions from the source[7]. Therefore, the annual H_2S emissions will be conservatively estimated as 10% of the annual NH_3 emissions from the lagoons and storage ponds. Average daily H_2S emissions are equal to the annual H_2S emissions divided by 365 days. However, these studies and others have also indicated substantial variation in daily H_2S emission rates; hence the maximum daily H_2S emission rate is estimated to be five times the average daily rate. The H_2S emissions for this project are as summarized in the following table:

Liquid Manure Lagoons/Storage Ponds				
Category	**Annual NH3 Emissions (lb/yr)**	**Annual H2S Emissions (10% of Annual NH3 Emissions) (lb/yr)**	**Daily Average H2S Emissions (Annual H2S/365 days/yr) (lb/day)**	**Maximum Daily H2S Emissions (Annual H2S/365 days/yr x 5) (lb/day)**
Milk cows	26,240	2,624	7.2	35.9
Dry cows	2,268	227	0.6	3.1
Support stock	3,520	352	1.0	4.8
Total:	**32,028**	**3,203**	**8.8**	**43.8**

Diesel Engine Emissions:

Emissions from the diesel engines are as summarized in the following tables:

N-7056-6-0: 550 HP Tier 2 Electrical Generator Engine:

Pollutant	E.F		HP Rating		Hr/day		grams/lb		lb/day
NOx	3.79	x	550	x	24	/	453.6	=	110.3
SOx	0.0051	x	550	x	24	/	453.6	=	0.1
PM10	0.088	x	550	x	24	/	453.6	=	2.6
CO	2.6	x	550	x	24	/	453.6	=	75.7
VOC	0.12	x	550	x	24	/	453.6	=	3.5

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

Annual PE2									
Pollutant	E.F		HP Rating		Hr/yr		grams/lb		lb/yr
NOx	3.79	x	550	x	100	/	453.6	=	460
SOx	0.0051	x	550	x	100	/	453.6	=	1
PM10	0.088	x	550	x	100	/	453.6	=	11
CO	2.6	x	550	x	100	/	453.6	=	315
VOC	0.12	x	550	x	100	/	453.6	=	15

N-7056-7-0: 220 HP Tier 2 Irrigation Pump Engine:

Daily PE2									
Pollutant	E.F		HP Rating		Hr/day		grams/lb		lb/day
NOx	4.25	x	220	x	24	/	453.6	=	49.5
SOx	0.0051	x	220	x	24	/	453.6	=	0.1
PM10	0.119	x	220	x	24	/	453.6	=	1.4
CO	0.6	x	220	x	24	/	453.6	=	7.0
VOC	0.12	x	220	x	24	/	453.6	=	1.4

Annual PE2									
Pollutant	E.F		HP Rating		Hr/yr		grams/lb		lb/yr
NOx	4.25	x	220	x	1,440	/	453.6	=	2,968
SOx	0.0051	x	220	x	1,440	/	453.6	=	4
PM10	0.119	x	220	x	1,440	/	453.6	=	83
CO	0.6	x	220	x	1,440	/	453.6	=	419
VOC	0.12	x	220	x	1,440	/	453.6	=	84

N-7056-8-0: 187 HP Tier 2 Irrigation Pump Engine:

Daily PE2									
Pollutant	E.F		HP Rating		Hr/day		grams/lb		lb/day
NOx	4.55	x	187	x	24	/	453.6	=	45.0
SOx	0.0051	x	187	x	24	/	453.6	=	0.1
PM10	0.112	x	187	x	24	/	453.6	=	1.1
CO	0.6	x	187	x	24	/	453.6	=	5.9
VOC	0.12	x	187	x	24	/	453.6	=	1.2

Annual PE2									
Pollutant	E.F		HP Rating		Hr/yr		grams/lb		lb/yr
NOx	4.55	x	187	x	600	/	453.6	=	1,125
SOx	0.0051	x	187	x	600	/	453.6	=	1
PM10	0.112	x	187	x	600	/	453.6	=	28
CO	0.6	x	187	x	600	/	453.6	=	148
VOC	0.12	x	187	x	600	/	453.6	=	30

N-7056-9-0: 205 HP Tier 2 Irrigation Pump Engine:

Daily PE2									
Pollutant	E.F		HP Rating		Hr/day		grams/lb		lb/day
NOx	4.55	x	205	x	24	/	453.6	=	49.4
SOx	0.0051	x	205	x	24	/	453.6	=	0.1
PM10	0.112	x	205	x	24	/	453.6	=	1.2
CO	0.6	x	205	x	24	/	453.6	=	6.5
VOC	0.12	x	205	x	24	/	453.6	=	1.3

Annual PE2									
Pollutant	E.F		HP Rating		Hr/yr		grams/lb		lb/yr
NOx	4.55	x	205	x	800	/	453.6	=	1,645
SOx	0.0051	x	205	x	800	/	453.6	=	2
PM10	0.112	x	205	x	800	/	453.6	=	40
CO	0.6	x	205	x	800	/	453.6	=	217
VOC	0.12	x	205	x	800	/	453.6	=	43

N-7056-10-0: 74 HP Tier 2 Irrigation Pump Engine:

Daily PE2									
Pollutant	E.F		HP Rating		Hr/day		grams/lb		lb/day
NOx	4.40	x	74	x	24	/	453.6	=	17.2
SOx	0.0051	x	74	x	24	/	453.6	=	0.0
PM10	0.231	x	74	x	24	/	453.6	=	0.9
CO	0.7	x	74	x	24	/	453.6	=	2.7
VOC	0.23	x	74	x	24	/	453.6	=	0.9

Annual PE2									
Pollutant	E.F		HP Rating		Hr/yr		grams/lb		lb/yr
NOx	4.40	x	74	x	800	/	453.6	=	574
SOx	0.0051	x	74	x	800	/	453.6	=	1
PM10	0.231	x	74	x	800	/	453.6	=	30
CO	0.7	x	74	x	800	/	453.6	=	91
VOC	0.23	x	74	x	800	/	453.6	=	30

N-7056-11-0: 168 HP Tier 2 Irrigation Pump Engine:

Daily PE2									
Pollutant	E.F		HP Rating		Hr/day		grams/lb		lb/day
NOx	4.40	x	168	x	24	/	453.6	=	39.1
SOx	0.0051	x	168	x	24	/	453.6	=	0.0
PM10	0.134	x	168	x	24	/	453.6	=	1.2
CO	0.4	x	168	x	24	/	453.6	=	3.6
VOC	0.19	x	168	x	24	/	453.6	=	1.7

Annual PE2									
Pollutant	E.F		HP Rating		Hr/yr		grams/lb		lb/yr
NOx	4.40	x	168	x	800	/	453.6	=	1,304
SOx	0.0051	x	168	x	800	/	453.6	=	2
PM10	0.134	x	168	x	800	/	453.6	=	40
CO	0.4	x	168	x	800	/	453.6	=	119
VOC	0.19	x	168	x	800	/	453.6	=	56

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

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

Since this is a new source, SSPE1 = 0 for all pollutants.

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

Pursuant to Section 4.10 of District Rule 2201, the Post Project Stationary Source Potential to Emit (SSPE2) is the Potential to Emit (PE) from all units with valid Authorities to Construct (ATC) or Permits to Operate (PTO) at the Stationary Source

and the quantity of emission reduction credits (ERC) which have been banked since September 19, 1991 for Actual Emissions Reductions that have occurred at the source, and which have not been used on-site.

The SSPE2 for this facility is as shown in the following table:

Post-Project Stationary Source Potential to Emit (SSPE2)							
Permit Unit	NO_X (lb/yr)	SO_X (lb/yr)	PM_{10} (lb/yr)	CO (lb/yr)	VOC (lb/yr)	NH_3 (lb/yr)	H2S (lb/yr)
N-7056-1: Milk Barn	0	0	0	0	1,280	608	0
N-7056-2: Cow housing	0	0	13,162	0	43,687	207,540	0
N-7056-3: Liquid manure	0	0	0	0	8,605	66,618	3,203
N-7056-4: Solid manure	0	0	0	0	2,082	13,318	0
N-7056-5: Feed	0	0	0	0	56,375	0	0
N-7056-6: 550 HP ICE	460	1	11	315	15	0	0
N-7056-7: 220 HP ICE	2,968	4	83	419	84	0	0
N-7056-8: 187 HP ICE	1,125	1	28	148	30	0	0
N-7056-9: 205 HP ICE	1,645	2	40	217	43	0	0
N-7056-10: 74 HP ICE	574	1	30	91	30	0	0
N-7056-11: 168 HP ICE	1,304	2	40	119	56	0	0
SSPE2:	**8,076**	**11**	**13,394**	**1,309**	**112,287**	**288,084**	**3,203**

5. Major Source Determination

Pursuant to Section 3.25 of District Rule 2201, a major source is a stationary source with post-project emissions or a Post Project Stationary Source Potential to Emit (SSPE2), equal to or exceeding one or more of the following threshold values. However, Section 3.25.2 states "for the purposes of determining major source status, the SSPE2 shall not include 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."

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.*" The District has researched this issue and concurs with the CAPCOA assessment, as discussed in more detail in the following sections:

Milk Barns:

A mechanical ventilation system can be utilized to capture the gases emitted from the milk barns. 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 barns 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, or 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, or vent for the purpose of reducing emissions.

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, or vent for the purpose of reducing emissions. 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, or vent for the purpose of reducing emissions.

Feed Handling and Storage:

Although there are potentially significant emissions from the feed handling and storage operation, an emission factor has not been established. 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 capture any of the emissions from these piles. A system has not been designed to extract the gases from the face of the pile to capture them. Therefore, the District cannot reasonably demonstrate that these emissions can pass through a stack, chimney, or vent for the purpose of reducing emissions.

Liquid Manure Storage Lagoons/Ponds:

The District has determined that control technology to capture emissions from lagoons (biogas collection systems, for instance) is in use. Therefore, lagoon emissions are not fugitive, and will be taken into consideration when determining if this facility is a major source.

The following table compares the non-fugitive SSPE to the major source thresholds in order to determine if the facility is a major source or not:

Major Source Determination					
Permit Unit	**NO_X** (lb/yr)	**SO_X** (lb/yr)	**PM_{10}** (lb/yr)	**CO** (lb/yr)	**VOC** (lb/yr)
N-7056-1: Milk Barn	0	0	0	0	0
N-7056-2: Cow Housing	0	0	0	0	0
N-7056-3: Liquid Manure	0	0	0	0	3,080
N-7056-4: Solid Manure	0	0	0	0	0
N-7056-5: Feed	0	0	0	0	0
N-7056-6: 550 HP ICE	460	1	11	315	15
N-7056-7: 220 HP ICE	2,968	4	83	419	84
N-7056-8: 187 HP ICE	1,125	1	28	148	30
N-7056-9: 205 HP ICE	1,645	2	40	217	43
N-7056-10: 74 HP ICE	574	1	30	91	30
N-7056-11: 168 HP ICE	1,304	2	40	119	56
Non-Fugitive SSPE	**8,076**	**11**	**232**	**1,309**	**3,338**
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, the facility is not a major source.

6. Baseline Emissions (BE)

BE = Pre-project Potential to Emit for:

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

otherwise,

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

As shown in Section VII.C.5 above, the facility is not a Major Source for any criteria pollutant. Therefore, BE = PE1 = 0 for all pollutants and emission units.

7. SB 288 Major Modification

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

Since this facility is not a major source for any of the pollutants addressed in this project, this project does not constitute an SB288 major modification.

8. Federal Major Modification

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

District Rule 2201, Section 3.17 states that Federal Major Modifications are the same as "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).

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 C.

VIII. Compliance

Rule 1070 Inspections

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

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

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

Rule 2010 Permits Required

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

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

Rule 2201 New and Modified Stationary Source Review Rule

A. Best Available Control Technology (BACT)

1. BACT Applicability

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

a. Any new emissions unit with a potential to emit exceeding two pounds per day,

b. The relocation from one Stationary Source to another of an existing emissions unit with a potential to emit exceeding two pounds per day,

c. Modifications to an existing emissions unit with a valid Permit to Operate resulting in an AIPE exceeding two pounds per day, and/or

d. Any new or modified emissions unit, in a stationary source project, which results in an 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 emissions units – PE > 2 lb/day

All the emission units at the proposed facility are new. The following table is a summary of the daily emissions for each emissions unit:

Emission unit	Daily Emissions (lb/day)						
	NOx	SOx	PM10	CO	VOC	NH3	H2S
N-7056-1: Milk Barn	0.0	0.0	0.0	0.0	3.5	1.7	0.0
N-7056-2: Cow Housing	0.0	0.0	36.1	0.0	119.7	568.6	0.0
N-7056-3: Liquid Manure – Lagoons	0.0	0.0	0.0	0.0	8.5	87.7	43.8
N-7056-3: Liquid Manure - Land Application	0.0	0.0	0.0	0.0	15.2	94.8	0.0
N-7056-4: Solid Manure	0.0	0.0	0.0	0.0	5.7	36.5	0.0
N-7056-5: Feed - Silage	0.0	0.0	0.0	0.0	36.7	0.0	0.0
N-7056-5: Feed - TMR	0.0	0.0	0.0	0.0	117.7	0.0	0.0
N-7056-6: 550 HP ICE	110.3	0.1	2.6	75.7	3.5	0.0	0.0
N-7056-7: 220 HP ICE	49.5	0.1	1.4	7.0	1.4	0.0	0.0
N-7056-8: 187 HP ICE	45.0	0.1	1.1	5.9	1.2	0.0	0.0
N-7056-9: 205 HP ICE	49.4	0.1	1.2	6.5	1.3	0.0	0.0
N-7056-10: 74 HP ICE	17.2	0.0	0.9	2.7	0.9	0.0	0.0
N-7056-11: 168 HP ICE	39.1	0.0	1.2	3.6	1.7	0.0	0.0

As shown in preceding table, emissions exceed 2 lb/day and hence BACT is triggered for the following emission units:

- Milk Barn: VOC
- Cow Housing: PM10, VOC and NH3
- Lagoons: VOC, NH3 and H2S
- Land application: VOC and NH3
- Solid manure: VOC and NH3
- Feed - Silage: VOC
- Feed - TMR: VOC
- 550 HP ICE: NOx, PM10, and VOC
- 220 HP ICE: NOx
- 187 HP ICE: NOx
- 205 HP ICE: NOx
- 74 HP ICE: NOx
- 168 HP ICE: NOx

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

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

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

Since all the emission units at this facility are new, 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 NO_X emissions; therefore BACT is not triggered for any pollutant.

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 F, BACT has been satisfied with the following:

Milk Barns:

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

Cow Housing and TMR:

VOC: 1) Feed lanes and walkways constructed of concrete.
2) Feed lanes and walkways flushed, scraped or vacuumed four times per day for milk and dry cows; and two times per day for bulls and heifers.
3) All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.
4) Refused feed refed or removed from feed lanes on a daily basis to prevent decomposition.
3) Weekly scraping and/or manure removal using pull type manure harvesting equipment, except during periods of rainy weather.
4) Dry lots sloped to facilitate runoff and drying in accordance with Title 3, Food and Agriculture, Division 2, Animal Industry of the California Code of Regulations, Section 646.1.
5) VOC mitigation measures required by District Rule 4570.

NH_3: 1) Concrete feed lanes and walkways.
2) Feed lanes and walkways flushed, scraped or vacuumed four times per day for milk and dry cows; and two times per day for bulls and heifers.
3) Weekly scraping and/or manure removal using pull type manure harvesting equipment, except during periods of rainy weather.
4) All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.
5) Dry lots sloped to facilitate runoff and drying in accordance with Title 3, Food and Agriculture, Division 2, Animal Industry of the California Code of Regulations, Section 646.1.

PM_{10}: 1) Concrete freestall and dry lot feed lanes and walkways.
2) Open corrals equipped with shade structures.
3) Heifers fed (at least one feeding) at or near (within one hour of) dusk.
4) Weekly scraping and/or manure removal using pull type manure harvesting equipment, except during periods of rainy weather.
4) Establishment of a downwind windbreak meeting NRCS guidelines.

Liquid Manure Handling System:

Lagoon/Storage Pond:

VOC: 1) Anaerobic treatment lagoon designed according to NRCS guidelines.
2) Installation of an anaerobic digester contingent upon the final dairy BACT guideline.

NH_3: 1) Anaerobic treatment lagoon designed according to NRCS guidelines.
2) Installation of an anaerobic digester contingent upon the final dairy BACT guideline.

H2S: 1) All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.
2) Separation of solids from liquid manure stream prior to treatment in the lagoons.

Land Application:

VOC: 1) Irrigation of crops using liquid and slurry manure after anaerobic treatment.

NH_3: 1) Irrigation of crops using liquid and slurry manure after anaerobic treatment.

Solid manure:

VOC and NH3: 1) Land application with immediate incorporation.

Feed - Silage:

VOC: 1) Compliance with District Rule 4570 mitigation measures.

IC Engines:

NOx: Latest Tier Certification.

PM10: Latest Tier Certification.

VOC: Latest Tier Certification.

B. Offsets

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

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

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

C. Public Notification

1. Applicability

Public noticing is required for:

a. Any new Major Source, which is a new facility that is also a Major Source,

b. Major Modifications,

c. Any new emissions unit with a Potential to Emit greater than 100 pounds during any one day for any one pollutant,

d. Any project which results in the offset thresholds being surpassed, and/or

e. Any project with an SSIPE of greater than 20,000 lb/year for any pollutant.

a. New Major Source

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

b. Major modification

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

c. PE > 100 lb/day

Applications which include a new emissions unit with a Potential to Emit greater than 100 pounds during any one day for any pollutant will trigger public noticing requirements. The following table is a summary of daily emissions for each emissions unit:

Emissions unit	Daily Emissions (lb/day)						
	NOx	SOx	PM10	CO	VOC	NH3	H2S
N-7056-1: Milk Barn	0.0	0.0	0.0	0.0	3.5	1.7	0.0
N-7056-2: Cow Housing	0.0	0.0	36.1	0.0	119.7	568.6	0.0
N-7056-3: Liquid Manure – Lagoons	0.0	0.0	0.0	0.0	8.5	87.7	43.8
N-7056-3: Liquid Manure - Land Application	0.0	0.0	0.0	0.0	15.2	94.8	0.0
N-7056-4: Solid Manure	0.0	0.0	0.0	0.0	5.7	36.5	0.0
N-7056-5: Feed	0.0	0.0	0.0	0.0	154.5	0.0	0.0
N-7056-6: 550 HP ICE	110.3	0.1	2.6	75.7	3.5	0.0	0.0
N-7056-7: 220 HP ICE	49.5	0.1	1.4	7.0	1.4	0.0	0.0
N-7056-8: 187 HP ICE	45.0	0.1	1.1	5.9	1.2	0.0	0.0
N-7056-9: 205 HP ICE	49.4	0.1	1.2	6.5	1.3	0.0	0.0
N-7056-10: 74 HP ICE	17.2	0.0	0.9	2.7	0.9	0.0	0.0
N-7056-11: 168 HP ICE	39.1	0.0	1.2	3.6	1.7	0.0	0.0

As shown in the table above, the proposed project includes several emission units (cow housing, liquid manure, feed, and 550 hp engine) with potential emissions exceeding 100 lb/day. The project therefore triggers public notice requirements.

d. Offset Threshold

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

Offsets Thresholds				
Pollutant	SSPE1 (lb/year)	SSPE2 (lb/year)	Offset Threshold	Public Notice Required?
NO_X	0	8,076	20,000 lb/year	No
SO_X	0	11	54,750 lb/year	No
PM_{10}	0	13,394	29,200 lb/year	No
CO	0	1,309	200,000 lb/year	No
VOC	0	112,287	20,000 lb/year	Yes
NH3	0	288,084	N/A	No
H2S	0	3,203	N/A	No

As shown above, the VOC offsets threshold has been surpassed due to this project; therefore public noticing is required under this category.

e. SSIPE > 20,000 lb/year

Public notice 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/yr)	SSPE1 (lb/yr)	SSIPE (lb/yr)	Public Notice Threshold (lb/yr)	Public Notice Required?
NO_x	8,076	0	8,076	20,000	No
SO_x	11	0	11	20,000	No
PM_{10}	13,394	0	13,394	20,000	No
CO	1,309	0	1,309	20,000	No
VOC	112,287	0	112,287	20,000	Yes
NH_3	288,084	0	288,084	20,000	Yes
H2S	3,203	0	3,203	20,000	No

As demonstrated in the preceding table, the SSIPE for VOC and NH_3 is greater than 20,000 lb/year. Public notice for SSIPE purposes is therefore required.

2. Public Notice Action

As discussed above, public notice is required for this project. Public notice documents will be submitted to the California Air Resources Board (CARB) and a

public notice will be published in a local newspaper of general circulation in Tulare County prior to the issuance of the ATCs for the project.

D. Daily Emission Limits (DELs)

Daily Emission Limits (DELs) and other enforceable conditions are required 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 by the number and types of cows listed in the permit equipment description for the Cow Housing (Permit N-7056-2).

The following conditions will be placed on the permit to enforce these requirements:

Milking Parlor

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

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

Cow Housing:

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

- The total number of cows housed at this dairy at any one time shall not exceed any of the following limits: 3,200 milk cows, not to exceed a combined total of 3,740 mature cows (milk and dry cows); and 1,600 total support stock (heifers, calves and bulls). [District Rule 2201]

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

- Open corrals shall be scraped weekly using a pull-type scraper in the morning hours, except when this is prevented by wet conditions. [District Rule 2201]

- Permittee shall establish windbreaks along the entire Eastern and Southern boundaries of the open corral housing areas. Windbreaks shall consist of two rows of Italian Cypress trees, planted 9 feet apart. Each row should be offset from the adjacent row. Spacing between rows shall be sufficient to accommodate cultivation

equipment, but shall not exceed 24 feet. An alternative windbreak proposal must be approved by the District. [District Rule 2201]

- The open corrals shall be equipped with shade structures. [District Rule 2201]

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

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

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

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

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

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

Liquid Manure Handling System:

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 3,200 milk cows, not to exceed a combined total of 3,740 mature cows (milk and dry cows); and 1,600 total support stock (heifers, calves and bulls). [District Rule 2201]

- The liquid manure handling system shall include an anaerobic treatment lagoon designed, constructed and operated according to NCRCS Guideline No. 359. [District Rule 2201]

E. Compliance Assurance

1. Source Testing

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

2. Monitoring

Cow Housing:

Based on guidelines from University of Idaho in a document entitled "*Dairy Odor Management & Control Practices*"[8], the following conditions will be placed on the permit to ensure that emissions from the dairy are minimized:

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

3. Recordkeeping

Recordkeeping is required to demonstrate compliance with the offset, public notification and daily emission limit requirements of Rule 2201. Recordkeeping for the Milk Barns, the Liquid Manure Management System, and the Solid Manure Management System is satisfied with the records that must be kept to demonstrate compliance with the numbers and types of cows listed on the permit equipment description for the Cow Housing. The following conditions will be added to the permit for the Cow Housing:

Cow Housing

The following conditions 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]
- Permittee shall maintain records of: (1) the number of times feed lanes are flushed per day and (2) the frequency of scraping and manure removal from open corrals; and (3) a log of pothole inspections performed at the dairy. [District Rules 2201 and 4570]

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

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 an attainment area for NO_X, CO, and SO_X. As shown by the AAQA summary sheet, the proposed dairy will not cause a violation of an air quality standard for NO_X, CO, or SO_X.

The proposed location is in a non-attainment area for PM_{10} State standards. The increase in the ambient PM_{10} concentration due to the proposed dairy expansion is shown on the table titled Calculated Contribution. The District's Interim Significance Level for the State's AAQS, is shown in the table 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}	9.98	N/A	N/A	N/A	

As shown in the preceding tables, modeling results indicated that the calculated increase in the ambient PM_{10} concentration due to the proposed project did not exceed the District's significance level. The project is therefore approved.

In addition, the proposed location is in a non-attainment area for H_2S. Modeling results indicated that the calculated increase in the ambient H_2S concentration due to the proposed equipment will not exceed the state standard.

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

- The average concentration of undissociated hydrogen sulfide (H2S) at the surface of the lagoon(s) and storage pond(s) shall not exceed 5 mg/L. The concentration of undissociated H2S at the surface of each lagoon and storage pond shall be calculated using the monitored values for the total sulfide concentration, pH, and temperature. The fraction of total sulfide that is undissociated H2S shall calculated using the formula (10^-pH)/(10^-pH + Ka1), where Ka1 is the temperature-adjusted dissociation constant for H2S; or the procedures outlined in Standard Methods 4500-S2-H; or using other procedures approved by the District. [District Rules 2201 and 4102]

- The total sulfide concentration, pH, and temperature at the surface of each lagoon and storage pond shall be monitored and recorded at least once every calendar quarter and at other times requested by the District. If the average calculated undissociated H2S concentration from monitoring the lagoon(s) and pond(s) exceeds the maximum allowed concentration, the permittee shall monitor and record the total sulfide concentration, pH, and temperature at the surface of at least two other locations in each lagoon and pond as soon as possible, but no longer than 24 hours after results were available from the initial monitoring indicating a potential exceedance. The undissociated H2S concentration calculated from the initial monitoring locations and the secondary monitoring locations for the lagoons and ponds shall be averaged. If the calculated average concentration of undissociated H2S continues exceed the maximum allowed limit, then the total sulfide concentration, pH, and temperature at the surface of each lagoon and storage pond shall be monitored and recorded monthly until three consecutive months of monitoring show compliance, after which the monitoring frequency may return to quarterly. For each secondary storage pond that has a liquid depth of no greater than 5 feet during the monitoring period, the concentration of undissociated H2S may be considered negligible and monitoring shall not be required. Records of the results of monitoring of the sulfide concentration, pH, and temperature at the surface of each lagoon and storage pond and the maximum depth of storage ponds during periods that they are not monitored shall be maintained. The District may also approve alternative monitoring frequencies and/or parameters. [District Rules 2201 and 4102]

- Monitoring of the total sulfide concentration of lagoons and ponds shall be performed using a sulfide test kit, a sulfide meter, procedures of an accredited lab, Standard

Methods 4500-S2; ASTM D4658; USGS Method I-3840; EPA Method 376.2; Marine Pollution Studies Laboratory (MPSL) Standard Operating Procedure for measurement of sulfide; or an alternative method approved by the District. [District Rules 2201 and 4102]

Rule 2520 Federally Mandated Operating Permits

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

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	

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

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

HAP Emissions					
Category	**Number of cows**		**Emission Factor * lbs/hd-yr**		**lb/yr (tons/yr)**
Milk cows	3,200	x	1.828	=	5,850 (2.9)
Dry cows and bulls	546	x	1.123	=	613 (0.3)
Heifers (15-24 mo)	200	x	0.786	=	157 (0.1)
Heifers (7-14 mo)	980	x	0.686	=	672 (0.3)
Heifers (4-6 mo)	414	x	0.621	=	455 (0.2)
				Total=	**7,747 (3.8)**

* The emission factor has been adjusted for each category of cows using the ratio of amount of manure generated by that category to the amount generated by milk cows.

As shown in the table above, total HAP emissions from this facility are less than 10 tons/year. This demonstrates that the facility is below the 10 tons/year individual HAP threshold as well as the 25 tons/year total HAPs threshold. This facility is therefore not 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 an opportunity to consider public comment on any proposed changes.

Rule 4001 New Source Performance Standards (NSPS)

This rule incorporates NSPS from Part 60, Chapter 1, Title 40, Code of Federal Regulations (CFR); and applies to all new sources of air pollution and modifications of existing sources of air pollution listed in 40 CFR Part 60.

40 CFR 60 Subpart IIII (*Standards of Performance for Stationary Compression Ignition Internal Combustion Engines*)

The requirements of 40 CFR 60 Subpart IIII (*Standards of Performance for Stationary Compression Ignition Internal Combustion Engines*) applies to manufacturers, owners, and operators of stationary compression ignition (CI) internal combustion (IC) engines as specified in Section 60.4200. The subpart applies to owners and operators of stationary CI IC engines that commence construction after July 11, 2005 where the stationary CI ICE are: (i) Manufactured after April 1, 2006 and are not fire pump engines, or (ii) Manufactured as a certified National Fire Protection Association (NFPA) fire pump engine after July 1, 2006. This subpart also applies to owners and operators of stationary CI ICE that modify or reconstruct their stationary CI ICE after July 11, 2005. For the purposes of this subpart, the date that construction commences is the date the engine is ordered by the owner or operator.

Compliance with the California Air Toxic Control Measure (ATCM) and District Rule 4702 will ensure compliance with the requirements of 40 CFR 60 Subpart IIII.

40 CFR 60 Subpart JJJJ (*Standards of Performance for Stationary Spark Ignition Internal Combustion Engines*)

This subpart does not apply since the engines are not spark ignited.

Rule 4002 National Emission Standards for Hazardous Air Pollutants (NESHAPs)

This rule incorporates NESHAPs from Part 61, Chapter I, Subchapter C, Title 40, CFR and the NESHAPs from Part 63, Chapter I, Subchapter C, Title 40, CFR; and applies to all sources of hazardous air pollution listed in 40 CFR Part 61 or 40 CFR Part 63. The applicable NESHAPs are discussed below:

40 CFR Part 63, Subpart ZZZZ, National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

Subpart ZZZZ establishes national emission limitations and operating limitations for hazardous air pollutants (HAP) emitted from stationary reciprocating internal combustion engines (RICE) located at major and area sources of HAP emissions. This subpart also establishes requirements to demonstrate initial and continuous compliance with the emission limitations and operating limitations.

§6585(b) states, "A major source of HAP emissions is a plant site that emits or has the potential to emit any single HAP at a rate of 10 tons (9.07 megagrams) or more per year or any combination of HAP at a rate of 25 tons (22.68 megagrams) or more per year, except that for oil and gas production facilities, a major source of HAP emissions is determined for each surface site." §6585(c) states, "An area source of HAP emissions is a source that is not a major source."

This facility is not a major source as defined in §6585(b), therefore it is an area source of HAP emissions.

§6590(a) states, "An affected source is any existing, new, or reconstructed stationary RICE located at a major or area source of HAP emissions, excluding stationary RICE being tested at a stationary RICE test cell/stand."

Pursuant to §63.6590(a)(1)(iii), a compression ignition engine located at an area source of HAP emissions is existing if construction or reconstruction of the engine commenced before June 12, 2006.

Pursuant to §63.6590(b)(3), an existing stationary compression ignition engine located at an area source of HAP does not have to meet the requirements of this Subpart and of Subpart A of this Part. No initial notification is necessary.

As shown above, the compression-ignited engine(s) will comply with 40 CFR 60, Subpart IIII; therefore, the engine(s) will comply with 40 CFR 63, Subpart ZZZZ.

Rule 4101 Visible Emissions

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

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

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

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

- Activities conducted solely for the purpose of preparing land for the growing of crops or the raising of fowl or animals, such as brush or timber clearing, grubbing,

scraping, ground excavation, land leveling, grading, turning under stalks, disking, or tilling;

The units involved in this project that are directly used for the raising of dairy animals are exempt from the provisions of this rule.

However, since IC engines are not subject to or specifically exempt from Regulation VIII, the provisions of Rule 4101 apply to IC engines. Therefore, the following condition will be placed on the IC engine permits:

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

Rule 4102 Nuisance

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

Dairy operation:

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.

Engines:

Public nuisance conditions are not expected as a result of engine operation, provided the equipment is well maintained. The following condition will be listed on the engine ATCs to ensure compliance:

- {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]

California Health & Safety Code 41700 (Health Risk Assessment)

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

An HRA is not required for a project with a total facility prioritization score of less than 1.0. According to the Technical Services Memo for this project (Appendix D), the total facility prioritization score, including this project, was greater than 1.0. Therefore, a health risk assessment was required to determine the short-term acute and long-term chronic exposure from this project.

The health risk indices for this project are as shown in the following table:

RMR Summary					
Categories	**Milking Parlor (Unit 1-0)**	**Cow Housing (Unit 2-0)**	**Lagoons (Unit 3-0)**	**Diesel ICE (Unit 6-0)**	**Diesel ICE (Unit 7-0)**
Prioritization Score	0.52	42.92	36.97	N/A[1]	N/A[1]
Acute Hazard Index	0.00	0.02	0.50	N/A[2]	N/A[2]
Chronic Hazard Index	0.00	0.41	0.00	N/A[2]	N/A[2]
Maximum Individual Cancer Risk	**5.90E-08**	**5.18E-06**	**1.73E-07**	**2.30E-07**	**6.64E-07**
T-BACT Required?	No	Yes	No	No	No
Special permit conditions?	No	No	Yes	Yes	Yes
Categories	**Diesel ICE (Unit 8-0)**	**Diesel ICE (Unit 9-0)**	**Diesel ICE (Unit 10-0)**	**Diesel ICE (Unit 11-0)**	**Project & Facility Totals**
Prioritization Score	N/A[9]	N/A[9]	N/A[9]	N/A[9]	>1.0
Acute Hazard Index	N/A[10]	N/A[10]	N/A[10]	N/A[10]	0.52
Chronic Hazard Index	N/A[10]	N/A[10]	N/A[10]	N/A[10]	0.41
Maximum Individual Cancer Risk	**3.36E-08**	**7.27E-08**	**4.94E-08**	**6.85E-08**	6.53E-06
T-BACT Required?	No	No	No	No	
Special permit conditions?	Yes	Yes	Yes	Yes	

T-BACT:

BACT for toxic emission control (T-BACT) is required if the cancer risk exceeds 1.0 in one million. As demonstrated above, T-BACT is required for the proposed project because the estimated increase in cancer risk exceeds 1.0 per million.

T-BACT is satisfied with BACT for NOx, PM10, VOC, NH3 and H2S. Therefore, compliance with the District's Risk Management Policy is expected.

District policy APR 1905 also specifies that the increase in emissions associated with a proposed new source or modification not have acute or chronic indices, or a cancer risk greater than the District's significance levels (i.e. acute and/or chronic indices greater than 1.0 and a cancer risk greater than 10 in a million). As outlined by the RMR Summary in Appendix D of this report, the emissions increases for this project were determined to be less than significant.

[9] Prioritization for this unit was not required since it has been determined that all diesel-fired IC engines will result in a prioritization score greater than 1.0.

[10] Acute and Chronic Hazard Indices were not calculated since there is no risk factor, or the risk factor is so low that the risk has been determined to be insignificant for this type of unit.

Rule 4201 Particulate Matter Concentration

Particulate matter emissions from the engines will be less than or equal to the rule limit of 0.1 grain per cubic foot of gas at dry standard conditions as shown by the following calculation using the engine with the highest PM emission rate:

PM Conc. = 0.55 g-PM_{10}/bhp-hr × 1 g-PM/0.96 g-PM_{10} × 1 bhp-hr/2,542.5 Btu × 1,000,000 Btu/9,051 dscf × 0.35 Btu_{out}/1 Btu_{in} × 15.43 gr/g

PM Conc. ~ 0.1 gr-PM/dscf

Compliance with Rule 4201 is expected. Therefore, the following condition will be listed on the ATCs to ensure compliance:

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

Rule 4550 Conservation Management Practices (CMP)

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

The facility currently has a valid CMP plan (N-7056-CMPP-1) and is therefore in compliance with the requirements of this rule.

Rule 4570 Confined Animal Facilities (CAF)

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

Section 5.0 Requirements

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

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

The applicant has submitted an application containing all the requirements above. Since public noticing is required for this project, a public notice will be published in a local newspaper of general circulation prior to the issuance of these ATC's.

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

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

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

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

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

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

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

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

The following condition will be placed on each permit.

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

Section 7.0 Administrative Requirements

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

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

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

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

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

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

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

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

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

General Conditions

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

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

Feed Mitigation Measures Required

Required

Feed according to National Research Council (NRC) guidelines.

- {4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 4570] N

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

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

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

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

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

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

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

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

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

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

Optional

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

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

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

Silage

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

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

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

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

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

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

➢ Harvest silage crop at ≥ 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] N

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

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

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

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

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

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

- {4478} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rule 4570] N
- {4479} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall maintain a plan that requires that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rule 4570] N

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

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

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

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

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

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

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

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

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

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

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

Milking Parlor

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

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

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

Freestall Barn

Required

Pave feed lanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers.

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

Optional

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

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

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

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

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

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

Corral

Required

Pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 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] N

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

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

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

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

- {4501} Permittee shall clean manure from corrals at least four (4) times per year with at least sixty (60) days between each cleaning, or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rule 4570] N

- {4502} Permittee shall record the date that animal waste is cleaned from corrals or demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning. [District Rule 4570] N

Implement one of the following three mitigation measures: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 square feet or less, and slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 square feet per animal; 2) maintain corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface.

- {4554} Permittee shall implement at least one of the following corral mitigation measures: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 square feet or less and shall slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 square feet per animal; 2) maintain corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface except during periods of rainy weather. [District Rule 4570] N

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

Optional

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

- {4508} Permittee shall scrape, vacuum or flush concrete lanes in corrals at least once every day for mature cows and every seven (7) days for support stock. [District Rule 4570] N

- {4556} Permittee shall maintain records demonstrating that concrete lanes in corrals are scraped, vacuumed, or flushed at least once every day for mature cows and at least once every seven (7) days for support stock. [District Rule 4570] N

Install shade structures such that they are constructed with a light permeable roofing material.

- {4511} Permittee shall only install shade structures that are constructed with a light permeable roofing material. [District Rule 4570] N

- {4512} Permittee shall maintain records, such as design specifications, demonstrating that the shade structures are equipped with a light permeable roofing material. [District Rule 4570] N

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

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

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

Solid Manure

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

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

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

wind events remove the covering, not to exceed twenty-four (24) hours per event. [District Rule 4570] N

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

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

Liquid Manure

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

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

Land Application

Solid

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

- {4541} Permittee shall incorporate all solid manure within seventy-two (72) hours of land application. [District Rule 4570] N

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

Liquid

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

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

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

Therefore this facility is in compliance with this Rule.

Rule 4701 Internal Combustion Engines - Phase 1

Pursuant to Section 2.0, this rule applies to any internal combustion engine with a rated horsepower (hp) greater than 50 hp; therefore, the IC engines located at this facility are subject to this rule. However, Section 4.1 of the rule specifically exempts IC engines in agricultural operations used for the growing of crops or raising of fowl or animals. Since the engines are used for the growing of crops or raising of fowl or animals, they are exempt from the requirements of this rule.

Therefore, the following condition will be listed on each PTO to ensure compliance:

> {3698} This IC engine shall only be used for the growing of crops or raising of fowl or animals. [District Rule 4701]

Rule 4702 Stationary Internal Combustion Engines – Phase 2

The purpose of this rule is to limit the emissions of Nitrogen Oxides (NO_x), Carbon Monoxide (CO), and Volatile Organic Compounds (VOC) from internal combustion engines.

This rule applies to any internal combustion engine with a rated brake horsepower greater than 50 horsepower.

Emergency Engine (N-7056-6-0):

Pursuant to Section 4.2, except for the requirements of Sections 5.9 and 6.2.3, the requirements of this rule shall not apply to an internal combustion engine that meets the following condition:

- An emergency standby engine as defined in Section 3.0 of this rule, and provided that it is operated with a nonresettable elapsed operating time meter. In lieu of a nonresettable time meter, the owner of an emergency engine may use an alternative device, method, or technique, in determining operating time provided that the alternative is approved by the APCO. The owner of the engine shall properly maintain and operate the time meter or alternative device in accordance with the manufacturer's instructions.

Section 3.15 defines an "Emergency Standby Engine" as an internal combustion engine which operates as a temporary replacement for primary mechanical or electrical power during an unscheduled outage caused by sudden and reasonably unforeseen natural disasters or sudden and reasonably unforeseen events beyond the control of the operator. An engine shall be considered to be an emergency standby engine if it is used only for the following purposes: (1) periodic maintenance, periodic readiness testing, or readiness testing during and after repair work; (2) unscheduled outages, or to supply power while maintenance is performed or repairs are made to the primary power supply; and (3) if it is limited to operate 100 hours or less per calendar year for non-emergency purposes. An engine shall not be considered to be an emergency standby engine if it is used: (1) to reduce the demand for electrical power when normal electrical power line service has not failed, or (2) to produce power for the utility electrical distribution system, or (3) in conjunction with a voluntary utility demand reduction program or interruptible power contract.

Therefore, the emergency standby IC engine involved with this project will only have to meet the requirements of sections 5.9 and 6.2.3 of this Rule.

Section 5.9 of this Rule requires that the owner of an emergency standby engine shall comply with the requirements specified in section 5.9.2 through section 5.9.5 below:

1) Properly operate and maintain each engine as recommended by the engine manufacturer or emission control system supplier.
2) Monitor the operational characteristics of each engine as recommended by the engine manufacturer or emission control system supplier.

3) Install and operate a nonresettable elapsed operating time meter. In lieu of installing a nonresettable time meter, the owner of an engine may use an alternative device, method, or technique, in determining operating time provided that the alternative is approved by the APCO and is allowed by Permit-to-Operate or Stationary Equipment Registration condition. The owner of the engine shall properly maintain and operate the time meter or alternative device in accordance with the manufacturer's instructions.

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

- {3405} This engine shall be operated and maintained in proper operating condition as recommended by the engine manufacturer or emissions control system supplier. [District Rule 4702]

- {3478} During periods of operation for maintenance, testing, and required regulatory purposes, the permittee shall monitor the operational characteristics of the engine as recommended by the manufacturer or emission control system supplier (for example: check engine fluid levels, battery, cables and connections; change engine oil and filters; replace engine coolant; and/or other operational characteristics as recommended by the manufacturer or supplier). [District Rule 4702] N

- {3404} This engine shall be equipped with an operational non-resettable elapsed time meter or other APCO approved alternative. [District Rule 4702]

- {3495} This engine shall be operated only for maintenance, testing, required regulatory purposes, and during emergency situations. Operation of the engine for maintenance, testing, and required regulatory purposes shall not exceed 100 hours per year. [District Rule 4702]

- {3807} An emergency situation is an unscheduled electrical power outage caused by sudden and reasonably unforeseen natural disasters or sudden and reasonably unforeseen events beyond the control of the permittee. [District Rule 4702] N

- {3808} This engine shall not be used to produce power for the electrical distribution system, as part of a voluntary utility demand reduction program, or for an interruptible power contract. [District Rule 4702] N

Section 6.2.3 requires that an owner claiming an exemption under Section 4.2 or Section 4.3 shall maintain annual operating records. This information shall be retained for at least five years, shall be readily available, and submitted to the APCO upon request and at the end of each calendar year in a manner and form approved by the APCO. Therefore, the following condition will be listed on the permit to ensure compliance:

- {3496} The permittee shall maintain monthly records of emergency and non-emergency operation. Records shall include the number of hours of emergency operation, the date and number of hours of all testing and maintenance operations, the purpose of the operation (for example: load testing, weekly testing, rolling blackout, general area power outage, etc.), and records of operational characteristics monitoring. For units with automated testing systems, the operator may, as an alternative to keeping records of actual operation for testing purposes, maintain a readily accessible written record of the automated testing schedule. [District Rule 4702]

- {3497} All records shall be maintained and retained on-site for a minimum of five (5) years, and shall be made available for District inspection upon request. [District Rule 4702]

Non-Emergency IC Engines:

Section 5.1 requires that the owner of an internal combustion engine shall not operate it in such a manner that results in emissions exceeding the limits in the Engine Emission Limits table below for the appropriate engine type, according to the compliance schedule listed in Section 7.0. An engine shall be restricted by permit condition to emissions limits, in ppmv (corrected to 15% oxygen on a dry basis), that meets or exceeds the following applicable emission limits pursuant to Section 5.1 or Section 8.2:

Rule 4702 Section 5.1.2, Table 2*		
Engine Type	**Emission Limit/Standard**	**Compliance Date**
1. Non-Certified Compression-Ignited Engine		
a. Greater than 50 bhp not more than 500 bhp	EPA Tier 3 or Tier 4	1/1/2010
b. Greater than 500 bhp but not more than 750 bhp and less than 1000 annual operating hours	EPA Tier 3	1/1/2010
c. Greater than 750 bhp and less than 1000 annual operating hours	EPA Tier 4	7/1/2011
d. Greater than 500 bhp and greater than 1000 annual operating hours	80 ppm NOx, 2,000 ppm CO, 750 ppm VOC	1/1/2008 or, if owner has an agreement to electrify, comply by 1/1/2010
2. Certified Compression-Ignited Engine		
a. EPA Certified Tier 1 or Tier	EPA Tier 4	1/1/2015 or 12 years after

Rule 4702 Section 5.1.2, Table 2*		
Engine Type	**Emission Limit/Standard**	**Compliance Date**
2 Engine		installation date, whichever is later
b. EPA Certified Tier 3 or Tier 4 Engine	Meet Certified Compression-Ignited Engine Standard in effect at time of installation	At time of installation

* Corrected to 15% oxygen on a dry basis

The engines will be required to meet the emission limit/standard by the applicable compliance date.

Section 5.1.3 requires that on and after June 1, 2006, the owner of a compression-ignited engine that is subject to the requirements of section 5.1 shall not replace such engine with a compression-ignited engine that emits more emissions of NOx, VOC and CO, on a ppmv basis (corrected to 15% oxygen on a dry basis) than the engine being replaced.

Per Section 5.1.4, the owner of a non-certified compression-ignited engine, in place on June 1, 2006, shall comply with the Emission Limit/Standard and Compliance Date in Table 2 based on the non-certified compression-ignited engine that was in place on June 1, 2006, unless the owner meets one of the following conditions:

5.1.4.1 Replaces the non-certified compression-ignited engine with a non-modified Tier 3 or a non-modified Tier 4 engine after June 1, 2006,

5.1.4.2 Controls the non-certified compression-ignited engine after June 1, 2006, to emit emissions less than, or equal to, 80 ppm NOx, 2,000 ppm CO, and 750 ppm VOC, (corrected to 15% oxygen on a dry basis), or

5.1.4.3 Replaces the non-certified compression-ignited engine after June 1, 2006, with an engine or other source with emissions less than, or equal to, 80 ppm NOx, 2,000 ppm CO, and 750 ppm VOC (corrected to 15% oxygen on a dry basis).

The following conditions will be placed on the permit for the Tier 2 engine:

{3869} If this is a certified Tier 1 or Tier 2 engine, you must submit an Authority to Construct (ATC) application on or before July 1, 2014 or 12 years from the installation of the engine, whichever is later, to be in compliance with Rule 4702. [District Rule 4702]

Section 5.7 requires that the owner of a compression ignited engine subject to the emission limits of section 5.1 shall comply with the requirements specified in section 5.7.2 through section 5.7.5, as summarized below:

- Properly operate and maintain each engine as recommended by the engine

manufacturer or emission control system supplier.

- Monitor the operational characteristics of each engine as recommended by the engine manufacturer or emission control system supplier.

- Install and operate a nonresettable elapsed operating time meter. In lieu of installing a nonresettable time meter, the owner of an engine may use an alternative device, method, or technique, in determining operating time provided that the alternative is approved by the APCO and is allowed by Permit-to-Operate or registration condition. The owner of the engine shall properly maintain and operate the time meter or alternative device in accordance with the manufacturer's instructions.

Section 7.3.2 states that compression ignited AO engines subject to section 5.1, shall comply with the requirements of section 5.7 on and after June 1, 2006. Therefore, the following conditions will be listed on the permits to ensure compliance:

- {3405} This engine shall be operated and maintained in proper operating condition as recommended by the engine manufacturer or emissions control system supplier. [District Rule 4702]

- During periods of operation, the permittee shall monitor the operational characteristics of the engine as recommended by the manufacturer or emission control system supplier (for example: check engine fluid levels, battery, cables and connections; change engine oil and filters; replace engine coolant; and/or other operational characteristics as recommended by the manufacturer or supplier). [District Rule 4702]

- {3404} This engine shall be equipped with an operational non-resettable elapsed time meter or other APCO approved alternative. [District Rule 4702]

Section 6.1 requires that the owner of a compression-ignited engine subject to the requirements of section 5.1 shall submit to the APCO an emission control plan of all actions to be taken to satisfy the emission standards of section 5.1 and the compliance schedule of section 7.0. Such an emission control plan shall contain the following information:

- Permit-to-Operate number, Authority-to-Construct number, or Stationary Equipment Registration number
- Engine manufacturer
- Model designation and engine serial number
- Rated brake horsepower
- Type of fuel and type of ignition
- Combustion type: rich-burn or lean burn
- Total hours of operation in the previous one-year period, including typical daily operating schedule
- Fuel consumption (cubic feet of gas of gallons of liquid) for the previous one-year period
- Stack modifications to facilitate continuous in-stack monitoring and to facilitate source testing
- Type of control to be applied, including in-stack monitoring specifications

- Applicable emission limits
- Documentation showing existing emissions of NOx, VOC and CO, and
- Date that the engine will be in full compliance with Rule 4702

Section 7.3.1.2 states that the owner of an engine that is subject to Section 5.1 and that is required to submit an Emission Control Plan, an I&M Plan, a Stationary Equipment Registration application, or an Authority-to-Construct in order to comply with the requirements of Rule 4702, shall submit such document(s) by June 1, 2006, or 18 months before the engine is required to be in compliance with the requirements of Section 5.1 of Rule 4702, whichever is later.

Section 6.2.1 requires the maintenance of an engine operating log to demonstrate compliance with the requirements of this rule. The engine log information shall be retained for a period of at least five years, and shall be made readily available to the APCO upon request. The log shall include, on a monthly basis, the following information:

- Total hours of operation
- Type of fuel used
- Maintenance or modifications performed
- Monitoring data
- Compliance source test results,
- Any other information necessary to demonstrate compliance with this rule

Section 6.2.2 requires that the data collected pursuant to section 5.6 and section 5.7 shall be maintained for at least five years, and shall be made available to the APCO upon request.

Section 7.3.2 requires compliance with the above provisions on and after June 1, 2006. Therefore, the following condition shall be added to the permit to ensure compliance with this requirement:

- The permittee shall maintain an engine operating log to demonstrate compliance with District Rule 4702. The information shall be retained for a period of at least five years, and shall be made readily available to the APCO upon request. The engine operating log shall include, on a monthly basis: total hours of operation, type of fuel used, maintenance or modifications performed, monitoring data and any other information necessary to demonstrate compliance with District Rule 4702. [District Rule 4702]

Sections 6.3 and 6.4 specify source testing requirements and applicable source testing methods. Since the proposed engine does not have ppmv or percent reduction emission standards, source testing is not applicable.

Section 6.5 requires the owner or operator shall submit to the APCO for approval an Inspection and Monitoring plan specifying the following actions:

- Procedures requiring the owner or operator to establish ranges for control equipment parameters, engine operating parameters, and engine exhaust oxygen concentrations that source testing has shown result in pollutant concentrations within the rule limits.

- Procedures for monthly inspections as approved by the APCO. The applicable control equipment parameters and engine operating parameters will be inspected and monitored monthly in conformance with a regular inspection schedule listed in the I&M plan.

- Procedures for the corrective actions on the noncompliant parameter(s) that the owner or operator will take when an engine is found to be operating outside the acceptable range for control equipment parameters, engine operating parameters, and engine exhaust NOx, CO, VOC, or oxygen concentrations.

- Procedures for the owner or operator to notify the APCO when an engine is found to be operating outside the acceptable range for control equipment parameters, engine operating parameters, and engine exhaust NOx, CO, VOC, or oxygen concentrations.

- Procedures for preventive and corrective maintenance performed for the purpose of maintaining an engine in proper operating condition.

- Procedures and a schedule for using a portable NOx analyzer to take NOx emission readings pursuant to Section 5.6.9.

- Procedures for collecting and recording required data and other information in a form approved by the APCO including, but not limited to, data collected through the I&M plan and the monitoring systems described in Sections 5.6.1 and 5.6.2. Data collected through the I&M plan shall have retrieval capabilities as approved by the APCO.

- Procedures for revising the I&M plan. The I&M plan shall be updated to reflect any change in operation. The I&M plan shall be updated prior to any planned change in operation. An engine owner that changes significant I&M plan elements must notify the District no later than seven days after the change and must submit an updated I&M plan to the APCO no later than 14 days after the change for approval. The date and time of the change to the I&M plan shall be recorded in the engine operating log. For new engines and modifications to existing engines, the I&M plan shall be submitted to and approved by the APCO prior to issuance of the Permit-to-Operate or Stationary Equipment Registration. The owner of an engine may request a change to the I&M plan at any time.

Section 7.3.1.2 states that the owner of an engine that is subject to Section 5.1 and that is required to submit an Emission Control Plan, an I&M Plan, a Stationary Equipment Registration application, or an Authority-to-Construct in order to comply with the requirements of Rule 4702, shall submit such document(s) by June 1, 2006, or 6 months before the engine is required to be in compliance with the requirements of Section 5.1 of Rule 4702, whichever is later.

Rule 4801 Sulfur Compounds

This rule contains a limit on sulfur compounds. The limit at the point of discharge is 0.2 percent by volume (2000 ppmv), calculated as sulfur dioxide (SO_2), on a dry basis averaged over 15

consecutive minutes.

The maximum sulfur content of the diesel combusted shall not exceed 0.0015% by weight. Therefore, the sulfur concentration is:

S Conc. = 0.0015% S × 7.1 lb/gal × 64 lb-SO_2/32 lb-S × MMBtu/9,051 scf × gal-fuel/0.137 MMBtu × lb-mol/64 lb-SO_2 × 10.73 psi-ft^3/lb-mol-°R × 520 °R/14.7 psi

= 1.0 ppmv

Since 1 ppmv is ≤ 2000 ppmv, this project is expected to comply with Rule 4801. Therefore, the following condition will be listed on the ATC to ensure compliance:

- Only CARB certified diesel fuel containing not more than 0.0015% sulfur by weight is to be used. [District Rules 2201 and 4801 and 17 CCR 93116]

California Code of Regulations (CCR), Title 17 (Public Health), Division 3 (Air Resources), Chapter 1 (Air Resources Board), Subchapter 7.5 (Air Toxic Control Measures), Measure 93115 (Stationary Diesel Engines)

§93115.2 – Applicability

(a) Except as provided in section 93115.3 [Exemptions]*, this ATCM applies to any person who either sells a stationary CI engine, offers a stationary CI engine for sale, leases a stationary CI engine, or purchases a stationary CI engine for use in California, unless such engine is:*

(1) a portable CI engine[11],
(2) a CI engine used to provide motive power,
(3) an auxiliary CI engine used on a marine vessel, or
(4) an agricultural wind machine as defined in section 93115.4.

The IC engines in this project do not belong to any of the categories listed in (a)(1) through (a)(4) above.

(b) Except as provided in sections 93115.3 and 93115.9, this ATCM applies to any person who owns or operates a stationary CI engine in California with a rated brake horsepower greater than 50 (>50 bhp).

The IC engines in this project are CI engines with a rated bhp > 50; therefore, this ATCM applies.

§93115.3 – Exemptions

(b) The requirements specified in sections 93115.6, 93115.7, and 93115.10(a) do not apply to new or in-use stationary diesel-fueled CI engines used in agricultural operations. As such, the following condition applies:

[11] For rentals only. If the unit is farm-owned, this stationary ATCM applies.

- {4002} This IC engine shall only be used for the growing and harvesting of crops or the raising of fowl or animals for the primary purpose of making a profit, providing a livelihood, or conducting agricultural research or instruction by an educational institution. [17 CCR 93115]

§93115.4 – Definitions

(a) For purposes of this ATCM, the following definition applies:

(1) "Agricultural Operations" (AO) means the growing and harvesting of crops or the raising of fowl or animals for the primary purpose of making a profit, providing a livelihood, or conducting agricultural research or instruction by an educational institution. Agricultural operations do not include activities involving the processing or distribution of crops or fowl.

The facility meets the definition of an AO under this ATCM.

§93115.5 – Fuel and Fuel Additive Requirements for New and In-Use Stationary CI Engines That Have a Rated Brake Horsepower of Greater than 50

This subsection requires CARB diesel fuel. The requirement will be translated to the permit(s) as follows.

- {3395} Only CARB certified diesel fuel containing not more than 0.0015% sulfur by weight is to be used. [District Rule 4801 and 17 CCR 93115]
- The operator shall document the use of CARB certified diesel fuel through the retention of fuel purchase records. [District Rule 4801 and 17 CCR 93115]

§93115.8 – Emission Standards for Stationary Diesel-Fueled CI Engines (>50 bhp) Used in Agricultural Operations

(a) Emission Standards for <u>New</u> Stationary Diesel-Fueled CI Engines (>50 bhp) Used in Agricultural Operations.

As defined in this ATCM, "new" means "a stationary CI engine installed at a facility after January 1, 2005." The engine(s) in this project are "new" as defined in the ATCM; therefore, this section is applicable.

The engines satisfy the emission requirements of Table 6 since they are Tier 2 and Tier 3 engines that met the most stringent tier certification available at the time of installation.

§93115.10 – Recordkeeping, Reporting, and Monitoring Requirements

(a) *Reporting Requirements for Owners or Operators of New and In-Use Stationary CI Engines, Including Non-Diesel-Fueled CI Engines, Having a Rated Horsepower Greater than 50 (> 50 bhp)*

Per §93115.3(b), both new and in-use stationary diesel-fueled CI engines used in agricultural operations engine are exempt from the reporting requirements of §93115.10(a).

The engines in this project are new stationary diesel-fueled CI engines used in an agricultural operation; therefore, they are exempt from §93115.10(a).

(b) Demonstration of Compliance with Emission Limits.

(1) Prior to the installation of a new stationary diesel-fueled CI engine at a facility, the owner or operator of the new stationary diesel-fueled CI engine(s) subject to the requirements of section 93115.6(a)(3), 93115.6(a)(4), 93115.6(c)(1)(C), and 93115.7(a)(1) shall provide emission data to the District APCO in accordance with the requirements of section 93115.13 for purposes of demonstrating compliance.

The applicant has submitted sufficient information to determine compliance with the emission limits of this ATCM.

(c) Notification of Loss of Exemption

(1) Owners or operators of in-use stationary diesel-fueled CI engines, who are operating under an exemption specified in sections 93115.3 or 93115.8(a)(2) from all or part of the requirements of subsections 93115.6, 93115.7, or 93115.8 shall notify the District APCO within five days after they become aware that the exemption no longer applies and shall demonstrate compliance with the applicable requirements of:

(A) Section 93115.6 or 93115.7, no later than 180 days after the date the exemption no longer applies; or

(B) Section 93115.8, no later than 18 months after the date the exemption no longer applies or no later than 18 months after the emission standard compliance date set forth in section 93115.8, whichever is later.

The units are new; therefore is section does not apply.

(d) Monitoring Equipment

(1) A non-resettable hour meter with a minimum display capability of 9,999 hours shall be installed upon engine installation, or by no later than January 1, 2005, on all engines subject to all or part of the requirements of sections 93115.6, 93115.7, or 93115.8(a) unless the District determines on a case-by-case basis that a non-resettable hour meter with a different minimum display capability is appropriate in consideration of the historical use of the engine and the owner or operator's compliance history.

The following standard condition will ensure compliance with § 93115.10(e):

- {3403} This engine shall be equipped with an operational non-resettable elapsed time meter or other APCO approved alternative. [District Rule 4702 and 17 CCR 93115]

(e) Reporting Provisions for Exempted Agricultural Emergency, Prime, and Non-agricultural Emergency Engines.

An owner or operator of an agricultural emergency standby generator set engine subject to section 93115.3(a) or an engine subject to sections 93115.3(d) or 93115.3(j) shall keep records of the number of hours the engines are operated on a monthly basis. Such records shall be retained for a minimum of 36 months from the date of entry. Record entries made within 24 months of the most recent entry shall be retained on-site, either at a central location or at the engine's location, and made immediately available to the District staff upon request. Record entries made from 25 to 36 months from the most recent entry shall be made available to District staff within 5 working days from the district's request.

The following condition will ensure compliance with this section:

- {3479} The permittee shall maintain monthly records of emergency and non-emergency operation. Records shall include the number of hours of emergency operation, the date and number of hours of all testing and maintenance operations, the purpose of the operation (for example: load testing, weekly testing, rolling blackout, general area power outage, etc.) and records of operational characteristics monitoring. For units with automated testing systems, the operator may, as an alternative to keeping records of actual operation for testing purposes, maintain a readily accessible written record of the automated testing schedule. [District Rule 4702 and 17 CCR 93115]

(f) *Reporting Requirements for Emergency Standby Engines.*

(1) Starting January 1, 2005, each owner or operator of an emergency standby diesel-fueled CI engine shall keep records and prepare a monthly summary that shall list and document the nature of use for each of the following:
(A) emergency use hours of operation;
(B) maintenance and testing hours of operation;
(C) hours of operation for emission testing to show compliance with sections 93115.6(a)(3) and 93115.6(b)(3);
(D) initial start-up testing hours;
(E) if applicable, hours of operation to comply with the requirements of NFPA 25;
(F) hours of operation for all uses other than those specified in sections 93115.10(g)(1)(A) through (D) above; and

(G) the fuel used.
1. *For engines operated exclusively on CARB Diesel Fuel, the owner or operator shall document the use of CARB Diesel Fuel through the retention of fuel purchase records indicating that the only fuel purchased for supply to an emergency standby engine was CARB Diesel Fuel; or*
2. *For engines operated on any fuel other than CARB Diesel Fuel, fuel records demonstrating that the only fuel purchased and added to an emergency standby engine or engines, or to any fuel tank directly attached to an emergency standby engine or engines, meets the requirements of section 93115.5(b).*

(2) Records shall be retained for a minimum of 36 months. Records for the prior 24 months shall be retained on-site, either at a central location or at the engine's location, or at an offsite central location within California, and shall be made immediately available to the

District staff upon request. Records for the prior 25 to 36 months shall be made available to District staff within 5 working days from request.

The following standard conditions will ensure compliance with the recordkeeping requirements of §93115.10(g)(1) and (2):

- {3479} The permittee shall maintain monthly records of emergency and non-emergency operation. Records shall include the number of hours of emergency operation, the date and number of hours of all testing and maintenance operations, the purpose of the operation (for example: load testing, weekly testing, rolling blackout, general area power outage, etc.) and records of operational characteristics monitoring. For units with automated testing systems, the operator may, as an alternative to keeping records of actual operation for testing purposes, maintain a readily accessible written record of the automated testing schedule. [District Rule 4702 and 17 CCR 93115]

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

§93115.13 – Compliance Demonstration.

(a) Upon approval by the District APCO, the following sources of data may be used in whole or part to demonstrate compliance with the emissions standards or requirements of sections 93115.6 through 93115.9:

(1) off-road engine certification test data for the stationary diesel-fueled CI engine,

(2) engine mfr test data,

(3) emissions test data from a similar engine,

(4) emissions test data used in meeting the requirements of the Verification Procedure for the emission control strategy implemented, or

(5) An alternative compliance demonstration as described in section 93115.13(f).

The applicant has submitted sufficient information required above to verify compliance with this section.

California Health and Safety Code 42301.6 (School Notice)

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

California Senate Bill 700 (SB 700)

Veldhuis North Dairy is an agricultural operation that raises dairy cows for the production of milk for human consumption. Pursuant to Senate Bill (SB) 700, all agricultural operations, including Confined Animal Facilities (CAF), with emissions greater than ½ the major source

emissions threshold levels (5 ton/year of NO_X or VOC), are required to obtain a District permit.

The post-project emissions from the dairy exceed the 5 ton-VOC/year threshold and the dairy is classified as a large CAF by the California Air Resources Board (ARB) and is therefore subject to District permit requirements.

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.

Greenhouse Gas (GHG) Significance Determination

It is determined that another agency has prepared an environmental review document for the project. The District is a Responsible Agency for the project because of its discretionary approval power over the project via its Permits Rule (Rule 2010) and New Source Review Rule (Rule 2201), (CEQA Guidelines §15381). As a Responsible Agency, the District is limited to mitigating or avoiding impacts for which it has statutory authority. The District does not have statutory authority for regulating greenhouse gas emissions. The District has determined that the applicant is responsible for implementing greenhouse gas mitigation measures, if any, imposed by the Lead Agency.

District CEQA Findings

Merced County (County) is the Agency which has principal responsibility for approving this dairy project. The County determined that the Project would have a significant adverse environmental impact and prepared an Environmental Impact Report (EIR) for the Project. In certifying the Final EIR, the County determined that after implementing all feasible mitigation measures emissions certain impacts on air quality would be significant and unavoidable. The County approved the Project and adopted a Statement of Overriding Considerations (SOC), in accordance with CEQA Guidelines §15093(a), stating that economic, legal, social, technological, and other benefits resulting from the project will outweigh the unavoidable adverse environmental effects.

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

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

IX. Recommendation

Compliance with all applicable rules and regulations is expected. Pending a successful Public Noticing period, issue Authorities to Construct N-7056-1-0 through 11-0 subject to the permit conditions on the attached draft Authorities to Construct in Appendix F.

X. Billing Information

Annual Permit Fees			
Permit Number	Fee Schedule	Fee Description	Annual Fee
N-7056-1-0	3020-06	Milking Parlor	$89.00
N-7056-2-0	3020-06	Cow Housing	$89.00
N-7056-3-0	3020-06	Liquid Manure Handling System	$89.00
N-7056-4-0	3020-06	Solid Manure Handling System	$89.00
N-7056-5-0	3020-06	Feed Storage and Handling	$89.00
N-7056-6-0	3020-10-D	550 HP	$479.00
N-7056-7-0	3020-10-C	220 HP	$240.00
N-7056-8-0	3020-10-B	187 HP	$117.00
N-7056-9-0	3020-10-C	205 HP	$240.00
N-7056-10-0	3020-10-A	74 HP	$80.00
N-7056-11-0	3020-10-B	168 HP	$117.00

XI. Appendices

A: Commencement of Construction Determination
B: Anaerobic Treatment Lagoon Design Check
C: Quarterly Net Emissions Change (QNEC) Calculations

D: Summary of Health Risk Assessment (HRA) and Ambient Air Quality Analysis (AAQA)
E: BACT Analysis
F: Draft ATCs

APPENDIX A

Commencement of Construction Determination Memo

San Joaquin Valley Air Pollution Control District

OFFICE MEMO

DATE: July 3, 2006

TO: File N-7056, 1053547

FROM: Jonah Aiyabei, Air Quality Engineer

SUBJECT: Determination of Commencement of Construction – PH Ranch/Vel Dhuis North Dairy

---

Prior to January 1, 2004, agricultural operations were exempt from air permitting requirements in California. With the passage of Senate Bill 500 (SB 500) agricultural facilities with actual emissions greater than ½ the major source threshold levels for any air contaminant are required to obtain an Air District permit.

Since agricultural facilities were previously exempt from District permitting requirements, agricultural facilities installed prior to January, 1 2004 are "grandfathered" in without being subject to NSR. Pursuant to Section 9.0 of District Rule 2020, an emission unit that was installed at a time when permits were not required is not subject to the District's NSR Rule until the unit is modified.

Per District Rule 2050, section 3.1, 'commence', as applied to construction, means that the owner or operator has all necessary preconstruction approvals or permits and either has:

1. Begun, or caused to begin, a continuous program of actual onsite construction of the source to be completed within a reasonable time; or

2. Entered into binding agreements or contractual obligations, which cannot be cancelled or modified without substantial loss to the owner or operator, to undertake a program of actual construction of the source to be completed within a reasonable time.

The District requested information from Vel Dhuis North Dairy regarding its construction activities, hoping to determine if construction commenced prior to or after January 1, 2004. The District's request letter (dated September 9, 2005) outlined all the evidence the applicant was required to provide. The following is an analysis of the information that has been submitted.

Preconstruction Approvals

Vel Dhuis was issued a Conditional Use Permit (No. 00004) by the County of Merced on January 14, 2004. The CUP authorized the applicant to construct and operate an 8,161 animal unit dairy and heifer ranch on the West side of Lee Road, North of Bradbury Road in Ballico, Merced County.

Since a dairy could not have been legally constructed and operated at the subject site without approval of the Conditional Use Permit by Merced County, it is clear that the applicant did not have preconstruction approval prior to January 1, 2004.

Background and context:

As explained in the attached May 17, 2000 letter from Merced County to the applicant, the initial CUP application for the dairy was accepted by the county on April 5, 2000. The applicant requested to be allowed to replace the existing feed lot with one 615,000 square foot shade barn while the CUP application was being reviewed. The county approved this request, on condition that all the animals in the feed lot would be moved into the shade barn and the existing feed lot completely abandoned and the site cleaned up.

The county approved only replacement housing for the feed lot that was already operating at the site. The construction resulting from this approval should therefore not be construed to have anything to do with the January 14, 2004 CUP approval for the construction and operation of a full dairy.

Actual On-site Construction

Since the applicant did not have legal authority to begin construction of the dairy prior to January 1, 2004, any on-site construction would be of no consequence.

However, the applicant currently operates a 1,500 cow feed lot at the site. This number of cows may be grandfathered into permits. The freestall barn structure housing the existing cows will also be grandfathered into permits.

Recommendation:

Based on the evidence provided, it is reasonable to conclude that commencement of construction for the entire dairy operation began after January 1, 2004. As required by SB 700, Authority to Construct permits for all emission units should have been obtained prior to construction. The proposed 8,161 animal units would have resulted in emissions exceeding the permit requirement thresholds in effect on January 1, 2004.

The applicant should therefore submit Authority to Construct applications for all emissions units, and comply fully with all applicable New Source Review and CEQA Requirements. In processing the expected ATC applications, the District will take into account the 1,500 feed lot cattle currently housed in a freestall barn at the site. The

County granted the applicant authority to construct one freestall barn for the feed lot cattle prior to January 1, 2004.

Attachments

Letter From Merced County to Applicant, May 17, 2000.

Conditional Use Permit

PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT
2222 'M' STREET
MERCED, CALIFORNIA 95340
TELEPHONE (AREA CODE 209) 385-7654
FAX (209)726-1710

ROBERT E. SMITH
Director
WILLIAM NICHOLSON
Assistant Director

May 17, 2000

Mr. Ray Veldhuis
PH Ranch
6335 W. Oakdale Road
Winton, California 95388

RE: Replacement of a Legal Non-Conforming Feed Lot

Dear Mr. Veldhuis:

On April 5, 2000, the County Planning and Community Development Department accepted a Conditional Use Permit Application from you for establish a diary for a maximum of 8,000 animal units on a 1, 840 acre property that is located on the west side of Lee Road and approximately 2,600 feet north of Bradbury Road in the Ballico area. There is an existing feed lot with approximately 1,500 cows on the subject property. You have indicated to County staff that once the proposed dairy is approved by the County and the facility is constructed, the cows from the exiting feed lot will be moved to the new facility and the existing feed lot will be abandoned. You have requested that the County allow you to replace the existing feed lot with a 615,000 square foot shade barn at the proposed dairy site while the Conditional Use Permit for the dairy is being processed. According to the information that you have provided, this 615,000 square foot shade barn is equal in square footage to the existing feed lot facility. You have also stated that the new facility will be constructed in compliance with all the State and County regulations and standards and can therefore be considered an improvement with respect to the potential environmental impacts of the feed lot.

The County is willing to allow you to replace the existing feed lot facility with the proposed shade barn provided that once the subject shade barn is completed, all the animals are moved to the new facility, the existing confinement facility is abandoned, corrals are removed, and the area is cleaned up to satisfaction of the County staff. The County will require a $50,000 financial guarantee in the form of a Certificate of Deposit or bond prior to issuance of the building permit. This will enable the County to remove the corrals and to clean up the area if it is not done upon completion of the shade barn as discussed in this letter.

Sincerely,

Mohammad Khorsand

Mohammad Khorsand
Planner III

cc: Bob Smith, Planning and Community Development Director
Supervisor Kelsey

COUNTY OF MERCED
STATE OF CALIFORNIA

CONDITIONAL USE PERMIT NO. 00004

THIS PERMIT WILL EXPIRE ON January 14, 2005, IF USE IS NOT EXERCISED IN ACCORDANCE WITH SECTION 18.50.09 OF THE ZONING CODE.

Date of Issue:	January 14, 2004
Issued To:	Ray Veldhuis
Assessor's Parcel No.:	042-050-021
Location of property subject to this permit:	Located on the west side of Lee Road, 2,600 feet north of Bradbury Road, east of the unincorporated community of Ballico.
Description of Permitted Use:	To construct and operate an 8,161 animal unit dairy and heifer ranch on a 124-acre portion of a 1,840-acre site.

Your **Conditional Use Permit Application No. 00004** was **Approved** on **Wednesday, January 14, 2004,** by the Planning Commission. You may start the approved use subject to the following conditions:

1. Conditional Use Permit No. 00004 is granted for the construction and operation of a 8,161 animal unit milk cow dairy on 1,840 acres.

2. The 2-Vel Dairy project shall be located, developed and operated in a manner described on the approved plot plan, Comprehensive Nutrient Management Plan, mitigation measures, mitigation monitoring and reporting program, and conditions of this permit. Any changes or proposed modifications to the approved project would be based a written request of the applicant to the Planning Director.

3. All mitigation measures identified in the Environmental Impact Report are adopted and incorporated by reference as project conditions.

4. Prior to utilizing this conditional use permit, and prior to obtaining any building permits, the applicant shall enter into a reimbursement agreement with the County Road Division to maintain the structural section of County Roads. The applicant shall pay an impact fee of $79,000.00 to the Department of Public Works Road Division for the cost of asphalt concrete material to overlay Lee Road from Bradbury Road to Oakdale Road and to overlay Turlock Road from Lee Road to Oakdale Road. The applicant may pay the impact fee in five (5) equal annual installments of $15,000.00. The fee, or first installment, shall be paid within 12 months of use permit approval.

5. An encroachment permit must be obtained from the Department of Public Works, and a paved driveway approach constructed and streetlight installed to County standards at the primary access at Lee Road, and ten feet of Right-of-Way dedicated along Lee Road frontage, prior to utilizing the conditional use permit.

6. The project shall comply with all applicable regulations administered by the County Fire, Health, Planning, and Public Works Departments.

7. For the purpose of condition and mitigation monitoring, an annual fee in the amount of **$300.00** shall be paid prior to utilizing the conditional use permit.

MERCED COUNTY PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT
William Nicholson, Director

By: Desmond Johnston, Deputy Director

cc: Assessor
Department of Public Works, Road Division
Department of Public Works, Building Division
Code Compliance Manager

PLEASE NOTE: A copy of your conditional use permit will be sent to the Merced County Assessor in Compliance with the California Planning and Zoning Law, Title 7, Division 1, Chapter 4, Article 2, Section 65863.5.

APPENDIX B

Anaerobic Treatment Lagoon Design Check

Lagoon Design Check in Accordance with NRCS Guideline #359

Proposed Lagoon Volume

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

Primary Treatment Lagoon Dimensions

Length	2352	ft
Width	180	ft
Depth	6	ft
Slope	2	ft

(Total depth is 22' but only a minimum constant depth of 6' is required for anaerobic treatment.)

Primary Lagoon Volume	**2,359,008 ft3**

INSTRUCTIONS

* only input yellow fields

Step 1 Enter primary lagoon dimensions on this sheet

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

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

Step 4 Go to "Minimum Treatment Volume"

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

Step 6 Go to "Hydraulic Retention Time"

Step 7 Adjust fresh water as applicable

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

Lagoon Design Check in Accordance with NRCS Guideline #360

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	3,200	x	17	x	71%	x	50%	=	**19,312**
Dry Cow	740	x	9.2	x	71%	x	50%	=	**2,417**
Heifer (15 to 24 months)	684	x	7.1	x	48%	x	50%	=	**1,166**
Heifer (7 to 14 months)	1,796	x	4.9	x	48%	x	50%	=	**2,112**
Heifer (3 to 6 months)	414	x	2.7	x	48%	x	50%	=	**268**
Calf (under 3 months)	0	x	1.0	x	100%	x	50%	=	**0**
Bulls	6	x	9.2	x	71%	x	50%	=	**20**
Total for Dairy									**25,294**

*Number of animals includes heifers housed in pre-existing heifer ranch since treatment lagoon is shared.

[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.

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 #360

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	19,312	÷	0.011	=	**1,755,636**
Dry Cow	2,417	÷	0.011	=	**219,713**
Heifer (15 to 24 months)	1,166	÷	0.011	=	**105,958**
Heifer (7 to 14 months)	2,112	÷	0.011	=	**192,009**
Heifer (3 to 6 months)	268	÷	0.011	=	**24,388**
Calf (under 3 months)	0	÷	0.011	=	**0**
Bulls	20	÷	0.011	=	**1,781**
Total for Dairy					**2,299,485**

[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 #360

Sludge Accumulation Volume

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

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

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

SAV = VPL - MTV

Where:

SAV = Sludge Accumulation Volume (ft^3)

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

MTV = Minimum Treatment Volume (ft^3)

SAV =	VPL	-	MTV	
SAV =	**2,359,008**	**2,299,485**	**=**	**59,523 (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	3,200	x	2.40	ft^3	=	7,680	ft^3/day
Dry Cows	740	x	1.30	ft^3	=	962	ft^3/day
Heifers (15-24 mo)	684	x	0.78	ft^3	=	534	ft^3/day
Heifers (7-14 mo)	1,796	x	0.78	ft^3	=	1,401	ft^3/day
Heifers (3-6 mo)	414	x	0.30	ft^3	=	124	ft^3/day
Calves	0	x	0.15	ft^3	=	-	ft^3/day
Bulls	6	x	1.30	ft^3	=	8	ft^3/day
Total	6,840					**10,708**	**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~~	3200 ~~milk cows~~	x	ft3		+	10,708	ft3	
~~milk cow *~~ day			7.48	~~gal~~			day	
				=		32,098.8	ft3/day	

Formula:

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

HRT:

2,299,485 ~~ft3~~	day	=		=	71.6377962	days
	32,098.8 ~~ft3~~					

APPENDIX C

Quarterly Net Emissions Change (QNEC) Calculations

Quarterly Net Emissions Change (QNEC)

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

QNEC = PE2 - BE, where:

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

Since all emission units in this project are new, BE = PE1 = 0 lb/yr in all cases. Using the values in Sections VII.C.2 in the evaluation above, quarterly PE2 and QNEC are as summarized in the following tables:

Milking Barn (N-7056-1)

Quarterly PE2					
Pollutant	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO_X	0	÷	4 qtr/year	=	0.0
SO_X	0	÷	4 qtr/year	=	0.0
PM_{10}	0	÷	4 qtr/year	=	0.0
CO	0	÷	4 qtr/year	=	0.0
VOC	1,280	÷	4 qtr/year	=	320.0
NH_3	608	÷	4 qtr/year	=	152.0

QNEC					
Pollutant	PE2 (lb/qtr)	-	BE (lb/qtr)	=	QNEC (lb/qtr)
NO_X	0.0	-	0.0	=	0.0
SO_X	0.0	-	0.0	=	0.0
PM_{10}	0.0	-	0.0	=	0.0
CO	0.0	-	0.0	=	0.0
VOC	320.0	-	0.0	=	320.0
NH_3	152.0	-	0.0	=	152.0

Cow Housing (N-7056-2)

Quarterly PE2					
Pollutant	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO_X	0	÷	4 qtr/year	=	0.0
SO_X	0	÷	4 qtr/year	=	0.0
PM_{10}	13,162	÷	4 qtr/year	=	3,290.5
CO	0	÷	4 qtr/year	=	0.0
VOC	43,687	÷	4 qtr/year	=	10,921.75
NH_3	207,540	÷	4 qtr/year	=	51,885.0

QNEC					
Pollutant	PE2 (lb/qtr)	-	BE (lb/qtr)	=	NEC (lb/qtr)
NO_X	0.0	-	0.0	=	0.0
SO_X	0.0	-	0.0	=	0.0
PM_{10}	3,290.5	-	0.0	=	3,290.5
CO	0.0	-	0.0	=	0.0
VOC	10,921.75	-	0.0	=	10,921.75
NH_3	51,885.0	-	0.0	=	51,885.0

Liquid Manure Handling System (N-7056-3)

Quarterly PE2					
Pollutant	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO_X	0	÷	4 qtr/year	=	0.0
SO_X	0	÷	4 qtr/year	=	0.0
PM_{10}	0	÷	4 qtr/year	=	0.0
CO	0	÷	4 qtr/year	=	0.0
VOC	8,605	÷	4 qtr/year	=	2,151.25
NH_3	66,618	÷	4 qtr/year	=	16,654.5
H2S	3,203	÷	4 qtr/year	=	800.75

QNEC					
Pollutant	PE2 (lb/qtr)	-	BE (lb/qtr)	=	NEC (lb/qtr)
NO_X	0.0	-	0.0	=	0.0
SO_X	0.0	-	0.0	=	0.0
PM_{10}	0.0	-	0.0	=	0.0
CO	0.0	-	0.0	=	0.0
VOC	2,151.25	-	0.0	=	2,151.25
NH_3	16,654.5	-	0.0	=	16,654.5
H2S	800.75	-	0.0	=	800.75

Solid Manure Handling System (N-7056-4)

Quarterly PE2					
Pollutant	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO_X	0	÷	4 qtr/year	=	0.0
SO_X	0	÷	4 qtr/year	=	0.0
PM_{10}	0	÷	4 qtr/year	=	0.0
CO	0	÷	4 qtr/year	=	0.0
VOC	2,082	÷	4 qtr/year	=	520.5
NH_3	13,318	÷	4 qtr/year	=	3,329.5
H2S	0	÷	4 qtr/year	=	0

QNEC					
Pollutant	PE2 (lb/qtr)	-	BE (lb/qtr)	=	NEC (lb/qtr)
NO_X	0.0	-	0.0	=	0.0
SO_X	0.0	-	0.0	=	0.0
PM_{10}	0.0	-	0.0	=	0.0
CO	0.0	-	0.0	=	0.0
VOC	520.5	-	0.0	=	520.5
NH_3	3,329.5	-	0.0	=	3,329.5
H2S	0.0	-	0.0	=	0.0

Feed Storage and Handling (N-7056-5)

Quarterly PE2					
Pollutant	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO_X	0	÷	4 qtr/year	=	0.0
SO_X	0	÷	4 qtr/year	=	0.0
PM_{10}	0	÷	4 qtr/year	=	0.0
CO	0	÷	4 qtr/year	=	0.0
VOC	56,375	÷	4 qtr/year	=	14,093.75
NH_3	0	÷	4 qtr/year	=	0
H2S	0	÷	4 qtr/year	=	0

QNEC					
Pollutant	PE2 (lb/qtr)	-	BE (lb/qtr)	=	NEC (lb/qtr)
NO_X	0.0	-	0.0	=	0.0
SO_X	0.0	-	0.0	=	0.0
PM_{10}	0.0	-	0.0	=	0.0
CO	0.0	-	0.0	=	0.0
VOC	14,093.75	-	0.0	=	14,093.75
NH_3	0.0	-	0.0	=	0.0
H2S	0.0	-	0.0	=	0.0

550 HP Engine (N-7056-6)

Quarterly PE2					
Pollutant	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO_X	460	÷	4 qtr/year	=	115.0
SO_X	1	÷	4 qtr/year	=	0.25
PM_{10}	11	÷	4 qtr/year	=	2.75
CO	315	÷	4 qtr/year	=	78.75
VOC	15	÷	4 qtr/year	=	3.75

QNEC					
Pollutant	PE2 (lb/qtr)	-	BE (lb/qtr)	=	QNEC (lb/qtr)
NO_X	115.0	-	0.0	=	115.0
SO_X	0.25	-	0.0	=	0.25
PM_{10}	2.75	-	0.0	=	2.75
CO	78.75	-	0.0	=	78.75
VOC	3.75	-	0.0	=	3.75

220 HP Engine (N-7056-7)

Quarterly PE2					
Pollutant	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO_X	2,968	÷	4 qtr/year	=	742.0
SO_X	4	÷	4 qtr/year	=	1.0
PM_{10}	83	÷	4 qtr/year	=	20.75
CO	419	÷	4 qtr/year	=	104.75
VOC	84	÷	4 qtr/year	=	21.0

QNEC					
Pollutant	PE2 (lb/qtr)	-	BE (lb/qtr)	=	QNEC (lb/qtr)
NO_X	742.0	-	0.0	=	742.0
SO_X	1.0	-	0.0	=	1.0
PM_{10}	20.75	-	0.0	=	20.75
CO	104.75	-	0.0	=	104.75
VOC	21.0	-	0.0	=	21.0

187 HP Engine (N-7056-8)

Quarterly PE2					
Pollutant	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO_X	1,125	÷	4 qtr/year	=	281.25
SO_X	1	÷	4 qtr/year	=	0.25
PM_{10}	28	÷	4 qtr/year	=	7.0
CO	148	÷	4 qtr/year	=	37.0
VOC	30	÷	4 qtr/year	=	7.5

QNEC					
Pollutant	PE2 (lb/qtr)	-	BE (lb/qtr)	=	QNEC (lb/qtr)
NO_X	281.25	-	0.0	=	281.25
SO_X	0.25	-	0.0	=	0.25
PM_{10}	7.0	-	0.0	=	7.0
CO	37.0	-	0.0	=	37.0
VOC	7.5	-	0.0	=	7.5

205 HP Engine (N-7056-9)

Quarterly PE2					
Pollutant	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO_X	1,645	÷	4 qtr/year	=	411.25
SO_X	2	÷	4 qtr/year	=	0.5
PM_{10}	40	÷	4 qtr/year	=	10.0
CO	217	÷	4 qtr/year	=	54.25
VOC	43	÷	4 qtr/year	=	10.75

QNEC					
Pollutant	PE2 (lb/qtr)	-	BE (lb/qtr)	=	QNEC (lb/qtr)
NO_X	411.25	-	0.0	=	411.25
SO_X	0.5	-	0.0	=	0.5
PM_{10}	10.0	-	0.0	=	10.0
CO	54.25	-	0.0	=	54.25
VOC	10.75	-	0.0	=	10.75

74 HP Engine (N-7056-10)

Quarterly PE2					
Pollutant	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO_X	574	÷	4 qtr/year	=	143.5
SO_X	1	÷	4 qtr/year	=	0.25
PM_{10}	30	÷	4 qtr/year	=	7.5
CO	91	÷	4 qtr/year	=	22.75
VOC	30	÷	4 qtr/year	=	7.5

QNEC					
Pollutant	PE2 (lb/qtr)	-	BE (lb/qtr)	=	QNEC (lb/qtr)
NO_X	143.5	-	0.0	=	143.5
SO_X	0.25	-	0.0	=	0.25
PM_{10}	7.5	-	0.0	=	7.5
CO	22.75	-	0.0	=	22.75
VOC	7.5	-	0.0	=	7.5

168 HP Engine (N-7056-11)

Quarterly PE2					
Pollutant	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO_X	1,304	÷	4 qtr/year	=	326.0
SO_X	2	÷	4 qtr/year	=	0.5
PM_{10}	40	÷	4 qtr/year	=	10.0
CO	119	÷	4 qtr/year	=	29.75
VOC	56	÷	4 qtr/year	=	14.0

QNEC					
Pollutant	PE2 (lb/qtr)	-	BE (lb/qtr)	=	QNEC (lb/qtr)
NO_X	326.0	-	0.0	=	326.0
SO_X	0.5	-	0.0	=	0.5
PM_{10}	10.0	-	0.0	=	10.0
CO	29.75	-	0.0	=	29.75
VOC	14.0	-	0.0	=	14.0

APPENDIX D

Summary of Health Risk Assessment (HRA) and 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:	October 20, 2011
Facility Name:	Veldhuis North
Location:	12465 Lee Road, Ballico
Application #(s):	N-7056-1-0 thru 11-0
Project #:	N-1063725

A. RMR SUMMARY

RMR Summary					
Categories	**Milking Parlor (Unit 1-0)**	**Cow Housing (Unit 2-0)**	**Lagoons (Unit 3-0)**	**Diesel ICE (Unit 6-0)**	**Diesel ICE (Unit 7-0)**
Prioritization Score	0.52	42.92	36.97	N/A[1]	N/A[1]
Acute Hazard Index	0.00	0.02	0.50	N/A[2]	N/A[2]
Chronic Hazard Index	0.00	0.41	0.00	N/A[2]	N/A[2]
Maximum Individual Cancer Risk	**5.90E-08**	**5.18E-06**	**1.73E-07**	**2.30E-07**	**6.64E-07**
T-BACT Required?	**No**	**Yes**	**No**	**No**	**No**
Special Permit Conditions?	**No**	**No**	**Yes**	**Yes**	**Yes**
Categories	**Diesel ICE (Unit 8-0)**	**Diesel ICE (Unit 9-0)**	**Diesel ICE (Unit 10-0)**	**Diesel ICE (Unit 11-0)**	**Project & Facility Totals**
Prioritization Score	N/A[1]	N/A[1]	N/A[1]	N/A[1]	>1.0
Acute Hazard Index	N/A[2]	N/A[2]	N/A[2]	N/A[2]	0.52
Chronic Hazard Index	N/A[2]	N/A[2]	N/A[2]	N/A[2]	0.41
Maximum Individual Cancer Risk	**3.36E-08**	**7.27E-08**	**4.94E-08**	**6.85E-08**	6.53E-06
T-BACT Required?	**No**	**No**	**No**	**No**	
Special Permit Conditions?	**Yes**	**Yes**	**Yes**	**Yes**	

1 Prioritization for this unit was not required since it has been determined that all diesel-fired IC engines will result in a prioritization score greater than 1.0.

2 Acute and Chronic Hazard Indices were not calculated since there is no risk factor, or the risk factor is so low that the risk has been determined to be insignificant for this type of unit.

Proposed Permit Conditions

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

Unit 3-0

1. The pH value cannot be any lower than 7.5.
2. The quarterly H2S concentration cannot exceed 5 mg/L.

Unit 6-0

1. Modified {1901} The PM10 emissions rate shall not exceed **0.15** g/hp-hr based on US EPA certification using ISO 8178 test procedure. [District Rule 2201]
2. {1898} The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102] N
3. Modified {1344} The engine shall be operated only for maintenance, testing, and required regulatory purposes, and during emergency situations. Operation of the engine for maintenance, testing, and required regulatory purposes shall not exceed **100** hours per year. [District NSR Rule and District Rule 4701]N

Unit 7-0

1. Modified {1901} The PM10 emissions rate shall not exceed **0.15** g/hp-hr based on US EPA certification using ISO 8178 test procedure. [District Rule 2201]
2. {1898} The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102] N
3. Operation of the engine shall not exceed **1440** hours per year. [District NSR Rule and District Rule 4701]N

Unit 8-0

1. Modified {1901} The PM10 emissions rate shall not exceed **0.15** g/hp-hr based on US EPA certification using ISO 8178 test procedure. [District Rule 2201]
2. {1898} The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102] N
3. Operation of the engine shall not exceed **600** hours per year. [District NSR Rule and District Rule 4701]N

Unit 9-0

1. Modified {1901} The PM10 emissions rate shall not exceed **0.15** g/hp-hr based on US EPA certification using ISO 8178 test procedure. [District Rule 2201]
2. {1898} The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102] N
3. Operation of the engine shall not exceed **800** hours per year. [District NSR Rule and District Rule 4701]N

Unit 10-0

1. Modified {1901} The PM10 emissions rate shall not exceed **0.3** g/hp-hr based on US EPA certification using ISO 8178 test procedure. [District Rule 2201]
2. {1898} The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102] N
3. Operation of the engine shall not exceed **800** hours per year. [District NSR Rule and District Rule 4701]N

Unit 11-0

1. Modified {1901} The PM10 emissions rate shall not exceed **0.22** g/hp-hr based on US EPA certification using ISO 8178 test procedure. [District Rule 2201]
2. {1898} The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102] N
3. Operation of the engine shall not exceed **800** hours per year. [District NSR Rule and District Rule 4701]N

B. RMR REPORT

I. Project Description

Technical Services performed an Ambient Air Quality Analysis and a Risk Management Review for a dairy which will be reconstructed into a full scale dairy with 3,200 milk cows, 540 dry cows, 884 large heifers, 1796 medium heifers, 414 small heifers, and 6 mature bulls. The operation will also include 5 diesel-fired engines powering irrigation pumps and 1 diesel-fired engine powering an electrical generator.

II. Analysis

Units 1-0 thru 5-0

Technical Services performed prioritizations using the District's HEARTs database. Emissions were calculated using District-developed spreadsheets for dairies, and 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 units were prioritized using the procedures in the 1990 CAPCOA Facility Prioritization Guidelines and incorporated in the District's HEART's database.

Units 1-0, 2-0, and 3-0 (milking parlor, cow housing, and lagoons 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 5-year concatenated meteorological data from Modesto to determine maximum dispersion factors at the nearest on-site residential and off-site 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 Unit 4-0 (solid manure handling) and Unit 5-0 (feed handling and storage).

Units 6-0 thru 11-0

Prioritizations for these units were not required since it has been determined that all diesel-fired internal combustion engines will result in prioritization scores greater than 1.0; therefore, refined health risk assessments were required and performed for each unit. AERMOD was used, with District approved generic point source modeling parameters for engines and 5-year concatenated meteorological data from Modesto to determine maximum dispersion factors at the nearest on-site residential and off-site receptors. These dispersion factors were input into the HARP model to calculate the carcinogenic risk for each unit.

The following parameters were used for the review:

Analysis Parameters N-7056, Project N-1063725			
Total Cows		6,840	
Total Annual NH3 (lbs/yr)	295,365	**Total Hourly NH3 (lbs/hr)**	33.717
Total Annual PM10 (lbs/yr)	10,191	**Total Hourly PM10 (lbs/hr)**	1.163

In addition to the RMR, Technical Services performed an Ambient Air Quality Analysis for Unit 2-0 and Units 6-0 thru 11-0.

For Unit 2-0 (cow housing), Technical Services performed modeling for the criteria pollutant PM_{10} using AERMOD. The emission rate used was 10,191 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	9.98[2]
Interim Significance Level	10.4[1]
Result	Pass

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

For Units 6-0 thru 11-0 (Diesel ICEs), Technical Services also performed modeling for criteria pollutants CO, NOx, SOx, and PM_{10}. Emission rates used for criteria pollutant modeling varied for each unit.

The results from the Criteria Pollutant Modeling are as follows:

Criteria Pollutant Modeling Results*
Values are in $\mu g/m^3$

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

*Results were taken from the attached PSD spreadsheets.
[1]The criteria pollutants are below EPA's level of significance as found in 40 CFR Part 51.165 (b)(2).
[2]The units were compared to the 1-hour NO2 National Ambient Air Quality Standard that became effective on April 12, 2010, using the District's approved procedures.
[3]For Unit 6-0 only, the unit is an intermittent source as defined in APR-1920. In accordance with APR-1920, compliance with short-term (i.e., 1-hour, 3-hour, 8-hour, and 24-hour) standards is not required.

III. Conclusions

Unit 1-0

The acute and chronic indices are below 1.0; and the maximum individual cancer risk associated with the unit is **5.90E-08**, which is less than the 1 in a million threshold. In accordance with the District's Risk Management Policy, the unit is approved **without** Toxic Best Available Control Technology (T-BACT).

Unit 2-0

The ambient air quality impacts from PM_{10} emissions at the dairy do not exceed the District's 24-hour interim threshold for fugitive dust sources.

The acute and chronic indices are below 1.0; and the maximum individual cancer risk associated with the unit is **5.81E-06**, which is greater than the 1 in a million threshold. In accordance with the District's Risk Management Policy, the unit is approved **with** Toxic Best Available Control Technology (T-BACT).

Unit 3-0

The acute and chronic indices are below 1.0; and the maximum individual cancer risk associated with the unit is **1.73E-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).

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

Units 6-0 thru 11-0

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

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

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

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

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....*".[12] 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 feed, bedding materials, dry manure, and unpaved soil surfaces such as corrals.

The mass of particulate matter emitted from totally or partially enclosed confinement facilities, as well as the particle size distribution, depend on type of ventilation and ventilation rate. Particulate matter emissions from naturally ventilated buildings will be lower than those from mechanically ventilated buildings.

2. VOC Formation and Emissions:

Volatile Organic Compounds (VOCs) result from ruminant digestive processes and are formed as intermediate metabolites when organic matter manure decomposes. Under

[12] 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

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.[13] 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[14]. Exposure to high levels of ammonia can cause irritation to the skin, throat, lungs, and eyes.

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

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

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

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

ammonia emissions between solid and liquid manure handling systems if liquid manure is stored over extended periods of time prior to land application.[15]

4. Hydrogen Sulfide Emissions

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

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

II. Top Down BACT Analysis for the Milking Parlor

BACT Analysis for VOC Emissions from the Milking Parlor:

a. Step 1 - Identify all control technologies

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

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

Description of Control Technologies

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

Milking parlors can be either naturally or mechanically ventilated. According to some dairy designers, mechanical ventilation is more reliable than natural ventilation. Mechanical ventilation can be easily applied to all areas of the milking parlors, except

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

the holding area. The mechanical system for the milking parlors can be utilized to capture the gases emitted from the milking parlors, however in order to capture all of the gases, and to keep an appropriate negative pressure throughout the system, the holding area would also need to be entirely enclosed. No facility currently encloses the holding area since cows are continuously going in and out of the barn throughout the day. The capital required to enclose this large area would also be significant. Although the feasibility of such a technology is in question, it will be considered in this analysis. The captured VOC emissions could then be sent to an incinerator. Thermal incineration is a well-established VOC control technique. During combustion, gaseous hydrocarbons are oxidized to form CO_2 and water. It is assumed that 95% of the gasses emitted from the milking parlor will be captured by the mechanical ventilation system and that 98% of the captured VOCs will be eliminated by thermal incineration[16]; therefore the total control for VOCs from the milking parlor = 0.95 x 0.98 = 93.1%.

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

A biofilter is a device for removing contaminants from a gas in which the gas is passed through a media that supports microbial activity by which the pollutants are degraded by biological oxidation. In the biofiltration process, live bacteria biodegrade organic contaminants and ammonia into carbon dioxide, nitrogen and water. Bacterial cultures (microorganisms that typically consist of several species coexisting in a colony) that use oxygen to biodegrade organics are called aerobic cultures. These bacteria are found in soil, peat, compost and natural water bodies including ponds, lakes, rivers and oceans. They are environmentally friendly and non-harmful to humans unless ingested.

Since biofilters rely on living organisms to function, the temperature, moisture content, and pH of the filter media should be monitored to ensure optimum operating conditions. The filter media also needs to be replaced periodically because of deterioration. It is assumed that 95% of the gasses emitted from the milking parlors will be captured by the mechanical ventilation system and that a properly functioning biofilter will eliminate 80% of the captured VOCs[17]; therefore, the total control for VOCs from the milking parlor = 0.95 x 0.80 = 76%.

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

Almost all dairy operations utilize some type of flush or spray system to wash out the manure that dairy cows deposit in the milking parlors. The primary purpose of the flush or spray system is to maintain the minimum level of sanitation required in the milking parlors. However, this system also serves as an emission control for reducing VOC and ammonia emissions. The manure deposited in the milking parlor, which is a source of VOC emissions, is removed from the milking parlors many times a day by flushing after each milking. Many of the VOCs emitted from fresh cow manure, such as alcohols (ethanol and methanol) and many Volatile Fatty Acids (VFAs), are highly soluble in

[16] OAQPS Control Cost Manual, 4th Edition, EPA 450/3-90-006, January 1990, page 3-8.
[17] 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."

water. Therefore, a large percentage of these compounds will dissolve in the flush water and will not be emitted from the milking parlors. The flush water can then carry the manure and the dissolved volatile compounds to an anaerobic treatment lagoon or other manure stabilization process for treatment.

It must be noted that flushing or spraying out the milking parlors after each group of cows is milked will only control the VOCs emitted from the manure, it will have little or no effect on enteric emissions produced from the cows' digestive processes. It will be assumed that the control efficiency for VOCs emitted from manure is 75%. Enteric emissions compose approximately 78% of the VOC emissions from the milking parlor and VOC emissions from the manure make up the remaining 22%; therefore the total control for VOCs from the milking parlor = 0.75 x 0.22 =16.5%.

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) Enclose, capture, and incineration (≈ 93% of VOC emissions from the milking parlors)
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 the fuel requirements and fuel cost for thermal incineration are greater than catalytic incineration, the following analysis also demonstrates that thermal incineration would not be cost effective.

Air Flow Rate of Milking Parlor

In order to effectively calculate the costs of this control option, the airflow rate of the milking parlors must be determined. According to Cornell University's publication "Environmental Controls for Today's Milking Center", the minimum ventilation rate required for milking parlors is 15 room air exchanges per hour in the winter and 60 to 90

room air exchanges per hour in the summer[18]. 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 milking parlor is approximately 123 ft long by 52 ft wide and is conservatively assumed to have a height of 20 feet. The total airflow rate is calculated as follows:

(123 ft x 52 ft x 20 ft) x 35/hr = 4,477,200 ft^3/hr

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 = (4,477,200 scf/hr)(0.0194 Btu/scf)(600 °F - 100 °F)(1-0.7)
= **13,028,652 Btu/hr**

Fuel Cost for Thermal Incineration:

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

Average Cost for natural gas = $6.59/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:

13,028,652 Btu/hr x 1 MMBtu/10^6 Btu x 12 hr/day x 365 day/year x $6.59/MMBtu = **$376,062/year**

VOC Emission Reductions for Thermal Incineration

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

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

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

= (3,200 milk cows) x (0.4 lb-VOC/milk cow-year) x (0.95) x (0.98)
= **1,192 lb-VOC/year**

Cost of VOC Emission Reductions

Cost of reductions = ($376,062/year)/((1,192 lb-VOC/year)(1 ton/2000 lb))
= **$630,977/ton of VOC reduced**

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

Biofiltration:

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

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

Cost of Biofiltration

The cost estimate for a biofiltration system is taken from the United States EPA Report "Using Bioreactors to Control Air Pollution". The cost is largely dependent on the airflow rate that the filter must handle. According to University of Minnesota, Biofilters used to treat ventilating air exhausted from a livestock building should be sized to treat the maximum ventilation rate, which is typically the warm weather rate. The EPA report gives a range of $2.35 - $37.06 per cfm for the initial construction of a biofilter. As stated above, the minimum ventilation rate required for milking parlor is 15 room 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:

123 ft x 52 ft x 20 ft x 60/hr x 1 hr/60 min = 127,920 cfm

Capital Cost

The cost estimate for the biofilter includes the costs of the fans, media, plenum,

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

The capital cost of the biofilter is calculated as follows:

$2.35 cfm x 127,920 cfm = $300,612

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 = $[\$300,612 \times 0.1(1.1)^{10}]/[(1.1)^{10}-1]$
= **$48,923/year**

VOC Emission Reductions for Biofiltration

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

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

= (3,200 milk cows) x (0.4 lb-VOC/milk cow-year) x (0.95) x (0.80)
= **973 lb-VOC/year**

Cost of VOC Emission Reductions

Cost of reductions = ($48,923/year)/((973 lb-VOC/year)(1 ton/2000 lb))
= **$100,561/ton of VOC reduced**

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

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

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

e. Step 5 - Select BACT

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

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

III. Top Down BACT Analysis for the Cow Housing Permit Unit

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

a. Step 1 - Identify all control technologies

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

1) Design and Management Practices

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

Description of Control Technologies

Weekly scraping of corrals

Dairy animals are typically housed in freestall barns or open corrals. In a freestall barn,

the milk cows are grouped in large pens with free access to feed bunks, water, and stalls for resting, and exercise corral areas. An open corral is a large open area where cows are confined with unlimited access to feed and water. The corral surface is composed of earth and deposited manure, both of which have the potential for particulate matter emissions either as a result of wind or animal movement. Frequent scraping of corral surfaces will reduce the amount of dry manure on the corral surfaces that may be pulverized by the cows' hooves and emitted as PM_{10}.

Concrete feedlanes

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

Shade Structures in corrals

Installing shade structures in corral areas helps to decrease PM_{10} emissions. Dairy animals are easily susceptible to heat stress and will tend to seek out shade to reduce the effects of heat, particularly in the warmer months when higher PM_{10} emissions are expected because of drier conditions. PM_{10} emissions are reduced because the cows will spend less time walking on the dry corral surface.

Feeding heifers near (within 1 hour of) dusk

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

Shelterbelts/Windbreaks

A windbreak, or shelterbelt is composed of one or more rows of trees or shrubs, which are planted in a manner that breaks up wind and reduces the force of wind on downwind of the windbreak. Windbreaks can be used to prevent soil erosion, improve air quality by intercepting dust, chemicals, and odors, to protect crops, and to provide habitat for wildlife. The NRCS requires that a 3-row shelterbelt be installed, the first row consisting of shrubs, second row consisting of a medium size tree and the last row consisting of an evergreen (larger tree). NRCS also requires that an irrigation system be maintained so that there is greater survivability and rapid growth of the trees and shrubs. A windbreak/shelterbelt will reduce the amount of particulate matter entrained into the atmosphere.

Above-ground Calf Hutches

Above-ground calf hutches will reduce PM_{10} emissions because the calves will be confined within the hutches, significantly limiting their movement. In addition, the calves will have no contact with the ground, resulting in additional emission reductions.

Application of Water in Heifer Corrals

A sprinkler system can be installed to reduce PM_{10} emissions. The sprinkler system reduces dust by maintaining adequate moisture in the layer of manure and earth on the corral surface. Studies have shown that increasing the moisture of the corral surface greatly reduces the entrainment of PM_{10} into the atmosphere as a result of animal movement. Installation of a sprinkler system for dust control is an effective mitigation measure that reduces PM_{10} emissions. However, because of concerns for animal health and welfare, water application is not commonly used. Excess moisture from sprinkling systems can potentially accumulate in shaded areas where the cows lie down, which will lead to a breeding ground for pathogens and vermin, which will increase nuisance conditions and instances of disease. For this reason, sprinkler systems are not used.

b. Step 2 - Eliminate technologically infeasible options

Application of Water in Heifer Corrals

Mastitis is a common and costly disease of dairy cattle. Mastitis is the inflammation of the mammary gland caused by microorganisms, usually bacteria that invade the udder, multiply, and produce toxins that are harmful to the mammary gland. Mastitis is commonly considered to be more prevalent in mature, lactating cows. However, investigations have identified significant problems with mastitis in unbred, and bred heifers[19]. Environmental Mastitis is contracted from bacteria that may breed in the environment of the cow. Bacteria breeds in the bedding depending on the available nutrients, amount of contamination, moisture and temperature. Water sprinkling systems can potentially cause excess moisture in bedding areas where the heifers lie down. The moist resting areas create a breeding ground for the environmental mastitis bacteria which infect the teats of the resting heifers. Due to concerns for animal health and welfare, this mitigation measure/control will be removed from consideration at this time.

c. Step 3 - Rank remaining options by control effectiveness

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

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

[19] Heifer Mastitis, Fact Sheet, Sheila M. Andrew, Department of Animal Science, University of Connecticut

- Above-ground calf hutches for calves under three months

d. Step 4 - Cost Effectiveness Analysis

Design and Management Practices:

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

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

e. Step 5 - Select BACT

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

2. BACT Analysis for 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 joint with BACT for housing as it would not be practical to control emissions TMR separately.

a. Step 1 - Identify all control technologies

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

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

1) Enclosed freestalls vented to an incinerator - Entire herd (≈ 93%; 95% Capture, 98% Control of 100% of cow housing emissions)
2) Enclosed freestalls vented to an incinerator - Mature cows only (≈ 67% overall

control of entire housing; 95% capture, 98% Control of 72% of cow housing emissions[20])

3) Enclosed freestalls vented to a biofilter - Entire herd (≈ 76%; 95% Capture, 80% Control of 100% of cow housing emissions)
4) Enclosed freestalls vented to a biofilter - Mature cows only (≈ 55% overall control of entire housing; 95% Capture, 80% Control of 72% of cow housing emissions[21])
5) Feed and Manure Management Practices (≈ 22%)
   - Concrete feed lanes and walkways for all cows
   - Freestall feed lanes and walkways for milk cows and dry cows flushed four times per day (≈ 18% for total emissions from cow housing; 47% for emissions from manure) and feed lanes and walkways in the corrals for the remaining animals flushed at least two times per day
   - All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations. (5% of total emissions from dairy cows)
   - Uneaten feed re-fed to the animals or removed from feed lanes on a daily basis to prevent decomposition.
   - All open corrals adequately sloped to promote drainage (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal.
   - Weekly scraping of freestall exercise pens and open corrals using pull-type scraper in the morning hours except when prevented by wet conditions

Description of Control Technologies

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

In a freestall barn, cows are grouped in large pens with free access to feed bunks, water, and stalls for resting. In the mild climate of the San Joaquin Valley, the typical freestall barn is an open structure (roof but no sides). The primary freestall design consists of a roof that provides shade with all sides open to allow air to flow through, which in turn keeps the cows cool. No enclosed freestall barns that were installed at a California dairy could be identified. However, partially enclosed freestall barns are available. These include tunnel-ventilated freestall barns, which are fairly common in the southern and eastern parts of the United States, and greenhouse barns. Greenhouse barns use a lightweight, galvanized steel tube frame to support one or two layers of a commercial-grade plastic film as covering. The most common use for these structures is as heated chambers for growing plants. Although the potential to enclose

[20] Emissions from cow housing = 50,437 lb/hd-yr for all cows, while emissions from mature cows is equal to 36,487 lb/hd-yr. Therefore, mature cows represent 72% of the emissions from the cow housing (36,487 lb/hd-yr/50,437 lb/hd-yr). The overall control efficiency can then be calculated as follows: 95% Capture x 98% Control x 72 % of emissions = 67% overall control efficiency from entire cow housing.

[21] The overall control efficiency can be calculated as follows: 95% Capture x 80% Control x 72% of emissions = 55% overall control efficiency.

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; therefore the total control for VOCs from the freestall barns = 0.95 x 0.98 = 93.1%.

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

As stated above, the mechanical ventilation system of a completely enclosed freestall barn may be utilized to capture the gases emitted from the cow housing permit unit. The captured VOC emissions may then be sent to a biofilter. A biofilter is a device for removing contaminants from a gas in which the gas is passed through a media that supports microbial activity by which the pollutants are degraded by biological oxidation. In the biofiltration process, live bacteria biodegrade organic contaminants and ammonia into carbon dioxide, nitrogen and water. Bacterial cultures (microorganisms that typically consist of several species coexisting in a colony) that use oxygen to biodegrade organics are called aerobic cultures. These bacteria are found in soil, peat, compost and natural water bodies including ponds, lakes, rivers and oceans. They are environmentally friendly and non-harmful to humans unless ingested.

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

3) Feed and Manure Management Practices

Concrete Feed Lanes and Walkways

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

Increased Flushing for feed lanes and walkways

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

In addition to cleaning the corral and freestall feed lanes and walkways, the flush system also serves as an emission control for reducing PM_{10}, VOC, and ammonia emissions. The manure deposited in the lanes, which is a source of VOC emissions, is removed from the cow housing area by the flush system. Many of the VOCs emitted from fresh cow manure, such as alcohols (ethanol and methanol) and many Volatile Fatty Acids (VFAs), are highly soluble in water. Therefore, a large percentage of these compounds will dissolve in the flush water and will not be emitted from the cow housing permit unit. The flush water can then carry the manure and the dissolved volatile compounds to an anaerobic treatment lagoon or other manure stabilization process for treatment.

It must be noted that the flush system will only control the VOCs emitted from the manure it will have little or no effect on enteric emissions produced from the cows' digestive processes. As stated above, the feed lanes and walkways in the cow housing areas are typically flushed twice per day. Flushing the lanes four times per day will increase the frequency that manure is removed from the cow housing permit unit and should result in a higher percentage of soluble volatile compounds being dissolved in the flush. Based on calculations given in the final DPAG report[22], flushing the freestall lanes four times per day will be assumed to have a control efficiency of 47% for VOCs emitted from manure until better data becomes available. Enteric emissions compose approximately 61% of the VOC emissions from the cow housing permit unit and VOC emissions from the manure make up the remaining 39%; therefore the total VOC control for flushing the feed lanes and walkways in the cow housing areas four times per day is calculated as follows: 0.47 x 0.39 =18%.

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

Nutritional management of dairy feed is routinely practiced to improve milk production and herd health. The potential for VOC emissions can be reduced by reducing the quantity of undigested nutrients in the manure. Many of the VOCs emitted from Confined Animal Facilities, including dairies, originate from the decomposition of

[22] "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).

undigested protein in animal waste[23]. This undigested protein also produces ammonia emissions. The level of microbial action in the manure corresponds to the level of organic nitrogen content in the manure; the lower the level of nitrogen the lower the level of microbial action and the lower the production of ammonia and VOCs.

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

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

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

Removing or re-feeding refused feed from the feed lanes on a daily basis will minimize gaseous emissions from decomposition. The feed that is removed must be properly disposed of to ensure that the emissions are not just relocated to another area of the dairy. Although this practice is expected to reduce emissions from the cow housing permit unit, there is not sufficient research to estimate the emissions reductions and no VOC control efficiency will be assigned for this practice.

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

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

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

according to their control efficiency.

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) Enclosed freestalls vented to an incinerator - Mature cows only (≈ 67% overall control of entire housing; 95% capture, 98% Control of 72% of cow housing emissions)
4) Enclosed freestalls vented to a biofilter - Mature cows only (≈ 55% overall control of entire housing; 95% Capture, 80% Control of 72% of cow housing emissions)
5) Feed and Manure Management Practices (≈ 22%)
   - Concrete feed lanes and walkways for all cows
   - Freestall feed lanes and walkways for milk cows and dry cows flushed four times per day (≈ 18% for total emissions from cow housing; 47% for emissions from manure) and feed lanes and walkways in the corrals for the remaining animals flushed at least two times per day
   - All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations. (5% of total emissions from dairy cows)
   - Uneaten feed re-fed or removed from feed lanes on a daily basis to prevent decomposition.
   - All open corrals adequately sloped to promote drainage (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal.
   - Weekly scraping of freestall exercise pens and open corrals using pull-type scraper in the morning hours except when prevented by wet conditions.

d. Step 4 - Cost Effectiveness Analysis

Thermal and Catalytic Incineration:

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

Required Airflow Rate of the Freestall Barns

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

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

The minimum summer ventilation rate listed for mature cows is 500 cfm per cow. However, according to the University of Minnesota publication and Cornell University's publication "Natural or Tunnel Ventilation of Freestall Structures: What is Right for Your Dairy Facility?", the required airflow rate in the summer increases to 1,000 cfm per cow if tunnel ventilation is used to provide additional cooling.[24]

The climate in the San Joaquin Valley is characterized by relatively mild winters and hot summers. Because of the warmer climate, it is expected that tunnel ventilation or a similar system would need to be employed in an enclosed freestall barn to prevent excessive heat stress. Additionally, tunnel ventilation systems, which operate with negative pressure inside the freestall barns, are more representative of the types of systems that would be required to capture and control emissions. Although the summer air requirement of 1,000 cfm per cow for tunnel ventilation is more representative of the airflow requirements in a completely enclosed freestall barn located in the San Joaquin Valley, for worst-case calculation purposes, the following average year round airflow requirement will be assumed: mature cows – 335 cfm/cow (average of 170 and 500 cfm per cow); large heifers – 130 cfm/cow (average of 80 and 180 cfm per cow); small and medium heifers - 95 cfm/cow (average of 60 and 130 cfm per cow); baby calves – 75 cfm (average of 50 and 100 cfm per cow).

The analysis below is for the entire herd:

The dairy will consist of the following: 3,200 Holstein milk cows; 540 dry cows; 200 heifers (15-24 months); 980 heifers (7-14 months); and 414 heifers (4-6 months). Enclosed freestalls will be evaluated as a housing alternative for all animals at this dairy.

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

[24] 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)

Category	# of cows	cfm/cow	min/hr	ft^3/hr
Milk cow	3,200	335	60	64,320,000
Dry cow	540	335	60	10,854,000
Heifer (15-24 mo)	200	130	60	1,560,000
Heifer (7-14 mo)	980	95	60	5,586,000
Heifer (3-6 mo)	414	95	60	2,359,800
Calves	0	75	60	-
Total:				**84,679,800**

Fuel Requirement for Thermal Incineration

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

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

Where:

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

Natural Gas Requirement for Thermal Incineration

= (84,679,800 scf/hr)(0.0194 Btu/scf - °F)(600 °F - 100 °F)(1-0.7)
= **246,418,218 Btu/hr**

Fuel Cost for Thermal Incineration:

The cost for natural gas will be based upon the average spot market contract price (industrial) for October 2011 taken from the Energy Information Administration website (http://tonto.eia.doe.gov/dnav/ng/ng_sum_lsum_dcu_SCA_m.htm).
Average Cost for natural gas = $6.59/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:

246,418,218 Btu/hr x 1 MMBtu/10^6 Btu x 12 hr/day x 365 day/year x $6.59/MMBtu
= **$7,112,665/year**

VOC Emission Reductions for Thermal Incineration

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

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

Category	# of cows	EF- lbs/hd-yr	CE	lbs-VOC/yr
Milk cow	3,200	10.41	93%	30,980
Dry cow	540	5.88	93%	2,953
Support stock	1,594	4.5	93%	6,671
TMR	5,334	8.046	93%	39,913
Total				**80,517**

Cost of VOC Emission Reductions

Cost of reductions = ($7,112,665/year)/((80,517 lb-VOC/year)(1 ton/2000 lb))
= **$176,675/ton of VOC reduced**

As shown above, the natural gas cost alone for thermal or catalytic incineration would cause the cost of the VOC reductions to be greater than the $17,500/ton cost effectiveness threshold of the District BACT policy. Additional costs such as the cost of constructing freestalls for all support stock, enclosing all freestalls, and the cost of installing and operating a cooling system for cow comfort would make it even less cost effective to install this technology. The equipment is therefore not cost effective and is being removed from consideration at this time.

The analysis below is for mature cows only:

As discussed in the evaluation, the project will consist of the following number of mature cows: 3,740 mature cows (3,200 Holstein milk cows and 540 dry cows). Enclosed freestalls will be evaluated as a housing alternative for the mature cows.

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

Category	# of cows	cfm/cow	min/hr	ft^3/hr
Milk cow	3,200	335	60	64,320,000
Dry cow	540	335	60	10,854,000
Total				**75,174,000**

Fuel Requirement for Thermal Incineration

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

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

Where:

Flow (Q) = exhaust flow rate of VOC the freestall barns
Cp_{Air} = specific heat of air: 0.0194 Btu/scf - °F
ΔT = increase in the temperature of the contaminated air stream required for catalytic oxidation to occur (It will be assumed that the air

stream would increase in temperature from 100 °F to 600 °F.)
HEF = heat exchanger factor: 0.7

Natural Gas Requirement for Thermal Incineration

= (75,174,000 scf/hr)(0.0194 Btu/scf - °F)(600 °F - 100 °F)(1-0.7)
= **218,756,340 Btu/hr**

Fuel Cost for Thermal Incineration:

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

Average Cost for natural gas = $6.59/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:

218,756,340 Btu/hr x 1 MMBtu/10^6 Btu x 12 hr/day x 365 day/year x $6.59/MMBtu
= **$6,314,227/year**

VOC Emission Reductions for Thermal Incineration

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

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

Category	# of cows	EF- lbs/hd-yr	CE	lbs-VOC/yr
Milk cow	3,200	10.41	93%	30,980
Dry cow	540	5.88	93%	2,953
TMR	3,740	8.046	93%	27,986
Total				**61,919**

Cost of VOC Emission Reductions

Cost of reductions = ($6,314,227/year)/((61,919 lb-VOC/year)(1 ton/2000 lb))
= **$203,951/ton of VOC reduced**

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

Biofiltration:

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

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

Cost of Biofiltration

The cost estimate for a biofiltration system is taken from the United States EPA Report "Using Bioreactors to Control Air Pollution"[25]. 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 in the thermal/catalytic incineration section, the following average year round airflow requirements will be assumed for worst-case purposes (based on the averages from the Minnesota's publication "Improving Mechanical Ventilation in Dairy Barns"[25]. See discussion on page 18 of this BACT analysis): mature cows – 335 cfm/cow (average of 170 and 500 cfm per cow); large heifers – 130 cfm/cow (average of 80 and 180 cfm per cow); small and medium heifers - 95 cfm/cow (average of 60 and 130 cfm per cow); baby calves – 75 cfm (average of 50 and 100 cfm per cow).

The analysis below is for the entire herd:

The dairy will consist of the following: 3,200 Holstein milk cows; 540 dry cows; 200 heifers (15-24 months); 980 heifers (7-14 months); and 414 heifers (4-6 months). Enclosed freestalls will be evaluated as a housing alternative for all animals at this dairy.

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

[25] "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

Category	# of cows	cfm/cow	cfm
Milk cow	3,200	335	1,072,000
Dry cow	540	335	180,900
Heifer (15-24 mo)	200	130	26,000
Heifer (7-14 mo)	980	95	93,100
Heifer (3-6 mo)	414	95	39,330
Calves	0	75	-
Total			**1,411,330**

Capital Cost

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

The capital cost of the biofilter is calculated as follows:

$2.35 cfm x 1,411,330 cfm = $3,316,626

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

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

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

$$A = [\$3,316,626 \times 0.1(1.1)^{10}]/[(1.1)^{10}-1]$$
$$= \mathbf{\$539,765/year}$$

VOC Emission Reductions for Biofiltration

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

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

Category	# of cows	EF- lbs/hd-yr	CE	lbs-VOC/yr
Milk cow	3,200	10.41	76%	25,317
Dry cow	540	5.88	76%	2,413
Support stock	1,600	4.5	76%	5,472
TMR	5,340	8.046	76%	32,654
Total				**65,856**

Cost of VOC Emission Reductions

Cost of reductions = ($539,765/year)/((65,856 lb-VOC/year)(1 ton/2000 lb))
= **$16,392/ton of VOC reduced**

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

The analysis below is for mature cows only:

As discussed in the evaluation, the expansion will consist of the following number of mature cows: 3,740 mature cows (3,200 Holstein milk cows and 540 dry cows). Enclosed freestalls will be evaluated as a housing alternative for the mature cows.

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

Category	# of cows	cfm/cow	cfm
Milk cow	3,200	350	1,120,000
Dry cow	540	350	189,000
Total			**1,309,000**

Capital Cost

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

The capital cost of the biofilter is calculated as follows:

$2.35/cfm x 1,309,000 cfm = **$3,076,150**

Pursuant to District Policy APR 1305, section X (11/09/99), the cost for the purchase of

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

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

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

$$A = [\$3,076,150 \times 0.1(1.1)^{10}]/[(1.1)^{10}-1]$$
$$= \textbf{\$500,629/year}$$

VOC Emission Reductions for Biofiltration

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

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

Category	# of cows	EF- lbs/hd-yr	CE	lbs-VOC/yr
Milk cow	3,200	10.41	76%	25,317
Dry cow	540	5.88	76%	2,413
TMR	3740	8.046	76%	22,870
Total				**50,600**

Cost of VOC Emission Reductions

Cost of reductions = ($500,629/year)/((50,600 lb-VOC/year)(1 ton/2000 lb))
= **$19,788/ton of VOC reduced**

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

Feed and Manure Management Practices:

- Concrete feed lanes and walkways for all cows

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

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

e. Step 5 - Select BACT

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

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

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

a. Step 1 - Identify all control technologies

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

evaluated in this project. However, for purposes of the Dairy BACT Guideline, the District will not deem any control options Achieved-in-Practice until after the final Dairy BACT Guideline has been established

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

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

Description of Control Technologies

1) Feed and Manure Management Practices

Concrete Feed Lanes and Walkways

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

Increased Flushing for feed lanes and walkways

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

In addition to cleaning the corral and freestall feed lanes and walkways, the flush system also serves as an emission control for reducing PM_{10}, VOC, and ammonia emissions. The manure deposited in the lanes, which is also a source of NH_3 emissions, is removed from the cow housing area by the flush system. Ammonia has a high affinity for water and is highly soluble in water. Therefore, a large portion of ammonia will be flushed away with the flush water and will not be emitted from the cow housing permit unit.

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

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

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

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

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) Feed and Manure Management Practices
   - Concrete feed lanes and feed walkways for all cows
   - Freestall feed lanes and walkways for milk cows and dry cows flushed four times per day and feed lanes and walkways in the corrals for the remaining animals flushed at least two times per day
   - All animals fed in accordance with National Research Council (NRC) or other

District-approved guidelines utilizing routine nutritional analysis for rations.

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

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

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

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

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

a. Step 1 - Identify all control technologies

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

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

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

Description of Control Technologies

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

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

Sufficient oxygen must be provided to sustain the aerobic microorganisms in completely aerated lagoons. Lagoons can be considered completely aerobic if sufficient oxygen is provided to achieve a dissolved oxygen (DO) content of 2.0 mg/L or more. Oxygen is typically provided by mechanical aerators. These aerators may float on the lagoon surface or be submerged in the lagoon. Aeration can also be performed by injection of tiny air bubbles into the lagoon water, mixing of the lagoon water, or spraying of the water into the air. According to Dr. Ruihong Zhang, a researcher at the University of California, Davis, at least 95% VOC control can be achieved if the dissolved oxygen (DO) content of the liquid manure is 2.0 mg/L or more. A major disadvantage of completely aerated lagoons is the enormous cost of the energy required to run the aerators continuously. Because of this, it has been determined that completely aerated lagoons are not cost effective options for dairy facilities at the present time.

2) Covered Lagoon Anaerobic Digester

Pursuant to Section 5.3 of the Settlement Agreement (9/20/2004) between the District and the Western United Dairyman and the Alliance of Western Milk Producers Inc, installation of an anaerobic digester will only be required if this technology is proven effective in reducing emissions and is required by the final Dairy BACT Guideline. [3]

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

As stated above, the gas generated in the covered lagoon can be captured and then sent to a suitable combustion device. Combustion (thermal incineration) is a generally accepted, well-established VOC control technique. During combustion, gaseous hydrocarbons are oxidized to form CO_2 and water. The VOCs emitted from the liquid manure in the covered lagoon can be reduced by 95% with the use of an appropriate combustion device. Therefore, installation of the digester will lower the total VOCs emitted from the liquid manure from the liquid manure handling system. Although the control efficiency of the gas captured from the primary lagoon is expected to be 95% or more, the overall control efficiency is expected to be less since VOCs will also be emitted from the storage pond and as fugitive emissions. The overall control efficiency is assumed to be 75% of the emissions that would have been emitted from the lagoon and storage pond.

3) Anaerobic Treatment Lagoon

An anaerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of manure by microbes in the absence of oxygen. The process of anaerobic decomposition results in the preferential conversion of organic compounds in the wastewater into methane (CH_4), carbon dioxide (CO_2), and water rather than intermediate metabolites (VOCs). The National Resource Conservation Service (NRCS) California Field Office Technical Guide Code 359 - Waste Treatment Lagoon specifies criteria for the design of anaerobic treatment lagoons. A properly designed anaerobic treatment lagoon will reduce the Volatile Solids (VS) by at least 50% and will reduce the biological oxygen demand (BOD), which will result in greater efficiency in degrading compounds that contain carbon into methane and carbon dioxide rather than VOCs. Although, the VS reduction is expected to be at least 50%, a conservative control efficiency of 40% will be assumed for anaerobic treatment lagoons, until better data becomes available.

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

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

d. Step 4 - Cost Effectiveness Analysis

Aerobic Treatment Lagoon:

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

Energy Requirement for Complete Aeration

In order to effectively calculate the costs of this control option, the energy requirement for complete aeration must be determined. According to Dr. Ruihong Zhang of the University of California, Davis, 2.4 lbs (1.1 kg) of oxygen (O_2) per cow must be provided each day for complete removal of Biological Oxygen Demand (BOD_5).[26] This does not include the additional oxygen that would be required for conversion of ammonia to nitrate (nitrification). The typical aeration efficiencies for mechanical aerators range from 1 to 2 kg of oxygen (O_2) provided per kW-hr of energy utilized.[26] For this analysis it will be assumed that the mechanical aerators provide the average of 1.5 kg of oxygen (O_2) per kW-hr of energy. The yearly energy requirement per cow is calculated as follows:

(1.1 kg/cow-day) ÷ (1.5 kg/kW-hr) x (365 day/year) = 267.67 kW/cow-year

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

[26] 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)

and the BOD loading from the baby calves will be 21% of milk cows.[27]

The dairy will house 3,200 Holstein milk cows; 540 dry cows; 200 heifers (15-24 months); 980 heifers (7-14 months), and 414 heifers (3-6 months). The amount of electricity required for complete aeration of the lagoon system is calculated as follows:

(3,200 milk cows x 267.67 kW/cow-year) + (540 dry cows x 0.8 x 267.67 kW/cow-year) + (200 large heifers (15-24 mo.) x 0.73 x 267.67 kW/cow-year) + (980 medium heifers (7-14 mo) x 0.35 x 267.67 kW/cow-year) + (414 small heifers (3-6 mo.) x 0.35 x 267.67 kW/cow-year)

= 1,141,853 kW-hr/year

Cost of Electricity for Complete Aeration:

The cost for electricity is based upon on an average retail price of industrial electricity in California for the year 2009 taken from the Energy Information Administration (EIA) Website: http://www.eia.doe.gov/cneaf/electricity/epm/table5_6_b.html.

Average Cost for electricity = $0.1056/kW-hr

The electricity costs for complete aeration are calculated as follows:

1,141,853 kW-hr/year x $0.1056/kW-hr
= $120,580/year

VOC Emission Reductions for Complete Aeration

Complete aeration is estimated to control at least 95% of the emissions from the lagoon and storage pond. The annual VOC emission reductions for the lagoons and storage ponds are calculated as follows:

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

[(3,200 milk cows x 0.74 lb-VOC/cow-year) + (540 dry cows x 0.40 lb-VOC/cow-year) + (1,600 support stock x 0.31 lb-VOC/cow-year)] x 0.95 + (3,200 milk cows x 1.33 lb-VOC/cow-year) + (540 dry cows x 0.72 lb-VOC/cow-year) + (1,600 support stock x 0.55 lb-VOC/cow-year)] x 0.95

= 2,926 lb-VOC/year + 5,249 lb-VOC/year
= 8,175 lb-VOC/year

Cost of VOC Emission Reductions

Cost of reductions = ($120,580/year)/((8,175 lb-VOC/year)(1 ton/2000 lb))
= **$29,500/ton of VOC reduced**

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

Covered Lagoon Anaerobic Digester:

Pursuant to Section 5.3 of the Settlement Agreement (9/20/2004) between the District and the Western United Dairyman and the Alliance of Western Milk Producers Inc, installation of an anaerobic digester will only be required if this technology is proven effective in reducing emissions and is required by the final Dairy BACT Guideline.[3]

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

Anaerobic Treatment Lagoon:

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

e. Step 5 - Select BACT

The facility is proposing an anaerobic treatment lagoon designed according to National Resource Conservation Service (NRCS) Guidelines. Additionally, the facility is proposing to install a covered anaerobic digester with biogas recovery if determined to be an effective emissions control in the final Dairy BACT guideline. Therefore, the BACT requirements are satisfied.

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

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

a. Step 1 - Identify all control technologies

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

The following practice has been identified as a possible control option for the NH_3 emissions from the lagoon and storage pond. No other control technologies that meet the definition of Achieved-in-Practice have been identified for the lagoon or storage pond.

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

Description of Control Technologies

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

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

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

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

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

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

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

a. Step 1 - Identify all control technologies

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

1. Lagoon PH maintained at a minimum of 7.8, with monitoring and recordkeeping, and adjustment with lime (or similar base) as needed

2. Feeding per NRC Guidelines

3. Solids Separation

4. Reduce or Eliminate the Use of Copper Sulfate as a Footbath Disinfectants

Description of Control Technologies

1) Lagoon pH Maintained at a Minimum of 7.8

Hydrogen Sulfide in the lagoon exists in both aqueous and vapor phases. The aqueous phase is represented by hydrogen sulfide (HS^-) and sulfide (S^{2-}) ions, whereas the vapor phase is represented by Hydrogen Sulfide gas. The determining factor of the proportion of each phase is pH. If the pH is low enough, virtually all Hydrogen Sulfide will exist in the vapor phase, and Hydrogen Sulfide gas emissions from the surface of the lagoon will be maximized. On the other hand, if the pH is high enough, virtually all the Hydrogen Sulfide will exist in the aqueous phase, and Hydrogen Sulfide gas emissions will be virtually non-existent.

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

2) Feeding per NRC Guidelines

H_2S is produced as a result of the decomposition of sulfur compounds in the manure under anaerobic conditions. The presence of these Sulfur compounds in the manure is primarily due to excretion of excess Sulfur from the digestive tract, as well as other inorganic sources[28].

Because both organic Nitrogen and Sulfur compounds are primarily components of amino acids, they tend to occur in set ratios and strategies to reduce the excretion of undigested protein and Nitrogen will also reduce the amount of Sulfur in the manure. A diet that is formulated to feed proper amounts of ruminantly-degradable protein will result in improved protein utilization by the animal and corresponding reduction in sulfur content of the manure, which will reduce the potential for production of H_2S.

3) Solids Separation

Solids separation will reduce loading and the amount of organic Sulfur compounds that are stored under anaerobic conditions, thereby reducing the potential for production of H_2S.

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

[28] http://www.epa.gov/ttnchie1/ap42/ch09/draft/draftanimalfeed.pdf

growth. This reduces the concentration of these compounds at the surface of the lagoons and reduces the rate of volatilization of these compounds to the atmosphere.

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

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

Some researchers recommended reducing or eliminating the use of Copper Sulfate as a means of reducing H_2S emissions from lagoons. This will reduce the amount of inorganic sulfur compounds that are stored under anaerobic conditions, thereby reducing the potential for production of H_2S. Copper Sulfate can also be detrimental to purple sulfur bacteria and other anaerobic microbes that reduce VOC and H_2S[29].

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

b. Step 2 - Eliminate technologically infeasible options

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

1) Lagoon pH Maintained at a Minimum of 7.8

This measure should not be considered because it would result in increased Ammonia emissions. Under pH conditions close to neutral or acidic (pH 7 or lower) Ammonia exists primarily as the soluble Ammonium ion, which is retained in the lagoon[30]. When the pH increases toward the basic range, the Ammonium ion is increasingly converted into the insoluble Ammonia phase and emitted into the atmosphere. Since under normal circumstances lagoon pH is close to neutral or is slightly acidic, it is reasonable to assume that the balance between H_2S and NH_3 emissions is somewhat optimal. Further, since NH_3 is generally present in significantly larger quantities than H_2S, leaving the pH in a natural range that may slightly favor H_2S emissions is more beneficial than influencing it into the basic range, which would favor NH_3 emissions.

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

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

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

[30] http://pubs.ext.vt.edu/442/442-110/442-110.html

has on H_2S emissions. Additional research is also needed regarding the effectiveness and practicality of the use of alternative disinfectants for the prevention of digital dermatitis. Therefore, this practice will not be required at this time but may be revaluated later.

c. Step 3 - Rank remaining options by control effectiveness

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

1) Feeding per NRC Guidelines

2) Solids Separation

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

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

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

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

a. Step 1 - Identify all control technologies

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

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

1) Aerobic Treatment Lagoon – mechanical aeration to achieve a dissolved oxygen concentration of 2.0 mg/L (≈ 95%)

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

3) Injection of Liquid and Slurry Manure (≈ 50%)

Description of Control Technologies

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

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

Sufficient oxygen must be provided to sustain the aerobic microorganisms in completely aerated lagoons. Lagoons can be considered completely aerobic if sufficient oxygen is provided to achieve a dissolved oxygen (DO) content of 2.0 mg/L or more. Oxygen is typically provided by mechanical aerators. These aerators may float on the lagoon surface or be submerged in the lagoon. Aeration can also be performed by injection of tiny air bubbles into the lagoon water, mixing of the lagoon water, or spraying of the water into the air. According to Dr. Ruihong Zhang, a researcher at the University of California, Davis, at least 95% VOC control can be achieved if the dissolved oxygen (DO) content of the liquid manure is 2.0 mg/L or more. A major disadvantage of completely aerated lagoons is the enormous cost of the energy required to run the aerators continuously. Because of this, it has been determined that completely aerated lagoons are not cost effective options for dairy facilities at the present time.

2) Anaerobic Treatment Lagoon

An anaerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of manure by microbes in the absence of oxygen. The process of anaerobic decomposition results in the preferential conversion of organic compounds in the wastewater into methane (CH_4), carbon dioxide (CO_2), and water rather than intermediate metabolites (VOCs). The National Resource Conservation Service (NRCS) California Field Office Technical Guide Code 359 - Waste Treatment Lagoon specifies criteria for the design of anaerobic treatment lagoons. A properly designed anaerobic treatment lagoon will reduce the Volatile Solids (VS) by at least 50% and will reduce the biological oxygen demand (BOD), which will result in greater efficiency in degrading compounds that contain carbon into methane and carbon dioxide rather than VOCs. Since 50% of the volatile solids in the liquid manure will have been removed or digested in the lagoon, there will be less volatile solids remaining in the effluent to decompose into VOCs. Although, the Volatile Solids reduction will be at least 50%, to be conservative a 40% control will be applied to irrigation from a storage pond after an anaerobic treatment lagoon.

3) Injection of Liquid and Slurry Manure

Liquid and slurry manure is used to irrigate crops on land farmed by dairies. Manure can either be injected into the soil or left on the surface of the soil and allowed to soak in. Because the liquid and slurry manure is high in Nitrogen, Phosphorus, and Potassium (N-P-K), it supplies nutrients needed by crops. Dairies have nutrient management programs to regulate the amount of liquid and slurry manure applied to cropland. This program is used to balance the specific nutrients applied to the crops, such as nitrogen, with the amount of nutrients that the crops can utilize. Balancing the needs of the crop with what is supplied helps to minimize contamination of ground water. During the process of liquid and slurry manure application to the crops VOC and NH_3 are emitted. Injecting manure hinders volatilization and speeds the uptake of nutrients that would degrade into gaseous pollutants. It is estimated that injection of manure will reduce VOC emissions from land application of manure by 50%.

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

b. Step 2 - Eliminate technologically infeasible options

Option 3 - Injection of Liquid and Slurry Manure

The Dairy Permitting Advisory Group (DPAG) found that injection of flushed manure was not be a feasible BACT option in their report of BACT options for dairies in the San Joaquin Valley.[31]

Injection is typically restricted to slurry manure that has been vacuumed from the cow housing or that has been removed from settling basins and/or weeping walls. Injection of flushed liquid manure from the lagoons is not considered feasible because the additional water from flushing increases the amount of liquid that must be transported by the trucks or honeywagons, which will generate more emissions. Because of the added time and expense, injection is not used for flushed liquid manure; therefore, this option will be removed from consideration at this time.

c. Step 3 - Rank remaining options by control effectiveness

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

[31] 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)

1) Aerobic Treatment Lagoon – mechanical aeration to achieve a dissolved oxygen concentration of 2.0 mg/L (≈ 95%)

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

d. Step 4 - Cost Effectiveness Analysis

Aerobic Treatment Lagoon:

The preceding cost analysis performed for the BACT analysis for VOC emissions from the lagoon and storage pond demonstrated that the energy costs alone, not including any capital costs, caused complete aeration to exceed the District VOC cost effectiveness threshold. Therefore, no further cost analysis is required for complete aeration.

Anaerobic Treatment Lagoon:

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

e. Step 5 - Select BACT

The facility is proposing an anaerobic treatment lagoon that is designed according to National Resource Conservation Service (NRCS) Guidelines. Additionally, the facility is proposing to install an anaerobic digester if determined to be an effective emissions control in the final Dairy BACT guideline. Therefore, the BACT requirements are satisfied.

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

2. BACT Analysis for NH_3 Emissions from the Liquid Manure Land Application

a. Step 1 - Identify all control technologies

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

definition of Achieved-in-Practice, pursuant to the Settlement Agreement (9/20/2004) between the District and Western United Dairyman and Alliance of Western Milk Producers Inc[3], the District will not deem any control options Achieved-in-Practice until after the Dairy BACT Guideline has been established.)

The following practice has been identified as a possible control option for the NH_3 emissions from the liquid manure land application. No other control technologies that meet the definition of Achieved-in-Practice have been identified for liquid manure land application.

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

Description of Control Technologies

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

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

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

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

d. Step 4 - Cost Effectiveness Analysis

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

required.

e. Step 5 - Select BACT

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

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

VI. Top Down BACT Analysis for the Solid Manure Handling and Land Application System

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

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

a. Step 1 - Identify all control technologies

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

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

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

destruction efficiency for both active and curing phases (or a combination of controls) (≈ 86.6%)

6) 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[32]. 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):

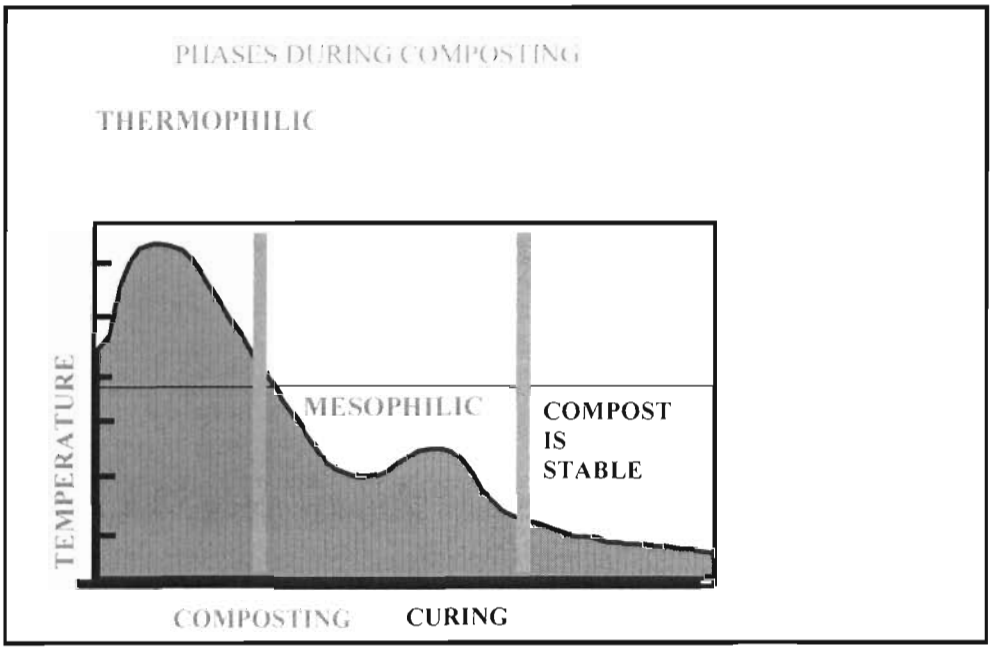
Conversely, the curing stage of the process is where the mesophilic microorganism population is the highest and the need for oxygen and evaporation rates decreases. The curing phase is defined in SCAQMD Rule 1133.2 as "a period that begins immediately after the active phase and lasts 40 days or until 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[33].

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 curing phases of composting[34].

[32] Page 8 of SCAQMD Rule 1133 final staff report
[33] SCAQMD Rule 1133 Technology Assessment
[34] Page 9-10, SCAQMD Final Staff Report for Proposed Rules 1133, 1133.1, and 1133.2.



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[35]: 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[36]. Increasing the carbon-to-nitrogen ratio by incorporating high carbon materials (leaves, plant residue, paper, sawdust, etc.) can reduce nitrogen loss.

[35] Proposed SCAQMD Rule 1133 (Pages 1-6)
[36] University of Nebraska-Lincoln

2) Negatively Aerated Static Pile (ASP)

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

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

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

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

A study conducted by City of Columbus, Ohio, demonstrated that the weighted-average odor emissions from an outdoor negative aeration pile is approximately 67% lower than those from an outdoor positive aeration pile. Negative aeration is usually used during the beginning of the composting process to greatly reduce odors. In enclosed active composting area, negative pressure aeration also reduces moisture released into the building, and thus, reduces fogging. Positive aeration is used mostly near the end of the composting cycle for more efficient drying of the compost[37].

An odor and emissions study done at the City of Philadelphia biosolids co-composting facility by the Department of Water[38] 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

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

[38] 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.

except that the exhaust gases are vented to a biofilter. As discussed above negative aeration appears to be more efficient in reducing odors and emissions than positive aeration.

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

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

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

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

Biofiltration is a well-established emission and control technology in Europe where over two hundred biofilters were in use as of 1984 and even more are expected today. In the United States, biofilters have been mainly utilized for the treatment of odors as well as VOCs in wastewater treatment plants. Based on the information collected by SCAQMD, existing biofilter composting applications have achieved control efficiencies of about 80% to 90% for VOC and 70% to over 90% for ammonia (one of this composting applications reported an initial control efficiency of 65 percent for VOC but was later improved to achieve an 80 percent control efficiency). This specific field example along with other available data presented in SCAQMD's Technology Assessment Report demonstrates that a well-designed, well-operated, and well-maintained biofilter is capable of achieving 80% control efficiency for VOC and ammonia[39].

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:

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

AgBag International Ltd.

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

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

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

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

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

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

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

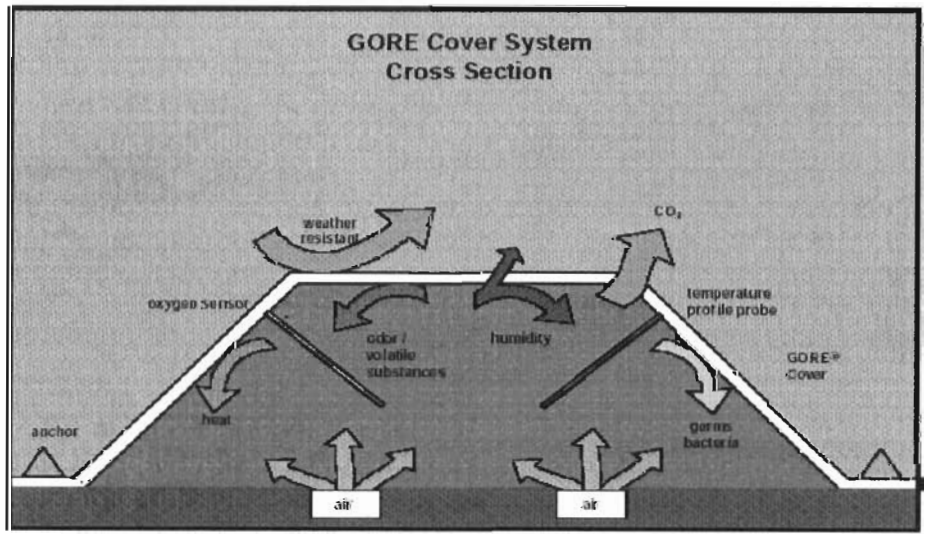
AgBag is working closely with SCAQMD and the Milk Producers Council to perform a pilot study to evaluate the efficiency of this technology. Until the study is completed, this technology will be conservatively assumed to control emissions by at least 10% more than open aerated static piles, with a minimum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

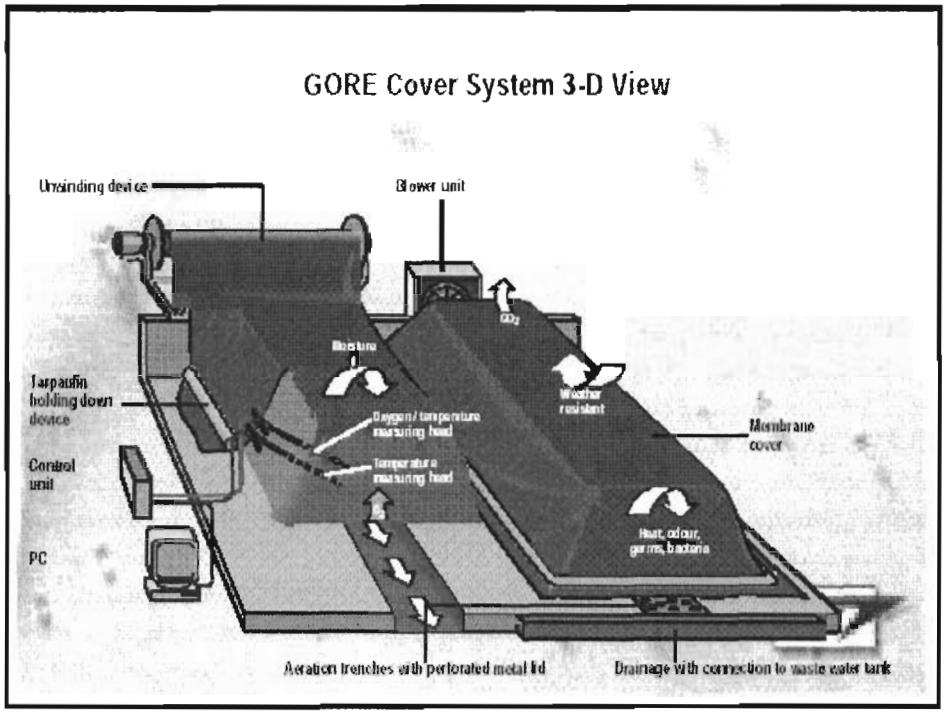


The system, according to Gore Cover, shortens the time required to produce finished, premium compost, as follows:

- 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[40].

Based on estimates in the Final DPAG Report - "Recommendations to the San Joaquin Valley Air Pollution Control Officer Regarding Best Available Control Technology for Dairies in the San Joaquin Valley", daily incorporation of solid manure removed from the cow housing will be assumed to have a 43% control efficiency for VOC emissions from solid manure handling and land application until data becomes available.

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) In-Vessel/Enclosed Negative Aerated Static Piles vented to biofilter $\geq$ 80% destruction efficiency for both active and curing phases (or a combination of controls) ($\approx$ 86.6%)[41]
2) Open Negatively Aerated Static Pile vented to biofilter $\geq$ 80% destruction efficiency for both active and curing phases (or a combination of controls) ($\approx$ 84.6%)[42]
3) Land Application with Immediate Incorporation ($\approx$ 43.5%)
4) Enclosed Negatively Aerated Static Pile ($\approx$ 33.2%)[43]

[40] 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)

[41] 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%

[42] 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%

[43] 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%.

5) Open Negatively Aerated Static Pile (ASP) (≈ 23.2%)[44]

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

A cost effectiveness was evaluated by SCAQMD for a variety of controls for new and existing co-composting facilities based on implementation of several possible scenarios. The cost effectiveness for new co-composting facilities was estimated to be about $24,000 to $27,000 per ton of VOC reduced or $11,000 to $12,000 per ton of VOC and ammonia reduced based on fabric or concrete type of enclosure for the active phase of composting and forced aeration system for the active and curing phases vented to a bio-filter[45].

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[46].

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.

[44] 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.

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

[46] 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)

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.

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 NH3 Emissions from Solid Manure Handling & Land Application:

a. Step 1 - Identify all control technologies

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

The following practices have been identified as a possible control option for the NH_3 emissions from the solid manure:

1) Animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.
2) Immediate Incorporation of Solid Manure into Cropland

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.

2) 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 Ammonia, thereby reducing overall emissions. Once the solid manure has been incorporated into the soil, Ammonia will remain predominantly in the nonvolatile Ammonium ion (NH_4^+) phase, thus increasing chances for uptake by crops.

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.

2) Immediate Incorporation of Solid Manure into cropland

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. In addition, solid manure will be incorporated into soil immediately after land application.

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.

VII. Top Down BACT Analysis for the 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.

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 3.1.1
Last Update: 7/10/2009
Emergency Diesel IC Engine

Pollutant	Achieved in Practice or in the SIP	Technologically Feasible	Alternate Basic Equipment
CO	Latest EPA Tier Certification level for applicable horsepower range		
NOX	Latest EPA Tier Certification level for applicable horsepower range		
PM10	0.15 g/hp-hr or the Latest EPA Tier Certification level for applicable horsepower range, whichever is more stringent. (ATCM)		
SOX	Very low sulfur diesel fuel (15 ppmw sulfur or less)		
VOC	Latest EPA Tier Certification level for applicable horsepower range		

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a state implementation plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

Top Down BACT Analysis for the Emergency IC Engine (N-7056-6-0)

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

1. BACT Analysis for NO_X and VOC Emissions:

a. Step 1 - Identify all control technologies

BACT Guideline 3.1.1 identifies only the following option:

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

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

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

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

Title 17 CCR, Section 93115.8(a)(1)(A) (CARB stationary diesel engine ATCM) applies to diesel-fired engines used in agricultural operations and requires that such engines be certified to the emission levels shown in Table 6. Please note that these levels are at least as stringent or more stringent than the emission levels in 40 CFR Subpart IIII.

Table 6: Summary of the Emission Standards for New Stationary Diesel-Fueled CI Engines > 50 BHP Used in Agricultural Operations (See section 93115.8(a))

Horsepower Range (hp)	*Diesel PM*	*Other Pollutants*
	Diesel PM Standards (g/bhp-hr)	*HC, NOx, NMHC+NOx, and CO Standards (g/bhp-hr)*
All Applications Greater Than 50 But Less Than 100, Other Than Generator Sets	Less Than or Equal to 0.30[1] OR Off-Road CI Engine Certification Standard for an off-road engine of the same maximum rated power, whichever is more stringent	Off-Road CI Engine Certification Standard for an off-road engine of the model year and maximum rated power of the engine installed to meet the applicable PM standard, or Tier 1 standards.[1]
All Applications Greater Than or Equal to 100 But Less Than 175, Other Than Generator Sets	Less Than or Equal to 0.22[1] OR Off-Road CI Engine Certification Standard for an off-road engine of the same maximum rated power, whichever is more stringent	
All Applications Greater Than or Equal to 175, Other Than Generator Sets	Less than or Equal to 0.15[1] OR Off-Road Engine Certification Standard for an off-road engine of the same maximum rated power, whichever is more stringent	
Generator Set Engines Greater Than 50	Less Than or Equal to 0. 15[1] OR Off-Road CI Engine Certification Standard for an off-road engine of the same maximum rated power, whichever is more stringent.	

1. Prior to January 1, 2008, these limits shall not apply to engines sold from one agricultural operation to another and funded under State or federal incentive funding programs, as pecified in 93115.8(a)(2).

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

Therefore, the most stringent applicable emission standards are those listed in the CARB ATCM (Table 6).

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

The proposed engine is rated at 550 hp and was installed in 2005. Therefore, the applicable control technology for is EPA Tier 2 certification.

2. BACT Analysis for PM_{10} Emissions:

a. Step 1 - Identify all control technologies

BACT Guideline 3.1.1 identifies only the following option:

- *0.15 g/bhp-hr or the Latest EPA Tier Certification level for applicable horsepower range, whichever is more stringent. (ATCM)*

The latest EPA Tier Certification level for an engine of the proposed model year and horsepower rating is Tier 2. Refer to the Top-Down BACT analysis for NOx for a discussion regarding the determination of the EPA Tier level to be considered.

Please note Tier 2 or 3 IC engines do not have a PM emission standard that is more stringent than 0.15 g/hp-hr. Additionally, the ATCM requires a PM emission standard of 0.15 g/hp-hr for all new emergency diesel IC engines.

Therefore, a PM/PM10 emission standard of 0.15 g/hp-hr is required as BACT.

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

BACT for PM10 is emissions of 0.15 g/hp-hr or less. The applicant is proposing an engine that meets this requirement. Therefore, BACT will be satisfied.

Top Down BACT Analysis for the Irrigation Engine (N-7056-7-0 through 11-0)

Emission Unit: Stationary Compression-Ignited AO IC Engines

Industry Type: Agriculture

Equipment Rating: ≤ 1,000 bhp

Last Update: June 1, 2006

Pollutant	Achieved in Practice	Technologically Feasible	Alternate Basic Equipment
VOC	• The proposed engine shall meet the latest available CARB certification standard for the particular horsepower range. (Example: a 200 bhp engine proposed in 2007 shall emit ≤ 0.149 g-PM10/bhp-hr if triggers BACT for PM10)		• Electrification • NG Fired Engine to meet 4702 • LPG/Propane Fired Engine to meet 4702
NO_x		SCR	
CO			
PM_{10}		PM Filter	• Electrification • NG Fired Engine • LPG/Propane Fired Engine
SO_x	• Very Low Sulfur Fuel (0.0015% fuel S by weight)		

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a state implementation plan must be cost effective as well as feasible. A cost effectiveness analysis is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

*This is a Summary Page for this Class of Source

3rd Quarter 2006

Top-Down BACT Analysis for NO_x Emissions

I. Step 1 - Identify All Possible Control Technologies

Option 1: Latest Available Certified Compression-Ignited Engine, Achieved in Practice (AIP)

Option 2: Natural Gas Fueled Engine, Alternate Basic Equipment (ABE)

Option 3: Propane/Liquid Petroleum Gas (ABE)

Option 4: Electrification (ABE)

Option 5: SCR, Technologically Feasible (TF)

II. Step 2 - Eliminate Technologically Infeasible Options

Even though all the listed options are technologically feasible, options 2, 3 and 4 are eliminated at this point because this BACT Analysis is being conducted for engines that have already been installed. The engines were installed in 2005 without Authority to Construct permits. Since the engines were installed with BACT, District Guidance stipulates that the current BACT analysis is limited to the types of controls that can be applied to the specific equipment that has already been installed.

III. Step 3 - Rank Technologies

Control Technology	Rank	Emissions	Technology Classification for BACT
SCR	1	≥ 85% NO_x reduction (≤ 0.8 g/bhp-hr)	TF
Latest Certification	2	Latest Tier Certification Level	AIP

IV. Step 4 - Cost Effectiveness Analyses

Cost Effectiveness Analysis: SCR

As demonstrated in the attached cost analyses, an SCR system for any engine 50 – 600 bhp being operated 1,440 hours/yr or less is not cost effective.

Cost Effectiveness Analysis: Latest Available Certified Compression-Ignited Engine

Per District BACT Policy, a cost effectiveness analysis is not required for AIP controls since the control must be implemented.

V. Step 5 - Select BACT

The remaining control not eliminated in Step 4 (latest available certification) is considered AIP BACT for this class and category of source. The engines are all tier certified, and complied with the certification level that was the most stringent at the time of installation in 2005; therefore, BACT is satisfied.

Stationary Irrigation Pump Tech. Feasible Cost Analysis: Selective Catalytic Reduction

Assumptions

Industry Standard NOx EF, Tier 3 for 50-100 hp:	3.33 g/bhp-hr
Industry Standard NOx EF, Tier 3 for 101-751 hp:	2.85 g/bhp-hr
Industry Standard NOx EF, Tier 2 for >751 hp:	4.66 g/bhp-hr
Operating Schedule:	1,440 hours/year
NOx Cost Effectiveness Threshold:	24,500 $/ton
SCR NOx Reduction:	85%
Capity Recovery Factor (10%, 10 years):	0.163
Ag engine annual average operating load fator:	65%

Cost Effectiveness Threshold (SCR)				
Engine Rating (bhp)	NOx Reductions (tons/year)	Cost Effectiveness Threshold ($/yr)	SCR Cost ($/yr)[1]	Cost Effective?
50	0.1	$21,915	$213,333	NO
101	0.3	$44,267	$213,333	NO
150	0.4	$56,352	$213,333	NO
200	0.5	$75,135	$213,333	NO
250	0.6	$93,919	$213,333	NO
300	0.7	$112,703	$213,333	NO
400	1.0	$150,271	$213,333	NO
500	1.2	$187,839	$373,333	NO
600	1.5	$225,406	$373,333	NO
752	3.1	$461,432	$373,333	YES
800	3.3	$490,885	$373,333	YES
900	3.7	$552,246	$373,333	YES
1,000	4.1	$613,606	$373,333	YES

[1]Capital cost is per Johson-Mathey; 25% has been added for tax and installation. This cost does n operational costs such as the urea cost of $2.50/gal.

APPENDIX F

Draft ATCs

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: N-7056-1-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: VELDHUIS NORTH DAIRY
MAILING ADDRESS: 12465 LEE RD
BALLICO, CA 95303

LOCATION: 12465 LEE RD
BALLICO, CA 95303

EQUIPMENT DESCRIPTION:
3,200 COW MILKING OPERATION WITH ONE 90-STALL (PARALLEL) MILKING PARLOR.

CONDITIONS

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

DRAFT

DAVID WARNER, Director of Permit Services
N-7056-1-0 : Jun 4 2012 1:20PM – AIYABEIJ : Joint Inspection NOT Required

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

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: N-7056-2-0

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: VELDHUIS NORTH DAIRY
MAILING ADDRESS: 12465 LEE RD
BALLICO, CA 95303

LOCATION: 12465 LEE RD
BALLICO, CA 95303

EQUIPMENT DESCRIPTION:
COW HOUSING - 3,200 MILK COWS, NOT TO EXCEED A COMBINED TOTAL OF 3,740 MATURE COWS (MILK AND DRY), AND 1,600 TOTAL SUPPORT STOCK (HEIFERS, CALVES, AND BULLS).

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 total number of cows housed at this dairy at any one time shall not exceed any of the following limits: 3,200 milk cows; not to exceed a combined total of 3,740 mature cows (milk and dry); and 1,600 support stock (heifers, calves and bulls). [District Rule 2201]

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

DAVID WARNER, Director of Permit Services
N-7056-2-0 : Jun 4 2012 1:20PM – AIYABEIJ : Joint Inspection NOT Required

5. Permittee shall pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers. [District Rules 2201 and 4570]
6. The concrete feed lanes and walkways for milk cows shall be flushed at least four times per day. [District Rules 2201 and 4570]
7. The concrete feed lanes and walkways for all other cows shall be flushed at least two times per day. [District Rules 2201 and 4570]
8. Permittee shall maintain an operating plan that requires the feed lanes and walkways to be flushed at least four times per day for milk cows and at least two times per day for all other cows. [District Rules 2201 and 4570]
9. All cows at this dairy shall be fed in accordance with the National Research Council (NRC) guidelines utilizing routine dairy nutritionist analyses of rations. [District Rule 2201]
10. Heifers at this dairy shall be fed near (within one hour of) dusk. [District Rule 2201]
11. Inspection for potholes or other sources of emissions shall be performed on a monthly basis. [District Rule 2201]
12. Firm, stable, and not easily eroded soils shall be used for the exercise pens. [District Rule 2201]
13. A supply of fill soil shall be kept on site in order to fill areas where erosion and gouging occurs. This fill soil shall be covered with a tarp. [District Rule 2201]
14. Clean rainfall runoff shall be diverted around exercise pens to reduce the amount of water that is potentially detained on the exercise pen surfaces. [District Rule 2201]
15. {4492} Permittee shall remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every seven (7) days. [District Rule 4570]
16. {4493} Permittee shall record the date that manure that is not dry is removed from individual cow freestall beds or raked, harrowed, scraped, or freestall bedding is graded at least once every seven (7) days. [District Rule 4570]
17. {4499} Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rule 4570]
18. {4500} Permittee shall maintain records demonstrating that water pipes and troughs are inspected and leaks are repaired at least once every seven (7) days. [District Rule 4570]
19. {4501} Permittee shall clean manure from corrals at least four (4) times per year with at least sixty (60) days between each cleaning, or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rule 4570]
20. {4502} Permittee shall record the date that animal waste is cleaned from corrals or demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning. [District Rule 4570]
21. Permittee shall implement at least one of the following corral mitigation measures: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 square feet or less and shall slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 square feet per animal; 2) maintain corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface except during periods of rainy weather. [District Rules 2201 and 4570]
22. {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]
23. The open corrals shall be scraped weekly using a pull-type scraper in the morning hours, except when this is prevented by wet conditions. [District Rule 2201]
24. The open corrals shall be equipped with shade structures constructed with light-permeable roofing materials. [District Rules 2201 and 4570]

CONDITIONS CONTINUE ON NEXT PAGE

25. {4512} Permittee shall maintain records, such as design specifications, demonstrating that the shade structures are equipped with a light permeable roofing material. [District Rule 4570]

26. Calf housing, if present, shall consist of aboveground hutches over paved flush lanes. [District Rule 2201]

27. Permittee shall establish windbreaks along the entire Eastern and Southern boundaries of the open corral housing areas. Windbreaks shall consist of two rows of Italian Cypress trees, planted 9 feet apart. Each row should be offset from the adjacent row. Spacing between rows shall be sufficient to accommodate cultivation equipment, but shall not exceed 24 feet. An alternative windbreak proposal must be approved by the District. [District Rule 2201]

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

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

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

31. {4518} Permittee shall manage corrals such that the manure depth in the corral does not exceed twelve (12) inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rule 4570]

32. {4519} Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rule 4570]

33. Permittee shall maintain records of: (1) the number of times concrete feed lanes and walkways are flushed per day, (2) the frequency of scraping and manure removal from open corrals; and (3) a log of pothole inspections performed at the dairy. [District Rules 2201 and 4570]

34. 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 records, ration sheets or periodic inventory records. [District Rules 2201 and 4570]

35. {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]

36. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: N-7056-3-0

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: VELDHUIS NORTH DAIRY
MAILING ADDRESS: 12465 LEE RD
BALLICO, CA 95303

LOCATION: 12465 LEE RD
BALLICO, CA 95303

EQUIPMENT DESCRIPTION:
LIQUID MANURE HANDLING SYSTEM CONSISTING OF 6 SETTLING BASINS, ONE ANAEROBIC TREATMENT/STORAGE LAGOON (2,352'X180'X22'), AND LAND APPLICATION OF LIQUID MANURE 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 3,200 milk cows; not to exceed a combined total of 3,740 mature cows (milk and dry); and 1,600 support stock (heifers, calves and bulls). [District Rule 2201]

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

DAVID WARNER, Director of Permit Services
N-7056-3-0 : Jun 4 2012 1:20PM – AIYABEIJ : Joint Inspection NOT Required

5. The liquid manure lagoon shall be designed, constructed and operated according to the anaerobic treatment lagoon requirements of NCRCS Guideline No. 359. A minimum liquid manure depth of 6 feet shall be retained in the lagoon at all times. [District Rules 2201 and 4570]

6. Permittee shall maintain design specifications, calculations, including Minimum Treatment Volume (MTV), Hydraulic Retention Time (HRT) demonstrating that the anaerobic treatment lagoon meets the requirements listed in the NRCS Field Office Technical Guide Code 359. [District Rules 2201 and 4570]

7. The average concentration of undissociated hydrogen sulfide (H2S) at the surface of the lagoon(s) and storage pond(s) shall not exceed 5 mg/L during any calendar quarter. The concentration of undissociated H2S at the surface of each lagoon and storage pond shall be calculated using the monitored values for the total sulfide concentration, pH, and temperature. The fraction of total sulfide that is undissociated H2S shall be calculated using the formula (10^-pH)/(10^-pH + Ka1), where Ka1 is the temperature-adjusted dissociation constant for H2S; or the procedures outlined in Standard Methods 4500-S2- H; or using other procedures approved by the District. [District Rules 2201 and 4102]

8. The total sulfide concentration, pH, and temperature at the surface of each lagoon and storage pond shall be monitored and recorded at least once every calendar quarter and at other times requested by the District. If the average calculated undissociated H2S concentration from monitoring the lagoon(s) and pond(s) exceeds the maximum allowed concentration, the permittee shall monitor and record the total sulfide concentration, pH, and temperature at the surface of at least two other locations in each lagoon and pond as soon as possible, but no longer than 24 hours after results were available from the initial monitoring indicating a potential exceedance. The undissociated H2S concentration calculated from the initial monitoring locations and the secondary monitoring locations for the lagoons and ponds shall be averaged. If the calculated average concentration of undissociated H2S continues exceed the maximum allowed limit, then the total sulfide concentration, pH, and temperature at the surface of each lagoon and storage pond shall be monitored and recorded monthly until three consecutive months of monitoring show compliance, after which the monitoring frequency may return to quarterly. For each secondary storage pond that has a liquid depth of no greater than 5 feet during the monitoring period, the concentration of undissociated H2S may be considered negligible and monitoring shall not be required. Records of the results of monitoring of the sulfide concentration, pH, and temperature at the surface of each lagoon and storage pond and the maximum depth of storage ponds during periods that they are not monitored shall be maintained. The District may also approve alternative monitoring frequencies and/or parameters. [District Rules 2201 and 4102]

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

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

11. {4550} Permittee shall not allow liquid manure to stand in the fields for more than twenty-four (24) hours after irrigation. [District Rule 4570]

12. {4551} Permittee shall maintain records to demonstrate liquid manure did not stand in the fields for more than twenty-four (24) hours after irrigation. [District Rule 4570]

13. {4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]

14. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: N-7056-4-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: VELDHUIS NORTH DAIRY
MAILING ADDRESS: 12465 LEE RD
BALLICO, CA 95303

LOCATION: 12465 LEE RD
BALLICO, CA 95303

EQUIPMENT DESCRIPTION:
SOLID MANURE HANDLING CONSISTING OF MANURE STOCKPILES AND LAND APPLICATION.

CONDITIONS

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

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (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

DRAFT

DAVID WARNER, Director of Permit Services
N-7056-4-0 : Jun 4 2012 1:20PM – AIYABEIJ : Joint Inspection NOT Required

5. {4527} Permittee shall keep records of dates when manure is removed from the facility or permittee shall maintain records to demonstrate that dry manure piles outside the pens are covered with a weatherproof covering from October through May. [District Rule 4570]

6. {4528} If weatherproof coverings are used, permittee shall maintain records, such as manufacturer warranties or other documentation, demonstrating that the weatherproof covering over dry manure are installed, used, and maintained in accordance with manufacturer recommendations and applicable standards listed in NRCS Field Office Technical Guide Code 313 or 367, or any other applicable standard approved by the APCO, ARB, and EPA. [District Rule 4570]

7. Permittee shall incorporate all solid manure within seventy-two (72) hours of land application. [District Rules 2201 and 4570]

8. Permittee shall maintain records to demonstrate that all solid manure has been incorporated within seventy-two (72) hours of land application. [District Rules 2201 and 4570]

9. {4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]

10. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: N-7056-5-0

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: VELDHUIS NORTH DAIRY
MAILING ADDRESS: 12465 LEE RD
BALLICO, CA 95303

LOCATION: 12465 LEE RD
BALLICO, CA 95303

EQUIPMENT DESCRIPTION:
FEED HANDLING AND STORAGE CONSISTING OF SILAGE PILES.

CONDITIONS

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

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

DAVID WARNER, Director of Permit Services
N-7056-5-0 : Jun 4 2012 1:20PM – AIYABEIJ : Joint Inspection NOT Required

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

CONDITIONS CONTINUE ON NEXT PAGE

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

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

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

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

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

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

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

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

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

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

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

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: N-7056-6-0

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: VELDHUIS NORTH DAIRY
MAILING ADDRESS: 12465 LEE RD
BALLICO, CA 95303

LOCATION: 12465 LEE RD
BALLICO, CA 95303

EQUIPMENT DESCRIPTION:
550 HP CUMMINS MODEL VTA171063 TIER 2 DIESEL-FIRED EMERGENCY STANDBY IC ENGINE POWERING AN ELECTRICAL GENERATOR.

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. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
4. {14} Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]
5. {15} No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]
6. This engine shall only be used for the growing of crops or raising of fowl or animals. [District Rule 4701]
7. Only CARB certified diesel fuel containing not more than 0.0015% sulfur by weight shall be consumed by the engine. [District Rules 2201, 4201 and 4801; and 17 CCR 93115]
8. Emissions from this IC engine shall not exceed any of the following limits: 3.79 g-NOx/bhp-hr, 2.6 g-CO/bhp-hr, or 0.12 g-VOC/bhp-hr. [District Rule 2201 and 17 CCR 93115]

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

DRAFT

DAVID WARNER, Director of Permit Services
N-7056-6-0 : Jun 4 2012 1:21PM – AIYABEIJ : Joint Inspection NOT Required

9. Emissions from this IC engine shall not exceed 0.088 g-PM10/bhp-hr based on USEPA certification using ISO 8178 test procedure. [District Rules 2201 and 4102; and 17 CCR 93115]

10. The permittee shall maintain monthly records of the type of fuel purchased. [District Rule 4702 and 17 CCR 93115]

11. This engine shall be equipped with an operational non-resettable elapsed time meter or other APCO approved alternative. [District Rules 2201 and 4702; and 17 CCR 93115]

12. This engine shall be operated only for maintenance, testing, required regulatory purposes, and during emergency situations. Operation of the engine for maintenance, testing, and required regulatory purposes shall not exceed 100 hours per year. [District Rules 2201 and 4702]

13. {3405} This engine shall be operated and maintained in proper operating condition as recommended by the engine manufacturer or emissions control system supplier. [District Rule 4702]

14. {3478} During periods of operation for maintenance, testing, and required regulatory purposes, the permittee shall monitor the operational characteristics of the engine as recommended by the manufacturer or emission control system supplier (for example: check engine fluid levels, battery, cables and connections; change engine oil and filters; replace engine coolant; and/or other operational characteristics as recommended by the manufacturer or supplier). [District Rule 4702]

15. {3807} An emergency situation is an unscheduled electrical power outage caused by sudden and reasonably unforeseen natural disasters or sudden and reasonably unforeseen events beyond the control of the permittee. [District Rule 4702]

16. {3808} This engine shall not be used to produce power for the electrical distribution system, as part of a voluntary utility demand reduction program, or for an interruptible power contract. [District Rule 4702]

17. The permittee shall maintain monthly records of emergency and non-emergency operation. Records shall include the number of hours of emergency operation, the date and number of hours of all testing and maintenance operations, the purpose of the operation (for example: load testing, weekly testing, rolling blackout, general area power outage, etc.) and records of operational characteristics monitoring. For units with automated testing systems, the operator may, as an alternative to keeping records of actual operation for testing purposes, maintain a readily accessible written record of the automated testing schedule. [District Rules 2201 and 4702; and 17 CCR 93115]

18. {3475} All records shall be maintained and retained on-site for a minimum of five (5) years, and shall be made available for District inspection upon request. [District Rule 4702 and 17 CCR 93115]

19. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: N-7056-7-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: VELDHUIS NORTH DAIRY
MAILING ADDRESS: 12465 LEE RD
BALLICO, CA 95303

LOCATION: 12465 LEE RD
BALLICO, CA 95303

EQUIPMENT DESCRIPTION:
220 HP VOLVO MODEL TAD941VE (S/N: D9A2A2009012391) TIER 2 DIESEL-FIRED IC ENGINE POWERING A WELL PUMP.

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. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
4. {14} Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]
5. {15} No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]
6. This engine shall only be used for the growing of crops or raising of fowl or animals. [District Rule 4701]
7. Operation of this engine shall not exceed 1,440 hours per year. [District Rule 2201]
8. Emissions from this IC engine shall not exceed any of the following limits: 4.25 g-NOx/bhp-hr, 0.6 g-CO/bhp-hr, or 0.12 g-VOC/bhp-hr. [District Rule 2201 and 17 CCR 93115]
9. Emissions from this IC engine shall not exceed 0.119 g-PM10/bhp-hr based on USEPA certification using ISO 8178 test procedure. [District Rules 2201 and 4102; and 17 CCR 93115]

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

DAVID WARNER, Director of Permit Services
N-7056-7-0 : Jun 19 2012 2:18PM – AIYABEIJ : Joint Inspection NOT Required

10. The engine shall be equipped with an operational nonresettable elapsed time meter or other APCO approved alternative. [District Rules 2201 and 4702]

11. {3844} The engine shall be operated and maintained in proper operating condition as recommended by the engine manufacturer or emissions control system supplier. [District Rule 4702]

12. {3845} During periods of operation, the permittee shall monitor the operational characteristics of the engine as recommended by the manufacturer or emission control system supplier (for example: check engine fluid levels, battery, cables and connections, change engine oil and filters, replace engine coolant, and/or other operational characteristics as recommended by the manufacturer or supplier). [District Rule 4702]

13. Only CARB certified diesel fuel containing not more than 0.0015% sulfur by weight shall be consumed by the engine. [District Rules 2201 and 4801; and 17 CCR 93115]

14. {4263} The permittee shall maintain monthly records of the type of fuel purchased. [District Rule 4702 and 17 CCR 93115]

15. {3847} The permittee shall maintain an engine-operating log that includes, on a monthly basis, the following information: total hours of operation, type of fuel used, maintenance or modifications performed, monitoring data, and any other information necessary to demonstrate compliance with Rule 4702. [District Rule 4702]

16. {3873} All records shall be maintained and retained on-site for a period of at least 5 years and shall be made available for District inspection upon request. [District Rule 4702]

17. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: N-7056-8-0

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: VELDHUIS NORTH DAIRY
MAILING ADDRESS: 12465 LEE RD
BALLICO, CA 95303

LOCATION: 12465 LEE RD
BALLICO, CA 95303

EQUIPMENT DESCRIPTION:
187 HP JOHN DEERE MODEL 6081HF0706 (S/N: RG6081H254713) TIER 2 DIESEL-FIRED IC ENGINE POWERING A WELL PUMP.

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. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
4. {14} Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]
5. {15} No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]
6. This engine shall only be used for the growing of crops or raising of fowl or animals. [District Rule 4701]
7. Operation of this engine shall not exceed 600 hours per year. [District Rule 2201]
8. Emissions from this IC engine shall not exceed any of the following limits: 4.55 g-NOx/bhp-hr, 0.6 g-CO/bhp-hr, or 0.12 g-VOC/bhp-hr. [District Rule 2201 and 17 CCR 93115]
9. Emissions from this IC engine shall not exceed 0.112 g-PM10/bhp-hr based on USEPA certification using ISO 8178 test procedure. [District Rules 2201 and 4102; and 17 CCR 93115]

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

DRAFT

DAVID WARNER, Director of Permit Services
N-7056-8-0 : Jun 19 2012 2:18PM – AIYABEIJ : Joint Inspection NOT Required

10. The engine shall be equipped with an operational nonresettable elapsed time meter or other APCO approved alternative. [District Rules 2201 and 4702]

11. {3844} The engine shall be operated and maintained in proper operating condition as recommended by the engine manufacturer or emissions control system supplier. [District Rule 4702]

12. {3845} During periods of operation, the permittee shall monitor the operational characteristics of the engine as recommended by the manufacturer or emission control system supplier (for example: check engine fluid levels, battery, cables and connections, change engine oil and filters, replace engine coolant, and/or other operational characteristics as recommended by the manufacturer or supplier). [District Rule 4702]

13. Only CARB certified diesel fuel containing not more than 0.0015% sulfur by weight shall be consumed by the engine. [District Rules 2201 and 4801; and 17 CCR 93115]

14. {4263} The permittee shall maintain monthly records of the type of fuel purchased. [District Rule 4702 and 17 CCR 93115]

15. {3847} The permittee shall maintain an engine-operating log that includes, on a monthly basis, the following information: total hours of operation, type of fuel used, maintenance or modifications performed, monitoring data, and any other information necessary to demonstrate compliance with Rule 4702. [District Rule 4702]

16. {3873} All records shall be maintained and retained on-site for a period of at least 5 years and shall be made available for District inspection upon request. [District Rule 4702]

17. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: N-7056-9-0

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: VELDHUIS NORTH DAIRY
MAILING ADDRESS: 12465 LEE RD
BALLICO, CA 95303

LOCATION: 12465 LEE RD
BALLICO, CA 95303

EQUIPMENT DESCRIPTION:
205 HP JOHN DEERE MODEL 6081HF070L (S/N: RG6081H230540) TIER 2 DIESEL-FIRED IC ENGINE POWERING A WELL PUMP.

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. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
4. {14} Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]
5. {15} No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]
6. This engine shall only be used for the growing of crops or raising of fowl or animals. [District Rule 4701]
7. Operation of this engine shall not exceed 800 hours per year. [District Rule 2201]
8. Emissions from this IC engine shall not exceed any of the following limits: 4.55 g-NOx/bhp-hr, 0.6 g-CO/bhp-hr, or 0.12 g-VOC/bhp-hr. [District Rule 2201 and 17 CCR 93115]
9. Emissions from this IC engine shall not exceed 0.112 g-PM10/bhp-hr based on USEPA certification using ISO 8178 test procedure. [District Rules 2201 and 4102; and 17 CCR 93115]

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

DAVID WARNER, Director of Permit Services
N-7056-9-0 : Jun 19 2012 2:20PM – AIYABEJ : Joint Inspection NOT Required

10. The engine shall be equipped with an operational nonresettable elapsed time meter or other APCO approved alternative. [District Rules 2201 and 4702]

11. {3844} The engine shall be operated and maintained in proper operating condition as recommended by the engine manufacturer or emissions control system supplier. [District Rule 4702]

12. {3845} During periods of operation, the permittee shall monitor the operational characteristics of the engine as recommended by the manufacturer or emission control system supplier (for example: check engine fluid levels, battery, cables and connections, change engine oil and filters, replace engine coolant, and/or other operational characteristics as recommended by the manufacturer or supplier). [District Rule 4702]

13. Only CARB certified diesel fuel containing not more than 0.0015% sulfur by weight shall be consumed by the engine. [District Rules 2201 and 4801; and 17 CCR 93115]

14. {4263} The permittee shall maintain monthly records of the type of fuel purchased. [District Rule 4702 and 17 CCR 93115]

15. {3847} The permittee shall maintain an engine-operating log that includes, on a monthly basis, the following information: total hours of operation, type of fuel used, maintenance or modifications performed, monitoring data, and any other information necessary to demonstrate compliance with Rule 4702. [District Rule 4702]

16. {3873} All records shall be maintained and retained on-site for a period of at least 5 years and shall be made available for District inspection upon request. [District Rule 4702]

17. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: N-7056-10-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: VELDHUIS NORTH DAIRY
MAILING ADDRESS: 12465 LEE RD
BALLICO, CA 95303

LOCATION: 12465 LEE RD
BALLICO, CA 95303

EQUIPMENT DESCRIPTION:
74 HP JOHN DEERE MODEL 4045TF270B (S/N: PE4045T408066) TIER 2 DIESEL-FIRED IC ENGINE POWERING AN IRRIGATION PUMP.

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. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
4. {14} Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]
5. {15} No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]
6. This engine shall only be used for the growing of crops or raising of fowl or animals. [District Rule 4701]
7. Operation of this engine shall not exceed 800 hours per year. [District Rule 2201]
8. Emissions from this IC engine shall not exceed any of the following limits: 4.40 g-NOx/bhp-hr, 0.7 g-CO/bhp-hr, or 0.23 g-VOC/bhp-hr. [District Rule 2201 and 17 CCR 93115]
9. Emissions from this IC engine shall not exceed 0.231 g-PM10/bhp-hr based on USEPA certification using ISO 8178 test procedure. [District Rules 2201 and 4102; and 17 CCR 93115]

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

DRAFT

DAVID WARNER, Director of Permit Services
N-7056-10-0: Jun 19 2012 2:20PM -- AIYABEIJ : Joint Inspection NOT Required

10. The engine shall be equipped with an operational nonresettable elapsed time meter or other APCO approved alternative. [District Rules 2201 and 4702]

11. {3844} The engine shall be operated and maintained in proper operating condition as recommended by the engine manufacturer or emissions control system supplier. [District Rule 4702]

12. {3845} During periods of operation, the permittee shall monitor the operational characteristics of the engine as recommended by the manufacturer or emission control system supplier (for example: check engine fluid levels, battery, cables and connections, change engine oil and filters, replace engine coolant, and/or other operational characteristics as recommended by the manufacturer or supplier). [District Rule 4702]

13. Only CARB certified diesel fuel containing not more than 0.0015% sulfur by weight shall be consumed by the engine. [District Rules 2201 and 4801; and 17 CCR 93115]

14. {4263} The permittee shall maintain monthly records of the type of fuel purchased. [District Rule 4702 and 17 CCR 93115]

15. {3847} The permittee shall maintain an engine-operating log that includes, on a monthly basis, the following information: total hours of operation, type of fuel used, maintenance or modifications performed, monitoring data, and any other information necessary to demonstrate compliance with Rule 4702. [District Rule 4702]

16. {3873} All records shall be maintained and retained on-site for a period of at least 5 years and shall be made available for District inspection upon request. [District Rule 4702]

17. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: N-7056-11-0

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: VELDHUIS NORTH DAIRY
MAILING ADDRESS: 12465 LEE RD
BALLICO, CA 95303

LOCATION: 12465 LEE RD
BALLICO, CA 95303

EQUIPMENT DESCRIPTION:
168 HP JOHN DEERE MODEL 6081HF275 (S/N: PE608H536336) TIER 2 DIESEL-FIRED IC ENGINE POWERING A WELL PUMP.

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. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
4. {14} Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]
5. {15} No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]
6. This engine shall only be used for the growing of crops or raising of fowl or animals. [District Rule 4701]
7. Operation of this engine shall not exceed 800 hours per year. [District Rule 2201]
8. Emissions from this IC engine shall not exceed any of the following limits: 4.40 g-NOx/bhp-hr, 0.4 g-CO/bhp-hr, or 0.19 g-VOC/bhp-hr. [District Rule 2201 and 17 CCR 93115]
9. Emissions from this IC engine shall not exceed 0.134 g-PM10/bhp-hr based on USEPA certification using ISO 8178 test procedure. [District Rules 2201 and 4102; and 17 CCR 93115]

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

DAVID WARNER, Director of Permit Services
N-7056-11-0: Jun 19 2012 2:21PM – AIYABEIJ : Joint Inspection NOT Required

10. The engine shall be equipped with an operational nonresettable elapsed time meter or other APCO approved alternative. [District Rules 2201 and 4702]
11. {3844} The engine shall be operated and maintained in proper operating condition as recommended by the engine manufacturer or emissions control system supplier. [District Rule 4702]
12. {3845} During periods of operation, the permittee shall monitor the operational characteristics of the engine as recommended by the manufacturer or emission control system supplier (for example: check engine fluid levels, battery, cables and connections, change engine oil and filters, replace engine coolant, and/or other operational characteristics as recommended by the manufacturer or supplier). [District Rule 4702]
13. Only CARB certified diesel fuel containing not more than 0.0015% sulfur by weight shall be consumed by the engine. [District Rules 2201 and 4801; and 17 CCR 93115]
14. {4263} The permittee shall maintain monthly records of the type of fuel purchased. [District Rule 4702 and 17 CCR 931.15]
15. {3847} The permittee shall maintain an engine-operating log that includes, on a monthly basis, the following information: total hours of operation, type of fuel used, maintenance or modifications performed, monitoring data, and any other information necessary to demonstrate compliance with Rule 4702. [District Rule 4702]
16. {3873} All records shall be maintained and retained on-site for a period of at least 5 years and shall be made available for District inspection upon request. [District Rule 4702]
17. {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]