San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

NOV 2 0 2017

Charles Van Der Kooi
Charles Van Der Kooi Dairy
1563 W Buckingham Dr
Hanford, CA 93230

Re: Notice of Preliminary Decision - Authority to Construct
Facility Number: C-7013
Project Number: C-1133052

Dear Mr. Van Der Kooi:

Enclosed for your review and comment is the District's analysis of Charles Van Der Kooi Dairy's application for an Authority to Construct for the expansion of an existing dairy operation from a maximum herd capacity of 3,200 milk cows, not to exceed a combined total of 3,430 mature cows (milk and dry), and 10 support stock (heifers and bulls); to a maximum herd capacity of 3,200 milk cows, not to exceed a combined total of 3,680 mature cows (milk and dry), and 2,440 support stock consisting of 2,060 heifers and bulls, and 380 calves; including the construction of a maximum of 18 new open corrals with shade structures, at 13695 W Elkhorn Ave, Riverdale.

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

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

Sincerely,

Arnaud Marjollet
Director of Permit Services

AM:jka

Enclosures

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

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

Facility Name:	Charles Van Der Kooi Dairy	Date:	November 6, 2017
Mailing Address:	1563 W Buckingham Dr Hanford, CA 93230	Engineer:	Jonah Aiyabei
		Lead Engineer:	Jerry Sandhu
Contact Person:	Charles Van Der Kooi		
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Application #s:	C-7013-2-4, 3-4, 4-4, and 8-2		
Project #:	C-1133052		
Deemed Complete:	June 29, 2015		

I. Proposal

Charles Van Der Kooi Dairy has requested Authority to Construct (ATC) permits for the expansion of an existing dairy operation from a maximum herd capacity of 3,200 milk cows, not to exceed a combined total of 3,430 mature cows (milk and dry), and 10 support stock (heifers and bulls); to a maximum herd capacity of 3,200 milk cows, not to exceed a combined total of 3,680 mature cows (milk and dry), 2,440 support stock consisting of 2,060 heifers and bulls, and 380 calves. The proposed expansion will include the construction of a maximum of 18 new open corrals with shade structures.

The draft ATC permits for the proposed modifications are included in Appendix A. The Permits to Operate (PTOs) for the existing operation are included in Appendix B. A project site plan showing the proposed modifications is included in Appendix C.

Pursuant to Rule 2201, Section 3.25, this expansion constitutes a modification of the cow housing (C-7013-2), liquid manure handling system (C-7013-3), solid manure handling operation (C-7013-4), and feed storage and handling operation (C-7013-8), due to the addition of new emissions units which are subject to District permitting requirements; and the increase in production rates of existing emissions units, which would necessitate changes in permit conditions. The proposed expansion will result in an increase in emissions of volatile organic compounds (VOC), ammonia (NH_3), and particulate matter (PM_{10}).

Project Background

In 2008, the applicant was issued ATC permits (via project #C-1053434) to expand the dairy operation from a grandfathered maximum capacity of 1,700 milk cows and 250 dry cows to a maximum capacity of 3,200 milk cows, 480 dry cows, 2,060 heifers and 380 calves. In 2013, the District's Compliance Division conducted a startup inspection of the proposed expansion. The

inspection established that the applicant had completed construction of six freestall barns capable of housing a maximum of 3,200 milk cows and 230 dry cows. However, the inspection established that the applicant had not yet completed construction of the open corrals for 250 dry cows, 2,060 heifers, and 380 calves. Only grading of the open corral areas had been done. The applicant confirmed that construction of the support stock portion of the expansion (open corrals) had stopped due to unfavorable economic conditions in the dairy industry at that time. The District determined that the ATC permits were already expired, pursuant to District Rule 2050, Cancellation of Application; and issued a Notice to Comply (NTC #5007650), in which the applicant was required to submit a new ATC permit application for the amended project scope (i.e. freestall barn housing only).

The applicant submitted the new ATC permit application on October 15, 2013 (current project, #C-1133052). However, while the new application was still under review, the applicant decided to complete the expansion of the dairy to the originally proposed scope. The applicant stated that this decision was based on improving economic conditions in the dairy industry. After considering the applicant's request to reinstate the original project scope, the District issued PTOs for the portion of the expansion already completed (i.e. freestall barn housing for 3,200 milk cows and 230 dry cows) and will issue new ATC permits under the current project for the portion of the expansion that has not yet been completed (i.e. open corral housing for 250 dry cows, 2,060 heifers, and 380 calves).

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 2410	Prevention of Significant Deterioration (6/16/11)
Rule 2520	Federally Mandated Operating Permits (6/21/01)
Rule 4101	Visible Emissions (2/17/05)
Rule 4102	Nuisance (12/17/92)
Rule 4550	Conservation Management Practices (8/19/04)
Rule 4570	Confined Animal Facilities (10/21/10)
CH&SC §41700	Health Risk Assessment
CH&SC §42301.6	School Notice

Public Resources Code 21000-21177: California Environmental Quality Act (CEQA)
California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000-15387: CEQA Guidelines

III. Project Location

Charles Van Der Kooi Dairy is located at 13695 W Elkhorn Ave, Riverdale. The dairy site is not located within 1,000 feet of the outer boundaries of any K-12 schools. The public notification requirement of California Health and Safety Code §42301.6 is therefore not applicable to this project.

IV. Process Description

The primary function of Charles Van Der Kooi Dairy is the production of dairy milk, which is used to make various food products, such as fluid milk,[1] butter, cheese, ice cream, and yogurt. Production of milk requires a herd of mature dairy cows that are lactating (milk cows). A cow's lactation cycle starts shortly after calving and lasts for approximately 12 months. Typically, a 10-month lactation period is followed by a 2-month non-lactation (dry cow) period, during which the cow prepares to calve again and begin a new lactation cycle. After the first few lactation cycles, the cow's milk yield is expected to decline steadily with each subsequent cycle.

Female calves are retained in the herd while the male calves are sold off for meat production or other purposes. The calves take approximately 15 to 24 months to reach reproductive maturity, at which point they enter the milk production stream as bred heifers. Thus, in addition to the mature cows (milk and dry), a typical dairy herd also includes a certain proportion of calves and heifers at various stages of development (support stock). Mature cows that are culled from the herd (primarily due to diminishing milk yield, but also due to injury, disease, or other reasons) are replaced by the bred heifers entering the milk production stream. The support stock may also include a certain number of mature bulls for breeding purposes, although this is not common due to the prevalent use of artificial insemination.

The primary functions involved in the day to day operation of a dairy include housing and feeding the herd, milking, and management of manure. These functions are described in more detail in the following sections:

Milking:

Milking is a dairy's primary income generating activity. The lactating cows are milked two to four times per day. The milk is chilled and temporarily stored in onsite tanks until it is collected by tanker truck for delivery to a creamery. A purpose-built structure known as the milking barn is used for milking and the associated onsite milk handling activities. The milking barn is located in proximity to, but separate from the lactating cow housing areas. It is designed to facilitate efficient in-and-out movement of groups of cows being milked; and also to allow workers access to individual cows during milking. The first part of the milking barn, known as the holding area, is an open-sided roofed space where cows that are ready for milking are temporarily confined as they enter the milking parlor. The milking occurs in the milking parlor within the barn. There are several different parlor designs, including flat, parallel, herringbone, and carousel. Charles Van Der Kooi Dairy uses a 72-stall carousel milking parlor.

Due to food safety regulations, high standards of hygiene must be observed in the milking parlor. The parlor floors are constructed of concrete, and are properly sloped to ensure effective drainage. Any manure that is deposited on the parlor floors during milking is promptly sprayed down with clean water and flushed into the drainage system, from where it is carried through pipes into the manure lagoons.

[1] Milk that has been processed in various ways (e.g. pasteurization, homogenization, fortification, etc.) and is intended to be consumed primarily as a beverage.

Cow Housing:

All the cows at this dairy are currently housed in freestall barns. The standard freestall barn design consists of an elongated, open-frame, roofed metal structure; with concrete-paved flooring and a central drive-through feed alley. Feed bunks are located along both sides of the drive-through alley. Stanchion fences separate the housing areas from the feed alley and also facilitate the cows' orderly access to the feed (i.e. one cow per stanchion). The rest of the barn floor is divided into bays of individual resting stalls. The stalls are padded with various bedding materials, such as sand or dried manure, to increase cow comfort and prevent injury. The stall bays are separated by access lanes, which also serve as manure collection/removal lanes (flush lanes). Watering troughs are located along the outer edges of the barn and can be accessed through the barn fencing. In addition to the facilities under the barn, loose-dirt open-air exercise pens are typically provided in the adjoining areas. These outdoor exercise pens not only enhance the cows' health and comfort, but also facilitate and/or encourage the exhibition of estrus behaviors such as mounting. Manure from barn feed lanes is typically removed by flushing with water. Manure from the exercise pen surfaces is removed by scraping with a box-type scraper.

After the proposed expansion, 250 dry cows and all the support stock will be housed in open corrals. An open corral is a large loose-dirt open-air space where cows are confined using fences. A corral is typically bordered along one side by a drive-through feed alley, which may or may not be paved. Feed bunks are located along the side of the drive-through alley. A stanchion fence separates the housing side of the corral from the feed alley and also facilitates the cows' orderly access to the feed (i.e. one cow per stanchion). The edge of the corral immediately opposite the feed bunks is often paved and equipped with a flush system for efficient removal of manure deposited during feeding, which is a significant amount of the total manure associated with corral housing. Manure from the unpaved surfaces of the corral is removed by scraping. Watering troughs are provided along the edges of the corral opposite the feed bunks, and can be accessed through the corral fencing. Shade structures may also be provided within the corral to improve the cows' comfort during hot weather.

Detailed pre-project and post project housing arrangements are shown in Appendix G ('PM10 Mitigation Measures' sheet).

Liquid Manure Handling:

Milk cows generate anywhere from 130 to 150 pounds of manure per day. The manure is deposited primarily in areas where the cows are housed and fed (cow housing), but a small amount is deposited in the milking barn and other transit areas. The manure is collected and managed in liquid and solid forms. Manure with a total solids 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.

The existing liquid manure handling system consists of settling basin(s), mechanical separator(s), three anaerobic (phototrophic/red water) treatment lagoons, and one storage pond.

Solids Separation:

Flush water from the milk barn and housing areas is pumped over the mechanical separator screens. The liquid passes through the screens and flows into the liquid manure lagoons. The solids fall off the bottom of the screen onto a stacking pad, from where they are later removed by a front end loader and spread out to dry on the drying pads.

Anaerobic (Phototrophic/Red Water) Treatment Lagoons:

Phototrophic ('red water') lagoons are anaerobic lagoons with a distinct purple or pink color, which is derived from the presence of stable colonies of phototrophic purple sulfur bacteria (PSB) and purple nonsulfur bacteria (PNSB).[2]

This technology seeks to take advantage of a naturally occurring phenomenon where municipal and animal waste lagoons as well as natural lagoons, estuaries and certain strata in lakes will occasionally turn either purple, pink, or rose in color. This phenomenon is caused by assemblages of phototrophic PSB and PNSB. Blooms of these bacteria occur opportunistically whenever conditions present the optimum dilute nutrient loads, in combination with the optimum temperatures, lighting conditions, and limited oxygen availability. In nature, these blooms (as the name suggests) are transitory. In order for these types of blooms to be maintained in a municipal waste-water treatment or farm context the conditions must be continuously and properly maintained.

In order to encourage and maintain the development of these bacterial species in farm lagoons year-round, the typical practice is to use sequential pond systems (i.e. up to 3 ponds: for processing, sequestration, and polishing), in combination with mechanical circulation/aeration, and mixing/dilution with fresh water. Continuous mechanical mixing of the lagoon liquids and solids ensures that the phototrophs are exposed to sufficient sunlight. Addition of fresh water (irrigation water) provides the necessary dilute conditions and translucency. As in any anaerobic treatment lagoon, this system also includes mechanical solids/liquids separation to remove excess solids prior to treatment. For phototrophic lagoons, solids removal has two advantages: 1) it removes the excess carbon found in the solids and which can inhibit the desired beneficial nitrification/denitrification process that occurs in these lagoons, and 2) excess solids contribute to turbidity, which in turn inhibit the growth of phototrophs.

The agricultural community has met with some success in taking advantage of these bacterial communities in treating wastewater from swine and dairy operations to reduce odors. Research indicates that these microbes and their associated syntrophs metabolize sulfur and nitrogen compounds as well as various long chain organic compounds, many of which are a potential source of problematic VOCs.

Phototrophic treatment is estimated to reduce VOC and hydrogen sulfide emissions by 70 - 90%, and ammonia emissions by 50 - 80%. However, in order to be conservative, it will be

[2] Chen, T., Schulte, D. D., Koelsch, R.K., and Parkhurst, A.M. 2003. Characteristics of Phototrophic and Non-Phototrophic Lagoons for Swine Manure. *Transactions of the ASABE,* Vol. 46(4): 1285–1292.

assumed that this treatment system is at least equivalent to a standard anaerobic treatment system (i.e. 40% control efficiency for VOC).[3]

Land Application:

Liquid manure from the storage pond will be applied to cropland as fertilizer/irrigation water. The application is done through flood and sprinkler irrigation, at agronomic rates in conformance with a nutrient management plan approved by the Regional Water Quality Control Board.

Solid Manure Handling:

Solid manure is stored in stockpiles until ready to be applied to cropland as fertilizer, or shipped offsite. When applied to land, solid manure will be promptly incorporated into the soil (within 2 hours of land application). The separated solids will be dried and used as fertilizer or as bedding in the freestalls or removed from the facility. Solid manure and/or separated solids may also be composted onsite in windrows.

Feed Handing and Storage:

The feed storage and handling area is used for the storage of feed ingredients and for the preparation of daily feed rations (known as 'total mixed rations', or TMR). Silage, the main ingredient in TMR, is stored in large elongated piles on concrete slabs. The required amount is extracted from one end of the pile, as needed. Other additive ingredients such as almond hulls, various grains, and cotton seed are stored in covered barns (commodity barns) to prevent damage from exposure to weather elements. Front-end loaders are used to retrieve the required proportions of the silage and additive ingredients and load them into a feed wagon with a built-in mixer. Once the silage and additive ingredients are thoroughly mixed, the feed wagon drives over to the cow housing areas to spread the TMR along the feed lanes.

V. Equipment Listing

Pre-Project Equipment Descriptions:

C-7013-2-1: COW HOUSING - 3,200 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 3,430 MATURE COWS (MILK AND DRY); 10 SUPPORT STOCK (HEIFERS AND BULLS); AND 6 FREESTALL BARNS WITH A FLUSH/SCRAPE SYSTEM

C-7013-3-1: LIQUID MANURE HANDLING SYSTEM CONSISTING OF SETTLING BASIN(S); MECHANICAL SEPARATOR(S); THREE ANAEROBIC TREATMENT LAGOONS (1100' X 200' X 20' EACH), AND ONE STORAGE POND; MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION AND SPRINKLER SYSTEM

[3] It is important to note that a phototrophic treatment system generally exceeds all the requirements specified in the Natural Resources Conservation Service (NRCS) Field Office Technical Guide No. 359, Waste Treatment Lagoon, for anaerobic treatment (i.e. minimum treatment volume, minimum hydraulic retention time, maximum volatile solids loading rate, and minimum lagoon depth of at least 12 feet).

C-7013-4-1: SOLID MANURE HANDLING OPERATION CONSISTING OF MANURE STOCK PILES; WINDROW COMPOSTING; SOLID MANURE APPLICATION TO LAND AND/OR HAULED OFFSITE

C-7013-8-1: FEED STORAGE AND HANDLING OPERATION CONSISTING OF COMMODITY BARN(S), SILAGE PILE(S), AND TOTAL MIXED RATION FEEDING

Proposed ATC Equipment Descriptions:

C-7013-2-4: MODIFICATION OF COW HOUSING - 3,200 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 3,430 MATURE COWS (MILK AND DRY); 10 SUPPORT STOCK (HEIFERS AND BULLS); AND 6 FREESTALL BARNS WITH A FLUSH/SCRAPE SYSTEM: INCREASE MAXIMUM NUMBERS OF COWS TO 3,200 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 3,680 MATURE COWS (MILK AND DRY); 2,440 SUPPORT STOCK CONSISTING OF 2,060 HEIFERS AND BULLS, AND 380 CALVES HOUSED IN OPEN CORRALS; AND CONSTRUCT A MAXIMUM OF 18 NEW OPEN CORRALS WITH SHADE STRUCTURES

C-7013-3-4: MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF SETTLING BASIN(S); MECHANICAL SEPARATOR(S); THREE ANAEROBIC TREATMENT LAGOONS (1100' X 200' X 20' EACH), AND ONE STORAGE POND; MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION AND SPRINKLER SYSTEM: ALLOW INCREASE IN THROUGHPUT DUE TO HERD EXPANSION

C-7013-4-4: MODIFICATION OF SOLID MANURE HANDLING OPERATION CONSISTING OF MANURE STOCK PILES; WINDROW COMPOSTING; SOLID MANURE APPLICATION TO LAND AND/OR HAULED OFFSITE: ALLOW INCREASE IN THROUGHPUT DUE TO HERD EXPANSION

C-7013-8-2: MODIFICATION OF FEED STORAGE AND HANDLING OPERATION CONSISTING OF COMMODITY BARN(S), SILAGE PILE(S), AND TOTAL MIXED RATION FEEDING: ALLOW INCREASE IN TOTAL MIXED RATION FEEDING DUE TO HERD EXPANSION

Post-Project Equipment Descriptions:

C-7013-2-4: COW HOUSING - 3,200 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 3,680 MATURE COWS (MILK AND DRY); 2,440 SUPPORT STOCK CONSISTING OF 2,060 HEIFERS AND BULLS, AND 380 CALVES HOUSED IN OPEN CORRALS; AND 6 FREESTALL BARNS WITH A FLUSH/SCRAPE SYSTEM

C-7013-3-4: LIQUID MANURE HANDLING SYSTEM CONSISTING OF SETTLING BASIN(S); MECHANICAL SEPARATOR(S); THREE ANAEROBIC TREATMENT LAGOONS (1100' X 200' X 20' EACH), AND ONE STORAGE POND; MANURE IS LAND

C-7013-4-4: SOLID MANURE HANDLING OPERATION CONSISTING OF MANURE STOCK PILES; WINDROW COMPOSTING; SOLID MANURE APPLICATION TO LAND AND/OR HAULED OFFSITE

C-7013-8-2: FEED STORAGE AND HANDLING OPERATION CONSISTING OF COMMODITY BARN(S), SILAGE PILE(S), AND TOTAL MIXED RATION FEEDING

VI. Emissions Control Technology Evaluation

Particulate matter (PM_{10}), volatile organic compounds (VOC), hydrogen sulfide (H_2S) and ammonia (NH_3) are the major pollutants of concern from dairy operations. PM_{10} emissions are generated primarily from the action of cows' hooves on dust and dry manure, which is subsequently picked up by wind and entrained into the atmosphere. VOC emissions are generated from the ruminant digestive process (i.e. enteric emissions), decomposition and fermentation of feed, and decomposition of organic matter in manure. NH_3 and H_2S emissions are generated from microbial metabolization of nitrogen and sulfur compounds in manure. The quantity of these emissions depends directly on the herd size and profile.[4]

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

Cow Housing:

Frequent Flushing:

A flush system will be used to remove manure from the paved lanes and walkways, at least four times per day for mature cows and once per day for support stock. Frequent flushing creates a moist environment that greatly reduces or eliminates PM_{10} emissions. In addition, flush water dissolves NH_3 as well as various water-soluble VOC in the manure, thereby stopping or decelerating the emission of these pollutants directly into the atmosphere. Both manure and dissolved pollutants are subsequently carried by the flush water into the liquid manure handling system for further treatment.

Feeding Cows in Accordance with the NRC Guidelines:

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

[4] Herd size refers to the total number of cows, whereas profile refers to the specific categories (e.g. lactating, dry, heifer, calf) that constitute the herd.

Corral Scraping:

Frequent scraping of the corral surfaces will reduce the amount of accumulated manure, 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 corral surface, which will further reduce emissions.

Feeding Heifers near Dusk:

Heifers are generally most active during late evening hours when the heat of the day has subsided slightly. This increased evening activity results in dust and associated PM10 emissions. This high propensity for increased evening activity can be counteracted by scheduling the afternoon feeding at this time, such that majority of the heifers will be occupied at the feeding lanes instead of moving around the dryer dirt areas of the corrals.

Corral Sprinklers:

When done at a rate sufficient to match the evaporation rate, sprinkling will keep corral surfaces consistently moist. This will reduce PM_{10} emissions by preventing any loose soil and dried manure from being entrained into the air by wind movement and/or cow activities. Water application rates must be properly adjusted, since excess water could potentially increase VOC and NH_3 emissions; and may also pose a health risk for the animals.

Liquid Manure Handling:

Solids Separation:

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

Anaerobic (Phototrophic/Red Water) Treatment System:

Phototrophic organisms, predominantly purple sulfur and purple non-sulfur bacteria, metabolize sulfur compounds (e.g. H_2S), NH_3, carbon dioxide, and organic compounds in order to carry out photosynthesis. Phototrophs require anaerobic conditions, fairly dilute nutrient levels, and sufficient light. As such, they thrive in the upper strata of lagoons, where sufficient light can penetrate. Mechanical pumps may also be used to increase exposure to light.

In order to sustain the desired microbial populations, phototrophic treatment systems must meet stricter standards, in terms of solids separation, treatment volume, and nutrient loading, than standard anaerobic treatment systems. They should therefore achieve higher control efficiencies than standard anaerobic treatment systems. However, in order to be conservative, this evaluation assumes that phototrophic treatment systems will achieve the same control efficiency as standard anaerobic treatment systems. The design check analysis shown in Appendix H demonstrates that the proposed phototrophic treatment system

Liquid Manure Land Application:

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

Solid Manure Handling:

Based on the information currently available, emissions from solid manure applied to cropland are expected to be low. However, to ensure that any possible emissions are minimized, the manure will be promptly incorporated into the soil after application. This will reduce any volatilization of gaseous pollutants, as the soil provides cover from wind and other weather elements that enhance volatilization. In addition, incorporation reduces emissions by biofilter effect, whereby the adsorption of NH_3, VOC, and other compounds onto soil particles provides an opportunity for oxidation by the action of various microorganisms the soil.[5]

Feed Storage and Handling:

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

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

VII. General Calculations

A. Assumptions

- Potential to emit calculations will be based on the permitted limits for the different age categories of cows in the existing and proposed herds.
- Only non-fugitive emissions are considered when determining major source status. For this facility, the lagoons/storage ponds (permit unit C-7013-3) and emergency standby turbine (permit unit C-7013-10) are the only sources of non-fugitive emissions.
- The conditions on the existing PTOs are based on the Rule 4570 Phase II mitigation measures originally proposed via application/project #C-1112537. Since the applicant has not proposed any Rule 4570 Phase II mitigation measure changes, the existing mitigation measures will be used in the current evaluation. Modifications to specific

[5] Page 9-38 of U.S. EPA's draft document entitled "Emissions From Animal Feeding Operations" (http://www.epa.gov/ttn/chief/ap42/ch09/draft/draftanimalfeed.pdf)

measures will be made, as necessary, to accommodate New Source Review requirements from the current project.

- All PM_{10} emissions will be allocated to the cow housing permit unit (C-7013-2).
- All H_2S emissions will be allocated to the liquid manure permit unit - lagoons. (C-7013-3).
- The PM_{10} control efficiency for shade structures is from a District document titled "Dairy/Feedlot PM_{10} Mitigation Practices and their Control Efficiencies."[6]
- The PM_{10} emission factors are from a District document titled "Dairy and Feedlot PM_{10} Emissions Factors,"[7] which compiled data from studies performed by Texas A&M and ASAE, and a USDA/UC Davis report, quantifying dairy and feedlot emissions.
- The VOC emission factors for milk cows are from a District document titled "Air Pollution Control Officer's Revision to the Dairy VOC Emission Factors, February 2012."[8] Volatile solids excretion ratios were used to derive the proportionate VOC emission factors for dry cows and support stock.
- The NH_3 emission factor for milk cows is based on California Air Resources Board's dairy cattle ammonia emission factor.[9] Manure-based VOC emission ratios were used to apportion the NH_3 emission factor to the various emissions units. Further, nitrogen excretion ratios were used to derive the proportionate NH_3 emission factors for dry cows and support stock.
- All the mitigation measures evaluated are expected to result in VOC emission reductions. Where a specific control efficiency has not been determined, a conservative 10% control efficiency will be assumed, unless noted otherwise.
- VOC emission reductions from a properly designed and maintained anaerobic (phototrophic) treatment lagoon system are expected to be high. However, in order to be conservative, a control efficiency of 40% for both the lagoons and land application of liquid manure will be applied to this control measure, until better data become available.

B. Emission Factors

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

C. Calculations

1. Pre-Project Potential to Emit (PE1)

The PE1 is based on the maximum permitted capacity for each age category of cows and the controls required and proposed by the applicant. All the emission calculations are included in Appendix G. A summary of the PE1 is shown in the following table:

[6] http://www.valleyair.org/busind/pto/dpag/Dairy_PM10_Control_Efficiencies.pdf
[7] http://www.valleyair.org/busind/pto/dpag/FYI_%20Dairy_Feedlot_PM10_Emission_Factor.pdf
[8] http://www.valleyair.org/busind/pto/emission_factors/2012-Final-Dairy-EE-Report/FinalDairyEFReport(2-23-12).pdf
[9] http://www.arb.ca.gov/ei/areasrc/livestockemisfwp.pdf

PE1 Summary								
Permit unit	PM_{10}		VOC		NH_3		H_2S	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
C-7013-2-1	10.8	4,008	104.1	37,934	192.2	70,128	0.0	0
C-7013-3-1	0.0	0	13.3	4,860	44.6	16,263	1.3	474
C-7013-4-1	0.0	0	4.5	1,630	25.7	9,392	0.0	0
C-7013-8-1	0.0	0	85.1	31,027	0.0	0	0.0	0

2. Post-Project Potential to Emit (PE2)

The PE2 is based on the maximum permitted capacity for each age category of cows and the controls required and proposed by the applicant. All the emission calculations are included in Appendix G. A summary of the PE2 is shown in the table below:

PE2 Summary								
Permit unit	PM_{10}		VOC		NH_3		H_2S	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
C-7013-2-4	32.4	11,857	118.6	43,319	231.5	84,500	0.0	0
C-7013-3-4	0.0	0	17.3	6,350	53.7	19,583	1.3	474
C-7013-4-4	0.0	0	5.8	2,120	31.1	11,333	0.0	0
C-7013-8-2	0.0	0	130.7	47,683	0.0	0	0.0	0

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

Pursuant to District Rule 2201, the SSPE1 is the sum of 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 (AER) that have occurred at the source, and which have not been used on-site. This facility does not have any ERCs. The PE values for units C-7013-1 through C-7013-4 and C-7013-8 are calculated in Appendix G. The PE values for unit C-7013-10 are calculated in Appendix I. The SSPE1 is as summarized in the following table:

SSPE1 (lb/year)							
Permit unit	NO_X	SO_X	PM_{10}	CO	VOC	NH_3	H_2S
C-7013-1-3	0	0	0	0	1,280	438	0
C-7013-2-1	0	0	4,008	0	37,934	70,128	0
C-7013-3-1	0	0	0	0	4,860	16,263	474
C-7013-4-1	0	0	0	0	1,630	9,392	0
C-7013-8-1	0	0	0	0	31,027	0	0
C-7013-10-0	872	2	12	1,727	0	0	0
SSPE1	**872**	**2**	**4,020**	**1,727**	**76,731**	**96,221**	**474**

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

Pursuant to District Rule 2201, the SSPE2 is the sum of the PE from all units with valid ATCs or PTOs at the Stationary Source and the quantity of ERCs which have been banked since September 19, 1991 for AER that have occurred at the source, and which have not been used on-site. This facility does not have any ERCs. The PE values for units C-7013-1 through C-7013-4 and C-7013-8 are calculated in Appendix G. The PE values for unit C-7013-10 are calculated in Appendix I. The SSPE2 is as summarized in the following table:

SSPE2 (lb/year)							
Permit unit	**NO_X**	**SO_X**	**PM_{10}**	**CO**	**VOC**	**NH_3**	**H_2S**
C-7013-1-4	0	0	0	0	1,280	438	0
C-7013-2-4	0	0	11,857	0	43,319	84,500	0
C-7013-3-4	0	0	0	0	6,350	19,583	474
C-7013-4-4	0	0	0	0	2,120	11,333	0
C-7013-8-2	0	0	0	0	47,683	0	0
C-7013-10-0	872	2	12	1,727	0	0	0
SSPE2	**872**	**2**	**11,869**	**1,727**	**100,752**	**115,854**	**474**

5. Major Source Determination

Rule 2201 Major Source Determination:

Pursuant to District Rule 2201, a major source is a stationary source with an SSPE2 equal to or exceeding one or more of the major source thresholds shown in Table 3-3. For the purposes of determining major source status the following shall not be included:

- Any ERCs associated with the stationary source
- Emissions from non-road engines (i.e. engines at a particular site at the facility for less than 12 months)
- Fugitive emissions, except for the source categories specified in 40 CFR 51.165

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

40 CFR 71.2 defines fugitive emissions as "those emissions which could not reasonably pass through a stack, chimney, vent, or other functionally-equivalent opening." In 2005, the California Air Pollution Control Officers Association (CAPCOA) issued guidance for estimating VOC emissions from dairy farms. This guidance determined that VOC emissions from the milking centers, cow housing areas, corrals, common manure storage areas, and land application of manure are considered fugitive since they are not physically contained and could not reasonably pass through a stack, chimney, vent, or other functionally-equivalentopening. The guidance also determined that VOC emissions from liquid manure lagoons and storage ponds are not considered fugitive because emission

collection technologies for liquid manure systems exist. The District has researched this issue and concurs with the CAPCOA determinations, as discussed in more detail below:

Milking Parlor:

The mechanical ventilation system could arguably be utilized to capture emissions from the milking parlor. In order achieve and maintain the negative pressure required for this purpose, the adjoining holding area would also need to be completely enclosed. However, enclosing the holding area is not practical due to the continuous movement of cows in and out of the barn throughout the day. In addition, the capital outlay required to enclose this large area would be prohibitive. The District therefore determines that emissions from the milking parlor cannot reasonably be captured, and are to be considered fugitive.

Cow Housing:

Although there are smaller dairy farms that have enclosed housing barns, such barns are usually not fully enclosed and do not include any systems for the collection of emissions. In addition, the airflow requirements for dairy cows are extremely high, primarily for herd health reasons. Airflow requirements are expected to be even higher in places such as the San Joaquin Valley, where daytime temperatures can exceed 110 degrees for prolonged periods during the summer months. Given the high air flow rates that will be involved, collection and control of the exhaust from housing barns is not only impractical but also cost prohibitive. The District therefore determines that emissions from housing barns cannot reasonably be captured, and are to be considered fugitive.

Manure Storage Areas:

Solid manure is typically stored in the housing areas, as mounds or piles in individual corrals or pens. Some manure may also be stored in piles outside the housing areas while awaiting land application, shipment offsite, or other uses. Thus, manure storage areas are widely distributed over the dairy site, making it impractical to capture emissions from any significant proportion of the solid manure. The District therefore determines that emissions from manure storage areas cannot reasonably be captured, and are to be considered fugitive.

Land Application:

Since manure has to be applied over large expanses of cropland (hundreds or even thousands of acres), there is no practical method that can be used to capture the associated emissions. The District therefore determines that emissions from land application of manure cannot reasonably be captured, and are to be considered fugitive.

Feed Handling and Storage:

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

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

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

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

As previously stated, emissions from liquid manure lagoons and storage ponds have already been determined to be non-fugitive. The facility's non-fugitive stationary source potential emissions are summarized in the following tables:

Non-Fugitive SSPE1 (lb/year)						
Category	**NO_X**	**SO_X**	**PM_{10}**	**CO**	**VOC**	**H_2S**
C-7013-3-1 - Lagoons only	0	0	0	0	2,330[10]	474
C-7013-10-0 - Turbine	872	2	12	1,727	0	0
Non-Fugitive SSPE1	**872**	**2**	**12**	**1,727**	**2,330**	**474**

Non-Fugitive SSPE2 (lb/year)						
Category	**NO_X**	**SO_X**	**PM_{10}**	**CO**	**VOC**	**H_2S**
C-7013-3-4 - Lagoons only	0	0	0	0	3,040[11]	474
C-7013-10-0 - Turbine	872	2	12	1,727	0	0
Non-Fugitive SSPE2	**872**	**2**	**12**	**1,727**	**3,040**	**474**

[10] From Appendix G - 'Pre-Project Potential to Emit (PE1)' sheet
[11] From Appendix G - 'Post-Project Potential to Emit (PE2)' sheet

The Rule 2201 major source determination is summarized in the following table:

Rule 2201 Major Source Determination						
Category	**NO_X**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**	**CO**	**VOC**
SSPE1 (lb/yr)	872	2	12	12	1,727	2,330
SSPE2 (lb/yr)	872	2	12	12	1,727	3,040
Major source threshold (lb/yr)	20,000	140,000	140,000	200,000	200,000	20,000
Major Source? (Y/N)	N	N	N	N	N	N

Note: $PM_{2.5}$ assumed to be equal to PM_{10}

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

Rule 2410 Major Source Determination:

In determining if a stationary source is a PSD major source, the following sources of emissions shall not be included:

- Emissions from non-road engines (i.e. engines at a particular site at the facility for less than 12 months)
- Fugitive emissions, except for the source categories specified in 40 CFR 52.21(b)(1)(iii)

Agricultural operations do not belong to any of the source categories specified in specified in 40 CFR 52.21(b)(1)(i). Since this facility is an agricultural operation, fugitive emissions shall not be included in determining whether it is a PSD major source; and the PSD major source threshold is 250 tons/yr (tpy) for any regulated NSR pollutant.

The non-fugitive stationary source emissions from the preceding section have been converted into tons.[12] The PSD major source determination is summarized in the following table:

PSD Major Source Determination						
Category	**NO_2**	**VOC**	**SO_2**	**CO**	**PM**	**PM_{10}**
Estimated facility PE before project increase (tpy)	0.4	1.2	0.0	0.9	0.0	0.0
PSD major source threshold (tpy)	250	250	250	250	250	250
PSD major source? (Y/N)	N	N	N	N	N	N

As shown above, the facility is not an existing major source for PSD for at least one pollutant. Therefore the facility is not an existing major source for PSD.

[12] (lb/yr) / (2,000 lb/ton) = tons/yr (tpy).

6. Baseline Emissions (BE)

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

Pursuant to District Rule 2201, BE = PE1 for:

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

Otherwise,

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

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

7. SB 288 Major Modification

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, the project does not constitute an SB 288 major modification.

8. Federal Major Modification

District Rule 2201, Section 3.18, 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 pollutant, this project does not constitute a federal major modification.

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

Rule 2410 applies to any pollutant regulated under the Clean Air Act, except those for which the District has been classified nonattainment. The pollutants which must be addressed in the PSD applicability determination for sources located in the San Joaquin Valley and which are involved in this project are:[13]

- PM
- PM_{10}

[13] See 52.21(b)(23) - definition of significant

- Hydrogen sulfide (H_2S)
- Total reduced sulfur (inlcuding H_2S)

Project Emissions Increase - New Major Source Determination

The post-project potentials to emit (PE) from all new and modified units are compared to the PSD major source thresholds to determine if the project constitutes a new major source subject to PSD requirements.

Agricultural operations do not belong to any of the source categories specified in specified in 40 CFR 52.21(b)(1)(i). Since this facility is an agricultural operation, fugitive emissions shall not be included in determining whether it is a PSD major source; and the PSD major source threshold is 250 tons/yr (tpy) for any regulated NSR pollutant.

The non-fugitive stationary source emissions from Section VII.C.5 have been converted into tons. The PSD applicability determination is summarized in the following table:

PSD Applicability Determination - New Major Source				
Category	**PM**	**PM_{10}**	**H_2S**	**S**
Total PE from new and modified units (tpy)	0	0	0.2	0.2
PSD major source threshold (tpy)	250	250	250	250
New PSD major source? (Y/N)	N	N	N	N

As shown in the preceding table, the PE for the proposed project, by itself, does not exceed any PSD major source threshold. Rule 2410 is therefore not applicable and no further analysis is required.

10. Quarterly Net Emissions Change (QNEC)

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

VIII. Compliance

Rule 1070 Inspections

This rule requires 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 authorizes the District to require record keeping, to make inspections and to conduct tests of air pollution sources. The following conditions will be placed on the ATC permits to ensure compliance:

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

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

Rule 2010 Permits Required

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

Pursuant to Section 3.0, any person building, altering or replacing any operation, article, machine, equipment, or other contrivance, the use of which may cause the issuance of air contaminants or the use of which may eliminate or reduce or control the issuance of air contaminants, shall first obtain authorization for such construction from the APCO. An Authority to Construct shall remain in effect until the Permit to Operate the source operation for which the application was filed is granted or denied, or the application is canceled as described in Rule 2050 (Cancellation of Application).

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

The facility has obtained a Permit to Operate for the existing operation, and has submitted an Authority to Construct permit application for the proposed modifications. Continued compliance with the requirements of this rule is therefore expected.

Rule 2201 New and Modified Stationary Source Review Rule

A. Best Available Control Technology (BACT)

1. BACT Applicability

BACT requirements are triggered on a pollutant-by-pollutant basis and on an emissions unit-by-emissions unit basis. Unless specifically exempted by Rule 2201, BACT shall be required for the following actions*:

a. Any new emissions unit with a potential to emit (PE) exceeding two pounds per day (> 2 lb/day),

b. The relocation from one stationary source to another of an existing emissions unit with a PE > 2 lb/day,

c. Modifications to an existing emissions unit with a valid Permit to Operate resulting in an adjusted increase in permitted emissions (AIPE) > 2 lb/day, and/or

d. Any new or modified emissions unit, in a stationary source project, which results in an SB 288 major modification or a federal major modification, as defined by the rule.
*Except for CO emissions from a new or modified emissions unit at a stationary source with an SSPE2 of less than 200,000 pounds per year of CO.

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

As previously discussed, the proposed expansion includes the construction of a maximum of 18 new emissions units (open corrals). As shown in the BACT calculations in Appendix J, the PE for several of the corrals exceeds 2 lb/day. BACT for new emissions units with PE > 2 lb/day is therefore triggered, as summarized below:

Corral #s 7 and 8: NH_3
Corral #s 9a/9b - 12a/12b: VOC and NH_3
Corral #s 13a/13b - 16a/16b: VOC, NH_3, and PM_{10}

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

There are no emissions units being relocated from one stationary source to another. BACT is therefore not triggered under this category.

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

AIPE = PE2 – HAPE

Where,

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

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

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

HAPE = PE1 x (EF2/EF1)

Where,

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

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

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

AIPE = PE2 – (PE1 x (EF2 / EF1))

Detailed AIPE calculations for each emissions unit are shown in Appendix J. The AIPE

is greater than 2 lb/day, and therefore BACT is triggered, for the emissions units and pollutants summarized below:

C-7013-3-4: Liquid Manure Handling

Lagoons/storage ponds: VOC and NH_3
Land application: NH_3

C-7013-4-4: Solid Manure Handling

Storage: NH_3
Land application: NH_3

C-7013-8-2: Feed Storage and Handling

Total mixed ration (TMR) feeding: VOC

d. SB 288/Federal Major Modification

As discussed in Sections VII.C.7 and VII.C.8 of this evaluation, this project does not constitute an SB 288 and/or federal major modification. BACT is therefore not triggered under this category.

2. Top-Down BACT Analysis

Per Permit Services policies and procedures for BACT, a top-down BACT analysis shall be performed as a part of the application review for each application subject to the BACT requirements pursuant to the District's NSR rule.

Pursuant to the attached top-down BACT analysis (Appendix E), BACT has been satisfied with the following:

Cow Housing – Open Corrals

VOC: 1) Concrete feed lanes and walkways;

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

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

4) Properly sloping corrals (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet) or managing corrals to ensure proper drainage;

5) Scraping corrals every two weeks using a pull-type scraper in the morning

hours except when prevented by wet conditions; and

6) Rule 4570 measures.

NH_3: 1) Concrete feed lanes and walkways;

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

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

4) Properly sloping corrals (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet) or managing corrals to ensure proper drainage; and

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

PM_{10}: 1) Concrete feed lanes and walkways;

2) Scraping of corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions;

3) Shade structures;

4) Feeding heifers near dusk (within 1 hour of dusk); and

5) Sprinklers.

Liquid Manure Handling System

Lagoons/Storage Ponds:

VOC: 1) Anaerobic treatment lagoon designed according to NRCS guidelines, and solids separation/removal system (mechanical separator(s) or settling basin(s)/weeping wall(s)).

NH_3: 1) All animals fed in accordance with NRC or other District-approved guidelines.

Land Application:

NH_3: 1) All animals fed in accordance with NRC or other District-approved guidelines.

Solid Manure Handling

Storage:

NH_3: 1) All animals fed in accordance with NRC or other District-approved guidelines.

Land Application:

NH_3: 1) Rapid incorporation of solid manure into the soil after land application, and all animals fed in accordance with NRC or other District-approved guidelines.

Feed Storage and Handling

Total mixed ration (TMR) feeding:

VOC: 1) District Rule 4570 measures.

B. Offsets

1. Offset Applicability

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

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

Offset Determination (lb/year)					
	NO_X	**SO_X**	**PM_{10}**	**CO**	**VOC**
SSPE2	872	2	11,869	1,727	100,752
Offset Thresholds	20,000	54,750	29,200	200,000	20,000
Offsets triggered?	No	No	No	No	Yes

2. Quantity of Offsets Required

The SSPE for VOC emissions exceeds the VOC offset threshold level. However, per Section 4.6.9 of Rule 2201, offsets are not required for agricultural sources unless they are a major source. As determined in Section VII.C.5 of this evaluation, this facility is not a major source for any pollutant. Offsets are therefore not required.

C. Public Notification

1. Applicability

Public notice is required for:

a. New major sources, federal major modifications, and SB 288 major modifications,
b. Any new emissions unit with a potential to emit (PE) greater than 100 pounds during any one day (> 100 lb/day) for any one pollutant,
c. Any project which results in the offset thresholds being surpassed,
d. Any project with an SSIPE of greater than 20,000 lb/year for any pollutant, and/or
e. Any project which results in a Title V significant permit modification.

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

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

As demonstrated in Sections VII.C.7 and VII.C.8 of this evaluation, this project does not constitute an SB 288 or federal major modification. Public notice for SB 288 or federal major modification purposes is not therefore required.

b. PE > 100 lb/day

As shown in the calculations in Appendix G, this project does not include any new emissions units with a PE > 100 lb/day for any pollutant. Public notice is therefore not required under this category.

c. Offset Threshold

The SSPE1 and SSPE2 are compared to the offset thresholds in the following table:

Public Notice - Offset Thresholds				
Pollutant	**SSPE1 (lb/year)**	**SSPE2 (lb/year)**	**Offset Threshold (lb/year)**	**Notice Required?**
NO_X	872	872	20,000	No
SO_X	2	2	54,750	No
PM_{10}	4,020	11,869	29,200	No
CO	1,727	1,727	200,000	No
VOC	76,731	100,752	20,000	No

As shown above, no offset thresholds are surpassed due to this project. Public notice for offset threshold purposes is therefore not required.

d. SSIPE > 20,000 lb/year

According to District policy, the SSIPE = SSPE2 – SSPE1. The SSIPE is compared to the SSIPE public notice thresholds in the following table:

Public Notice - SSIPE					
Pollutant	**SSPE2 (lb/year)**	**SSPE1 (lb/year)**	**SSIPE (lb/year)**	**Notice Threshold (lb/year)**	**Notice Required?**
NO_x	872	872	0	20,000	No
SO_x	2	2	0	20,000	No
PM_{10}	11,869	4,020	7,849	20,000	No
CO	1,727	1,727	0	20,000	No
VOC	100,752	76,731	24,021	20,000	Yes
NH_3	115,854	96,221	19,633	20,000	No
H_2S	474	474	0	20,000	No

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

e. Title V Significant Permit Modification

Since this facility does not have a Title V operating permit, this project cannot constitute a Title V significant permit modification. Public noticing is therefore not required under this category.

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 Fresno County prior to the issuance of the ATC permits.

D. Daily Emissions Limits (DELs)

DELs and other enforceable conditions are required by Rule 2201 to restrict a unit's maximum daily emissions to a level at or below the emissions associated with the maximum design capacity. The DELs must be contained in the latest ATC, contained in or enforced by the latest PTO, and be enforceable, in a practicable manner, on a daily basis. DELs are also required to enforce the applicability of BACT.

For dairies, the DEL is based on the numbers and age categories of the cows in the permitted herd, as well as conditions enforcing BACT requirements. The following DEL conditions also enforce project design specifications proposed by the applicant for compliance with ambient air quality standards for PM_{10}.

Proposed DEL Conditions:

Cow Housing

- {modified 4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 2201]
- {modified 4486} Permittee shall pave feedlanes for a width of at least 8 feet along the housing side of the feedlane fence for mature cows and at least 6 feet along the housing side of the feedlane fence for heifers and bulls. [District Rules 2201 and 4570]
- {modified 4489} Permittee shall flush lanes at least four times per day for mature cows and at least once per day for heifers and bulls. [District Rules 2201 and 4570]
- {modified 4492} Permittee shall remove manure that is not dry from individual cow freestall beds or shall rake, harrow, scrape, or grade freestall bedding at least once every seven (7) days. [District Rules 2201 and 4570]
- {modified 4499} Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rules 2201 and 4570]

- {modified 4501} Permittee shall clean manure from corrals at least four (4) times per year with at least sixty (60) days between each cleaning, or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]

- {modified 4554} Permittee shall implement at least one of the following exercise pen and corral mitigation measures: 1) slope the surface of the exercise pens and corrals at least 3% where the available space for each animal is 400 square feet or less and at least 1.5% where the available space for each animal is more than 400 square feet; 2) maintain exercise pens and corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape exercise pens and corral sufficiently to maintain a dry surface except during periods of rainy weather. [District Rules 2201 and 4570]

- Permittee shall scrape exercise pen and corral surfaces every two weeks using a pull-type scraper during morning hours, except when prevented by wet conditions. [District Rule 2201]

- All mature cow and heifer/bull open corrals shall be equipped with shade structures. [District Rule 2201]

- {modified 4517} Shade structures shall be installed in any of the following ways: 1) constructed with a light permeable roofing material; 2) located uphill of any slope in the corral; or 3) installed in a North/South orientation. Alternatively, permittee shall clean manure from under shade structures at least once every fourteen (14) days, when weather permits access into the corral. [District Rules 2201 and 4570]

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

- All mature cow and heifer/bull open corrals shall be equipped with a sprinkler system, or an equivalent system or method, designed and operated appropriately, to sprinkle water over the entire surface of each corral (except for paved areas and areas under shade structures; and except during wet weather conditions). The sprinkling rate shall be based on the local wet soil evaporation rate (70-80% of the local wet pan evaporation rate) and shall be adjusted appropriately to maintain a moisture content on the corral surfaces that is sufficient to suppress dust emissions. [District Rule 2201]

- For heifers/bulls, at least one of the daily feedings shall be done within 1 hour of dusk. [District Rule 2201]

- The combined maximum number of medium heifers (7 - 14 months old), small heifers (4 - 6 months old), and bulls shall not exceed 1,200 at any one time. [District Rule 2201]

- The number of calves may exceed the value stated in the equipment description as long as the total support stock (heifers, bulls, and calves) does not exceed the combined value stated in the equipment description, and there is no increase in the number of corrals. [District Rule 2201]

Liquid Manure

- {modified 4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 2201]
- All liquid manure shall be treated in an anaerobic treatment lagoon system that is designed and operated according to the Natural Resources Conservation Service (NRCS) Field Office Technical Guide No. 359. [District Rule 2201]
- {modified 4538} Permittee shall remove solids with a solids separation system prior to the manure entering the treatment lagoons. [District Rules 2201 and 4570]
- {modified 4548} Only liquid manure that has been treated in an anaerobic treatment lagoon system shall be applied to land. [District Rules 2201 and 4570]

Solid Manure

- {modified 4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 2201]
- {modified 4541} Solid manure shall be incorporated into the soil within two hours of land application. [District Rules 2201 and 4570]

Feed

- {modified 4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
- {modified 4456} Permittee shall push feed so that it is within three feet of feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]
- {modified 4458} Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
- {modified 4460} Permittee shall store grain in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]
- {modified 4462} Permittee shall feed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. [District Rules 2201 and 4570]
- {modified 4466} For total mixed rations (TMR) that contain at least 30% by weight of silage, permittee shall ensure that TMR contains at least 45% moisture. [District Rules 2201 and 4570]

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

- {modified 4469} Permittee shall cover all silage piles, except for the area where feed is being removed from the pile, with a plastic tarp that is at least five (5) mils (0.005 inches) thick, multiple plastic tarps with a cumulative thickness of at least 5 mils (0.005 inches), or an oxygen barrier film covered with a UV resistant material. Silage piles shall be covered within seventy-two (72) hours of last delivery of material to the pile. Sheets of material used to cover silage shall overlap so that silage is not exposed where the sheets meet. [District Rules 2201 and 4570]

- {modified 4471} Permittee shall select and implement one of the following mitigation measures for building each silage pile at the facility: Option 1) build the silage pile such that the average bulk density is at least 44 lb/cu ft for corn silage and 40 lb/cu ft for other silage types, as measured in accordance with Section 7.11 of District Rule 4570; Option 2) Adjust filling parameters when creating the silage pile to achieve an average bulk density of at least 44 lb/cu ft for corn silage and at least 40 lb/cu ft for other silage types as determined using a District-approved spreadsheet; or Option 3) build silage piles using crops harvested with the applicable minimum moisture content, maximum Theoretical Length of Chop (TLC), and roller opening identified in District Rule 4570, Table 4.1, 1.d and manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. Records of the option chosen as a mitigation measure for building each silage pile shall be maintained. [District Rules 2201 and 4570]

- {modified 4474} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall harvest corn used for the pile at an average moisture content of at least 65% and harvest other silage crops for the pile at an average moisture content of at least 60%. [District Rules 2201 and 4570]

- {modified 4476} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall adjust setting of equipment used to harvest crops for the pile to incorporate the following parameters for Theoretical Length of Chop (TLC) and roller opening, as applicable: 1) Corn with no processing: TLC not exceeding 1/2 inch, 2) Processed Corn: TLC not exceeding 3/4 inch and roller opening of 1-4 mm, 3) Alfalfa/Grass: TLC not exceeding 1.0 inch, 4) Other silage crops: TLC not exceeding 1/2 inch. [District Rules 2201 and 4570]

- {modified 4478} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rules 2201 and 4570]

- {modified 4480} Permittee shall select and implement at least two of the following mitigation measures for management of silage piles at the facility: Option 1) manage silage piles such that only one silage pile has an uncovered face and the total exposed surface area is less than 2,150 square feet, or manage multiple uncovered silage piles such that the total exposed surface area of all uncovered silage piles is less than 4,300 square feet; Option 2) use a shaver/facer to remove silage from the silage pile, or shall use another method to maintain a smooth vertical surface on the working face of the silage pile; or Option 3) inoculate silage with homolactic lactic acid bacteria in accordance with manufacturer recommendations to achieve a concentration of at least 100,000 colony forming units per gram of wet forage, apply propionic acid, benzoic acid, sorbic acid, sodium benzoate, or potassium sorbate at the rate specified by the manufacturer to reduce yeast counts when forming silage piles, or apply other additives at rates that have been demonstrated to reduce alcohol concentrations in silage and/or VOC emissions from silage and have been approved by the District and EPA. Records of the options chosen for managing each silage pile shall be maintained. [District Rules 2201 and 4570]

E. Compliance Assurance

1. Source Testing

Pursuant to District Policy APR 1705, Source Testing Frequency, source testing is not required for the proposed project.

2. Monitoring

No monitoring is required for the proposed project.

3. Recordkeeping

Recordkeeping is required to demonstrate compliance with the offset, public notification, and DEL requirements of Rule 2201. The following conditions will be placed on the ATC permits to enforce the applicable recordkeeping requirements:

Cow Housing

- {modified 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 2201]

- {modified 4490} Permittee shall maintain records sufficient to demonstrate that lanes are flushed at least four times per day for mature cows and at least once per day for heifers/bulls. [District Rules 2201 and 4570]

- {modified 4493} Permittee shall record either of the following: 1) the dates when manure that is not dry is removed from individual cow freestall beds or 2) the dates when the freestall bedding is raked, harrowed, scraped, or graded. [District Rules 2201 and 4570]

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

- {modified 4502} Permittee shall demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning or demonstrate that corrals are cleaned at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]

- {modified 4555} Permittee shall either 1) maintain sufficient records to demonstrate that exercise pens and corrals are maintained to ensure proper drainage preventing water from standing for more than forty-eight hours or 2) maintain records of dates when exercise pens and corrals are groomed (i.e., harrowed, raked, or scraped, etc.). [District Rules 2201 and 4570]

- Permittee shall maintain sufficient records to demonstrate that exercise pen and corral surfaces are scraped every two weeks using a pull-type scraper during morning hours, except when prevented by wet conditions. [District Rule 2201]

- {modified 4516} For compliance using shade structures constructed with a light permeable roofing material, permittee shall maintain records, such as design specifications, demonstrating that the shade structures are equipped with such roofing material. For compliance by cleaning manure from under shade structures, permittee shall maintain records demonstrating that manure is cleaned from under the shade structures at least once every fourteen (14) days, as long as weather permits access to corrals. [District Rules 2201 and 4570]

- {modified 4519} Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rules 2201 and 4570]

- Permittee shall maintain records of the local evaporation rates, and records of corral sprinkling rates. [District Rule 2201]

- Permittee shall maintain a record of feeding schedule for heifers/bulls. [District Rule 2201]

- {modified 4449} Permittee shall maintain a record of the number of animals of each species and production group at the facility and shall maintain quarterly records of any changes to this information. [District Rules 2201 and 4570]

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

Liquid Manure

- {modified 4455} Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed

tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4102]

- Permittee shall maintain design specifications and calculations, including minimum treatment volume (MTV) and hydraulic retention time (HRT) calculations, demonstrating that the anaerobic treatment lagoon system meets the requirements listed in the NRCS Field Office Technical Guide No. 359. [District Rule 2201]

- {modified 4549} Permittee shall maintain records to demonstrate that only liquid manure that has been treated in an anaerobic treatment lagoon system is applied to land. [District Rules 2201 and 4570]

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

Solid Manure

- {modified 4455} Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4102]

- {modified 4542} Permittee shall maintain records to demonstrate that solid manure has been incorporated into the soil within two hours of land application. [District Rules 2201 and 4570]

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

Feed

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

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

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

- {modified 4461} Permittee shall maintain records demonstrating grain is/was stored in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]
- {modified 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 Rules 2201 and 4570]
- {modified 4467} For total mixed rations (TMR) that contain at least 30% by weight of silage, permittee shall maintain records demonstrating rations that contain at least 45% moisture. [District Rules 2201 and 4570]
- {modified 4470} Permittee shall maintain records of the thickness and type of cover used to cover each silage pile. Permittee shall also maintain records of the date of the last delivery of material to each silage pile and the date each pile is covered. [District Rules 2201 and 4570]
- {modified 4472} For each silage pile that Option 1 (Measured Bulk Density) is chosen as a mitigation measure for building the pile, records of the measured bulk density shall be maintained. [District Rules 2201 and 4570]
- {modified 4473} For each silage pile that Option 2 (Bulk Density Determined by Spreadsheet) is chosen as a mitigation measure for building the pile, records of the filling parameters entered into the District-approved spreadsheet to determine the bulk density shall be maintained. [District Rules 2201 and 4570]
- {modified 4475} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records of the average percent moisture of crops harvested for silage shall be maintained. [District Rules 2201 and 4570]
- {modified 4477} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records that equipment used to harvest crops for the pile was set to the required TLC and roller opening for the type of crop harvested shall be maintained. [District Rules 2201 and 4570]
- {modified 4479} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall maintain a plan that requires that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rules 2201 and 4570]
- {modified 4481} If Option 1 (Limiting Exposed Area of Silage) is chosen as a mitigation measure for managing silage piles, the permittee shall calculate and record the maximum (largest part of pile) total exposed area of each silage pile. Records of the maximum calculated area shall be maintained. [District Rules 2201 and 4570]

- {modified 4482} For each silage pile that Option 2 (Shaver/Facer or Smooth Face) is chosen as a mitigation measure for managing the pile, the permittee shall maintain records that a shaver/facer was used to remove silage from the pile or shall visually inspect the pile at least daily to verify that the working face was smooth and maintain records of the visual inspections. [District Rules 2201 and 4570]
- {modified 4483} For each silage pile that Option 3 (Silage Additives) is chosen as a mitigation measure for managing the pile, records shall be maintained of the type additive (e.g. inoculants, preservative, other District & EPA-approved additive), the quantity of the additive applied to the pile, and a copy of the manufacturer's instructions for application of the additive. [District Rules 2201 and 4570]
- {modified 4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

4. Reporting

No reporting is required for the proposed project.

F. Ambient Air Quality Analysis (AAQA)

An AAQA is conducted for the purpose of determining whether a new or modified stationary source will cause, or worsen, the violation of an ambient air quality standard (AAQS). The District's Technical Services Division conducted the required analysis. A summary of the results is included in Appendix F of this evaluation.

Charles Van Der Kooi Dairy is located in an attainment area for NO_x, CO, and SO_x. As shown in the AAQA summary, the modified operation will not cause a violation of an AAQS for NO_x, CO, or SO_x.

The facility is located in a non-attainment area for PM_{10} (state) and $PM_{2.5}$ (state and federal) AAQS. As shown in the AAQA summary, the modified operation will not cause a violation of an AAQS PM_{10} or $PM_{2.5}$.

Rule 2410 Prevention of Significant Deterioration

As shown in Section VII.C.9 of this evaluation, the proposed project does not result in a new PSD major source or PSD major modification. The project is therefore not subject to the requirements of this rule.

Rule 2520 Federally Mandated Operating Permits

As shown in Section VII.C.5 of this evaluation, this facility is not a major source. The facility is therefore not subject to the requirements of this rule.

Rule 4101 Visible Emissions

Pursuant to Section 4.12, the requirements of this rule do not apply to emissions subject to or specifically exempt from Regulation VIII (Fugitive PM10 Prohibitions).

Pursuant to Rule 8011, Section 4.4, on-field agricultural sources are exempt from the requirements of Regulation VIII.

The proposed project involves only on-field agricultural sources and is therefore exempt from the requirements of Rule 4101.

Rule 4102 Nuisance

This rule prohibits the discharge of air contaminants which could cause injury, detriment, nuisance or annoyance to the public. According to the District's records, there have been no public nuisance complaints or violations associated with the operations of this facility.

Since the proposed modifications do not fundamentally alter the nature of the facility's operations, continued compliance with the requirements of this rule is expected.

California Health & Safety Code §41700 Health Risk Assessment

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

An HRA is not required for a project with a total facility prioritization score of less than one. According to the Risk Management Review (RMR) summary in Appendix F of this evaluation, this facility's total prioritization score, including the proposed project, is less than one. An HRA was therefore not required to determine the short-term acute and long-term chronic exposure risk.

District policy APR 1905 also specifies that the increase in emissions associated with a proposed new source or modification not have acute or chronic indices, or a cancer risk greater than the District's significance levels (i.e. acute and/or chronic indices greater than 1 and a cancer risk greater than 20 in a million). As outlined in the RMR summary in Appendix F, the risk increases for the proposed project were determined to be less than significant.

Rule 4550 Conservation Management Practices

This rule applies to agricultural operation sites located within the San Joaquin Valley air basin. The purpose of the rule is to limit fugitive dust emissions from agricultural operation sites. Pursuant to Section 5.1, effective on and after July 1, 2004, an owner/operator shall implement the applicable CMPs selected pursuant to Section 6.2 for each agricultural operation site.

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

Charles Van Der Kooi Dairy received District approval for its current CMP plan in 2006. The proposed project does not involve any changes or modifications to the CMP plan. Continued compliance with the requirements of this rule is therefore expected.

Rule 4570 Confined Animal Facilities (CAF)

This rule applies to CAF operations located within the San Joaquin Valley air basin. The purpose of the rule is to limit VOC emissions through the implementation of various mitigation measures for each emissions unit.

The facility was issued ATC permits to implement the requirements of this rule under project #C-1112537. The applicant has not proposed any changes to the previously selected mitigation measures. The permit conditions from project #C-1112537 will therefore be incorporated into the ATC permits issued under the current project. These permit conditions are summarized as follows:

General Conditions

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

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

Cow Housing

- {modified 4486} Permittee shall pave feedlanes for a width of at least 8 feet along the housing side of the feedlane fence for mature cows and at least 6 feet along the housing side of the feedlane fence for heifers/bulls. [District Rules 2201 and 4570]

- {modified 4487} Permittee shall flush lanes at least four times per day for mature cows and at least once per day for heifers/bulls. [District Rules 2201 and 4570]

- {modified 4488} Permittee shall maintain records sufficient to demonstrate that lanes are flushed at least four times per day for mature cows and at least once per day for heifers. [District Rules 2201 and 4570]

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

- {modified 4493} Permittee shall record either of the following: 1) the dates when manure that is not dry is removed from individual cow freestall beds or 2) the dates when the freestall bedding is raked, harrowed, scraped, or graded. [District Rules 2201 and 4570]

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

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

- {modified 4501} Permittee shall clean manure from corrals at least four (4) times per year with at least sixty (60) days between each cleaning, or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]

- {modified 4502} Permittee shall demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning or demonstrate that corrals are cleaned at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]

- {modified 4554} Permittee shall implement at least one of the following exercise pen and corral mitigation measures: 1) slope the surface of the exercise pens and corrals at least 3% where the available space for each animal is 400 square feet or less and at least 1.5% where the available space for each animal is more than 400 square feet; 2) maintain exercise pens and corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape exercise pens and corral sufficiently to maintain a dry surface except during periods of rainy weather. [District Rules 2201 and 4570]

- {modified 4555} Permittee shall either 1) maintain sufficient records to demonstrate that exercise pens and corrals are maintained to ensure proper drainage preventing water from standing for more than forty-eight hours or 2) maintain records of dates when exercise pens and corrals are groomed (i.e., harrowed, raked, or scraped, etc.). [District Rules 2201 and 4570]

- {modified 4517} Shade structures shall be installed in any of the following ways: 1) constructed with a light permeable roofing material; 2) located uphill of any slope in the corral; or 3) installed in a North/South orientation. Alternatively, permittee shall clean manure from under shade structures at least once every fourteen (14) days, when weather permits access into the corral. [District Rules 2201 and 4570]

- {modified 4516} For compliance using shade structures constructed with a light permeable roofing material, permittee shall maintain records, such as design specifications, demonstrating that the shade structures are equipped with such roofing material. For compliance by cleaning manure from under shade structures, permittee shall maintain records demonstrating that manure is cleaned from under the shade structures at least once every fourteen (14) days, as long as weather permits access to corrals. [District Rules 2201 and 4570]

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

- {modified 4519} Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rules 2201 and 4570]

Liquid Manure

- {modified 4538} Permittee shall remove solids with a solids separation system prior to the manure entering the treatment lagoons. [District Rules 2201 and 4570]

- {modified 4548} Only liquid manure that has been treated in an anaerobic treatment lagoon system shall be applied to land. [District Rules 2201 and 4570]

- {modified 4549} Permittee shall maintain records to demonstrate that only liquid manure that has been treated in an anaerobic treatment lagoon system is applied to land. [District Rules 2201 and 4570]

Solid Manure

- {modified 4541} Solid manure shall be incorporated into the soil within two hours of land application. [District Rules 2201 and 4570]

- {modified 4542} Permittee shall maintain records to demonstrate that solid manure has been incorporated into the soil within two hours of land application. [District Rules 2201 and 4570]

Feed

- {modified 4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]

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

- {modified 4456} Permittee shall push feed so that it is within three feet of feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]

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

- {modified 4458} Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rules 2201 and 4570]

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

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

- {modified 4461} Permittee shall maintain records demonstrating grain is/was stored in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]

- {modified 4462} Permittee shall feed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. [District Rules 2201 and 4570]

- {modified 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 Rules 2201 and 4570]

- {modified 4466} For total mixed rations (TMR) that contain at least 30% by weight of silage, permittee shall ensure that TMR contains at least 45% moisture. [District Rules 2201 and 4570]

- {modified 4467} For total mixed rations (TMR) that contain at least 30% by weight of silage, permittee shall maintain records demonstrating rations that contain at least 45% moisture. [District Rules 2201 and 4570]

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

- {modified 4469} Permittee shall cover all silage piles, except for the area where feed is being removed from the pile, with a plastic tarp that is at least five (5) mils (0.005 inches) thick, multiple plastic tarps with a cumulative thickness of at least 5 mils (0.005 inches), or an oxygen barrier film covered with a UV resistant material. Silage piles shall be covered within seventy-two (72) hours of last delivery of material to the pile. Sheets of material used to cover silage shall overlap so that silage is not exposed where the sheets meet. [District Rules 2201 and 4570]

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

- {modified 4471} Permittee shall select and implement one of the following mitigation measures for building each silage pile at the facility: Option 1) build the silage pile such that the average bulk density is at least 44 lb/cu ft for corn silage and 40 lb/cu ft for other silage types, as measured in accordance with Section 7.11 of District Rule 4570; Option 2) Adjust filling parameters when creating the silage pile to achieve an average bulk density of at least 44 lb/cu ft for corn silage and at least 40 lb/cu ft for other silage types as determined using a District-approved spreadsheet; or Option 3) build silage piles using crops harvested with the applicable minimum moisture content, maximum Theoretical Length of Chop (TLC), and roller opening identified in District Rule 4570, Table 4.1, 1.d and manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. Records of the option chosen as a mitigation measure for building each silage pile shall be maintained. [District Rules 2201 and 4570]
- {modified 4472} For each silage pile that Option 1 (Measured Bulk Density) is chosen as a mitigation measure for building the pile, records of the measured bulk density shall be maintained. [District Rules 2201 and 4570]
- {modified 4473} For each silage pile that Option 2 (Bulk Density Determined by Spreadsheet) is chosen as a mitigation measure for building the pile, records of the filling parameters entered into the District-approved spreadsheet to determine the bulk density shall be maintained. [District Rules 2201 and 4570]
- {modified 4474} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall harvest corn used for the pile at an average moisture content of at least 65% and harvest other silage crops for the pile at an average moisture content of at least 60%. [District Rules 2201 and 4570]
- {modified 4475} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records of the average percent moisture of crops harvested for silage shall be maintained. [District Rules 2201 and 4570]
- {modified 4476} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall adjust setting of equipment used to harvest crops for the pile to incorporate the following parameters for Theoretical Length of Chop (TLC) and roller opening, as applicable: 1) Corn with no processing: TLC not exceeding 1/2 inch, 2) Processed Corn: TLC not exceeding 3/4 inch and roller opening of 1-4 mm, 3) Alfalfa/Grass: TLC not exceeding 1.0 inch, 4) Other silage crops: TLC not exceeding 1/2 inch. [District Rules 2201 and 4570]
- {modified 4477} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records that equipment used to harvest crops for the pile was set to the required TLC and roller opening for the type of crop harvested shall be maintained. [District Rules 2201 and 4570]
- {modified 4478} For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rules 2201 and 4570]

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

- {modified 4480} Permittee shall select and implement at least two of the following mitigation measures for management of silage piles at the facility: Option 1) manage silage piles such that only one silage pile has an uncovered face and the total exposed surface area is less than 2,150 square feet, or manage multiple uncovered silage piles such that the total exposed surface area of all uncovered silage piles is less than 4,300 square feet; Option 2) use a shaver/facer to remove silage from the silage pile, or shall use another method to maintain a smooth vertical surface on the working face of the silage pile; or Option 3) inoculate silage with homolactic lactic acid bacteria in accordance with manufacturer recommendations to achieve a concentration of at least 100,000 colony forming units per gram of wet forage, apply propionic acid, benzoic acid, sorbic acid, sodium benzoate, or potassium sorbate at the rate specified by the manufacturer to reduce yeast counts when forming silage piles, or apply other additives at rates that have been demonstrated to reduce alcohol concentrations in silage and/or VOC emissions from silage and have been approved by the District and EPA. Records of the options chosen for managing each silage pile shall be maintained. [District Rules 2201 and 4570]

- {modified 4481} If Option 1 (Limiting Exposed Area of Silage) is chosen as a mitigation measure for managing silage piles, the permittee shall calculate and record the maximum (largest part of pile) total exposed area of each silage pile. Records of the maximum calculated area shall be maintained. [District Rules 2201 and 4570]

- {modified 4482} For each silage pile that Option 2 (Shaver/Facer or Smooth Face) is chosen as a mitigation measure for building the pile, the permittee shall maintain records that a shaver/facer was used to remove silage from the pile or shall visually inspect the pile at least daily to verify that the working face was smooth and maintain records of the visual inspections. [District Rules 2201 and 4570]

- {modified 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 Rules 2201 and 4570]

According to the District's inspection records, this facility has been operating in compliance with Rule 4570 requirements. Since the proposed modifications do not fundamentally alter the nature of the facility's operations, continued compliance with the requirements of this rule is expected.

California Health & Safety Code §42301.6 School Notice

The District has verified that the proposed project site is not located within 1,000 feet of the outer boundaries of any K-12 schools. A school notice pursuant to California Health and Safety Code §42301.6 is therefore not required.

California Environmental Quality Act (CEQA)

CEQA requires each public agency to adopt objectives, criteria, and specific procedures consistent with CEQA statutes and guidelines for administering its responsibilities under CEQA, including the orderly evaluation of projects and preparation of environmental documents. The 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; and
- 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.

District Lead Agency – Environmental Impact Report

On August 18, 2005, the initial Authority to Construct (ATC) application (project #C-1053434) to expand the dairy operation from a grandfathered maximum capacity of 1,700 milk cows and 250 dry cows to a maximum capacity of 3,200 milk cows, 480 dry cows, 2,060 heifers, and 380 calves (project) was submitted to the District.

The District determined that no other agency had broader discretionary approval power over the project and that the District was the first agency to act on the project, therefore establishing the District as the Lead Agency, per CEQA Guidelines §15051(b). An Initial Study was prepared, which identified the impact on air quality as the project's only potential significant adverse environmental effect. The District's engineering evaluation of the project determined that compliance with District rules and permit conditions would reduce and mitigate the project's potential environmental impact to less than significant. Consistent with CEQA Guidelines §15081, a Draft Environmental Impact Report (EIR) was prepared and released for public review from November 14, 2006 to December 29, 2006. Consistent with CEQA Guidelines §15088(b), all comments received were duly considered and addressed in preparation of the Final EIR, which was published in November 2007. Additionally, the District also prepared a Supplemental Environmental Impact Report (SEIR), which was available for public comment from May 20, 2008 to July 3, 2008, and was published in September of 2008, to address Greenhouse Gas (GHG).

In 2008, the District issued ATC permits (via project #C-1053434) to the applicant for this project (to expand the dairy operation from a grandfathered maximum capacity of 1,700 milk cows and 250 dry cows to a maximum capacity of 3,200 milk cows, 480 dry cows, 2,060 heifers, and 380 calves).

In 2013, the District's Compliance Division conducted a startup inspection of the proposed expansion. The inspection established that the applicant had completed construction of the mature cow portion of the expansion, with six completed freestall barns capable of housing a maximum of

3,200 milk cows and 230 dry cows. However, the inspection established, the applicant had not yet completed construction of the open corrals for 250 dry cows, heifers, and calves. Only grading of the open corral areas had been done. Therefore, the District determined that the ATC covering the open corrals had not yet commenced construction, and therefore had expired pursuant to Rule 2050, Cancellation of Application. The District issued a Notice to Comply (NTC #5007650) in which the applicant was required to submit a new ATC application for the amended project scope (i.e. mature cow housing only). As such, on October 15, 2013, the applicant submitted a new ATC application (current project #C-1133052), which was subsequently amended to reauthorize construction of the open corrals and restore the original project scope.

The environmental impacts of the proposed project #C-1133052 were analyzed under the EIR prepared for Van Der Kooi Dairy in 2008. Project #C-1133052 does not create any potential significant impact that was not covered in the EIR or SEIR. Therefore, preparation of a new environmental document or revision to the existing EIR is not required. As such, the District's engineering evaluation of the proposed project #C-1133052 (this document) determined that compliance with District rules and permit conditions would reduce and mitigate the project's potential environmental impact to less than significant.

Indemnification Agreement/Letter of Credit Determination

According to District Policy APR 2010 (CEQA Implementation Policy), when the District is the Lead or Responsible Agency for CEQA purposes, an indemnification agreement and/or a letter of credit may be required. The decision to require an indemnity agreement and/or a letter of credit are based on a case-by-case analysis of a particular project's potential for litigation risk, which in turn may be based on a project's potential to generate public concern, its potential for significant impacts, and the project proponent's ability to pay for the costs of litigation without a letter of credit, among other factors.

The proposed ATC project #C-1133052 is for an operation of public concern (Dairies) in the Valley and triggers Best Available Control Technology (BACT). The proposed project has been determined to have a less than significant impact and covered under the 2008 EIR. Therefore, the District determined that only an Indemnification Agreement is required. A Letter of Credit will not be required for this project in the absence of expressed public concern.

IX. Recommendation

Compliance with all the applicable rules and regulations is expected. Pending a successful NSR public notification process, issue ATC permits C-7013-2-4, 3-4, 4-4, and 8-2 subject to the permit conditions shown on the drafts in Appendix A.

X. Billing Information

Annual Permit Fees			
Permit Number	**Fee Schedule**	**Fee Description**	**Annual Fee**
C-7013-2-4	3020-06	Cow Housing	$116
C-7013-3-4	3020-06	Liquid Manure Handling	$116
C-7013-4-4	3020-06	Solid Manure Handling	$116
C-7013-8-2	3020-06	Feed Storage and Handling	$116

XI. Appendices

A: Draft ATC Permits
B: Current PTOs
C: Project Site Plan
D: BACT Guidelines
E: BACT Analysis
F: RMR and AAQA Summary
G: Dairy Emissions Calculations
H: Treatment Lagoon Design Check
I: PE Calculations for Unit C-7013-10
J: BACT Calculations
K: QNEC

APPENDIX A

Draft ATC Permits

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: C-7013-2-4

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: CHARLES VAN DER KOOI
MAILING ADDRESS: 1563 W BUCKINGHAM DR
HANFORD, CA 93230-7927

LOCATION: 13695 W ELKHORN AVE
RIVERDALE, CA 93656

EQUIPMENT DESCRIPTION:
MODIFICATION OF COW HOUSING - 3,200 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 3,430 MATURE COWS (MILK AND DRY); 10 SUPPORT STOCK (HEIFERS AND BULLS); AND 6 FREESTALL BARNS WITH A FLUSH/SCRAPE SYSTEM: INCREASE MAXIMUM NUMBERS OF COWS TO 3,200 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 3,680 MATURE COWS (MILK AND DRY); 2,440 SUPPORT STOCK CONSISTING OF 2,060 HEIFERS AND BULLS, AND 380 CALVES HOUSED IN OPEN CORRALS; AND CONSTRUCT A MAXIMUM OF 18 NEW OPEN CORRALS WITH SHADE STRUCTURES

CONDITIONS

1. This Authority to Construct (ATC) shall be implemented concurrently with ATCs C-7013-3-4, 4-4, and 8-2. [District Rule 2201]
2. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
3. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
4. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (559) 230-5950 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

Arnaud Marjollet, Director of Permit Services

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5. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 2201]
6. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rule 2201]
7. Permittee shall pave feedlanes for a width of at least 8 feet along the housing side of the feedlane fence for mature cows and at least 6 feet along the housing side of the feedlane fence for heifers/bulls. [District Rules 2201 and 4570]
8. Permittee shall flush lanes at least four times per day for mature cows and at least once per day for heifers/bulls. [District Rules 2201 and 4570]
9. Permittee shall maintain records sufficient to demonstrate that lanes are flushed at least four times per day for mature cows and at least once per day for heifers/bulls. [District Rules 2201 and 4570]
10. Permittee shall remove manure that is not dry from individual cow freestall beds or shall rake, harrow, scrape, or grade freestall bedding at least once every seven (7) days. [District Rules 2201 and 4570]
11. Permittee shall record either of the following: 1) the dates when manure that is not dry is removed from individual cow freestall beds or 2) the dates when the freestall bedding is raked, harrowed, scraped, or graded. [District Rules 2201 and 4570]
12. Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rules 2201 and 4570]
13. Permittee shall maintain records demonstrating that water pipes and troughs are inspected and leaks are repaired at least once every seven (7) days. [District Rules 2201 and 4570]
14. Permittee shall clean manure from corrals at least four (4) times per year with at least sixty (60) days between each cleaning, or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]
15. Permittee shall demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning or demonstrate that corrals are cleaned at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]
16. Permittee shall implement at least one of the following exercise pen and corral mitigation measures: 1) slope the surface of the exercise pens and corrals at least 3% where the available space for each animal is 400 square feet or less and at least 1.5% where the available space for each animal is more than 400 square feet; 2) maintain exercise pens and corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape exercise pens and corral sufficiently to maintain a dry surface except during periods of rainy weather. [District Rules 2201 and 4570]
17. Permittee shall either 1) maintain sufficient records to demonstrate that exercise pens and corrals are maintained to ensure proper drainage preventing water from standing for more than forty-eight hours or 2) maintain records of dates when exercise pens and corrals are groomed (i.e., harrowed, raked, or scraped, etc.). [District Rules 2201 and 4570]
18. Permittee shall scrape exercise pen and corral surfaces every two weeks using a pull-type scraper during morning hours, except when prevented by wet conditions. [District Rule 2201]
19. Permittee shall maintain sufficient records to demonstrate that exercise pen and corral surfaces are scraped every two weeks using a pull-type scraper during morning hours, except when prevented by wet conditions. [District Rule 2201]
20. All mature cow and heifer/bull open corrals shall be equipped with shade structures. [District Rule 2201]
21. Shade structures shall be installed in any of the following ways: 1) constructed with a light permeable roofing material; 2) located uphill of any slope in the corral; or 3) installed in a North/South orientation. Alternatively, permittee shall clean manure from under shade structures at least once every fourteen (14) days, when weather permits access into the corral. [District Rules 2201 and 4570]

CONDITIONS CONTINUE ON NEXT PAGE

22. For compliance using shade structures constructed with a light permeable roofing material, permittee shall maintain records, such as design specifications, demonstrating that the shade structures are equipped with such roofing material. For compliance by cleaning manure from under shade structures, permittee shall maintain records demonstrating that manure is cleaned from under the shade structures at least once every fourteen (14) days, as long as weather permits access to corrals. [District Rules 2201 and 4570]
23. Permittee shall manage corrals such that the manure depth in the corral does not exceed twelve (12) inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rules 2201 and 4570]
24. Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rules 2201 and 4570]
25. All mature cow and heifer/bull open corrals shall be equipped with a sprinkler system, or an equivalent system or method, designed and operated appropriately, to sprinkle water over the entire surface of each corral (except for paved areas and areas under shade structures; and except during wet weather conditions). The sprinkling rate shall be based on the local wet soil evaporation rate (70-80% of the local wet pan evaporation rate) and shall be adjusted appropriately to maintain a moisture content on the corral surfaces that is sufficient to suppress dust emissions. [District Rule 2201]
26. Permittee shall maintain records of the local evaporation rates, and records of corral sprinkling rates. [District Rule 2201]
27. For heifers/bulls, at least one of the daily feedings shall be done within 1 hour of dusk. [District Rule 2201]
28. Permittee shall maintain a record of the feeding schedule for heifers/bulls. [District Rule 2201]
29. The combined maximum number of medium heifers (7 - 14 months old), small heifers (4 - 6 months old), and bulls shall not exceed 1,200 at any one time. [District Rule 2201]
30. The number of calves may exceed the value stated in the equipment description as long as the total support stock (heifers, bulls, and calves) does not exceed the combined value stated in the equipment description, and there is no increase in the number of corrals. [District Rule 2201]
31. Permittee shall maintain a record of the number of animals of each species and production group at the facility and shall maintain quarterly records of any changes to this information. [District Rules 2201 and 4570]
32. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]
33. {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: C-7013-3-4

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: CHARLES VAN DER KOOI
MAILING ADDRESS: 1563 W BUCKINGHAM DR
HANFORD, CA 93230-7927

LOCATION: 13695 W ELKHORN AVE
RIVERDALE, CA 93656

EQUIPMENT DESCRIPTION:
MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF SETTLING BASIN(S); MECHANICAL SEPARATOR(S); THREE ANAEROBIC TREATMENT LAGOONS (1100' X 200' X 20' EACH), AND ONE STORAGE POND; MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION AND SPRINKLER SYSTEM: ALLOW INCREASE IN THROUGHPUT DUE TO HERD EXPANSION

CONDITIONS

1. This Authority to Construct (ATC) shall be implemented concurrently with ATC C-7013-2-4. [District Rule 2201]
2. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
3. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
4. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
5. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (559) 230-5950 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

Arnaud Marjollet, Director of Permit Services

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6. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rule 2201]
7. All liquid manure shall be treated in an anaerobic treatment lagoon system that is designed and operated according to the Natural Resources Conservation Service (NRCS) Field Office Technical Guide No. 359. [District Rule 2201]
8. Permittee shall maintain design specifications and calculations, including minimum treatment volume (MTV) and hydraulic retention time (HRT) calculations, demonstrating that the anaerobic treatment lagoon system meets the requirements listed in the NRCS Field Office Technical Guide No. 359. [District Rule 2201]
9. Permittee shall remove solids with a solids separation system prior to the manure entering the treatment lagoons. [District Rules 2201 and 4570]
10. Only liquid manure that has been treated in an anaerobic treatment lagoon system shall be applied to land. [District Rules 2201 and 4570]
11. Permittee shall maintain records to demonstrate that only liquid manure that has been treated in an anaerobic treatment lagoon system is applied to land. [District Rules 2201 and 4570]
12. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]
13. {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: C-7013-4-4 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: CHARLES VAN DER KOOI
MAILING ADDRESS: 1563 W BUCKINGHAM DR
HANFORD, CA 93230-7927

LOCATION: 13695 W ELKHORN AVE
RIVERDALE, CA 93656

EQUIPMENT DESCRIPTION:
MODIFICATION OF SOLID MANURE HANDLING OPERATION CONSISTING OF MANURE STOCK PILES; WINDROW COMPOSTING; SOLID MANURE APPLICATION TO LAND AND/OR HAULED OFFSITE: ALLOW INCREASE IN THROUGHPUT DUE TO HERD EXPANSION

CONDITIONS

1. This Authority to Construct (ATC) shall be implemented concurrently with ATC C-7013-2-4. [District Rule 2201]
2. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
3. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
4. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
5. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (559) 230-5950 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

Arnaud Marjollet, Director of Permit Services

C-7013-4-4 : Oct 25 2017 12:06PM – AIYABEIJ : Joint Inspection NOT Required

6. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rule 2201]
7. Solid manure shall be incorporated into the soil within two hours of land application. [District Rules 2201 and 4570]
8. Permittee shall maintain records to demonstrate that solid manure has been incorporated into the soil within two hours of land application. [District Rules 2201 and 4570]
9. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]
10. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: C-7013-8-2

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: CHARLES VAN DER KOOI
MAILING ADDRESS: 1563 W BUCKINGHAM DR
HANFORD, CA 93230-7927

LOCATION: 13695 W ELKHORN AVE
RIVERDALE, CA 93656

EQUIPMENT DESCRIPTION:
MODIFICATION OF FEED STORAGE AND HANDLING OPERATION CONSISTING OF COMMODITY BARN(S) AND SILAGE PILE(S) AND TOTAL MIXED RATION FEEDING: ALLOW INCREASE IN TOTAL MIXED RATION FEEDING DUE TO HERD EXPANSION

CONDITIONS

1. This Authority to Construct (ATC) shall be implemented concurrently with ATC C-7013-2-4. [District Rule 2201]
2. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
3. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
4. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
5. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (559) 230-5950 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

Arnaud Marjollet, Director of Permit Services

C-7013-8-2 : Oct 25 2017 12:07PM – AIYABEIJ : Joint Inspection NOT Required

6. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
7. Permittee shall push feed so that it is within three feet of feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]
8. Permittee shall maintain an operating plan or record that requires feed to be pushed within three feet of feedlane fence within two hours of putting out the feed, or use of a feed trough or other structure designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]
9. Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
10. Permittee shall maintain an operating plan or record of when feeding of total mixed rations began within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
11. Permittee shall store grain in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]
12. Permittee shall maintain records demonstrating grain is/was stored in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]
13. Permittee shall feed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. [District Rules 2201 and 4570]
14. 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 Rules 2201 and 4570]
15. For total mixed rations (TMR) that contain at least 30% by weight of silage, permittee shall ensure that TMR contains at least 45% moisture. [District Rules 2201 and 4570]
16. For total mixed rations (TMR) that contain at least 30% by weight of silage, permittee shall maintain records demonstrating rations that contain at least 45% moisture. [District Rules 2201 and 4570]
17. For bagged silage/feedstuff, permittee shall utilize a sealed feed storage system (e.g., ag bag). [District Rules 2201 and 4570]
18. Permittee shall cover all silage piles, except for the area where feed is being removed from the pile, with a plastic tarp that is at least five (5) mils (0.005 inches) thick, multiple plastic tarps with a cumulative thickness of at least 5 mils (0.005 inches), or an oxygen barrier film covered with a UV resistant material. Silage piles shall be covered within seventy-two (72) hours of last delivery of material to the pile. Sheets of material used to cover silage shall overlap so that silage is not exposed where the sheets meet. [District Rules 2201 and 4570]
19. Permittee shall maintain records of the thickness and type of cover used to cover each silage pile. Permittee shall also maintain records of the date of the last delivery of material to each silage pile and the date each pile is covered. [District Rules 2201 and 4570]
20. Permittee shall select and implement one of the following mitigation measures for building each silage pile at the facility: Option 1) build the silage pile such that the average bulk density is at least 44 lb/cu ft for corn silage and 40 lb/cu ft for other silage types, as measured in accordance with Section 7.11 of District Rule 4570; Option 2) Adjust filling parameters when creating the silage pile to achieve an average bulk density of at least 44 lb/cu ft for corn silage and at least 40 lb/cu ft for other silage types as determined using a District-approved spreadsheet; or Option 3) build silage piles using crops harvested with the applicable minimum moisture content, maximum Theoretical Length of Chop (TLC), and roller opening identified in District Rule 4570, Table 4.1, 1.d and manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. Records of the option chosen as a mitigation measure for building each silage pile shall be maintained. [District Rules 2201 and 4570]

CONDITIONS CONTINUE ON NEXT PAGE

21. For each silage pile that Option 1 (Measured Bulk Density) is chosen as a mitigation measure for building the pile, records of the measured bulk density shall be maintained. [District Rules 2201 and 4570]

22. For each silage pile that Option 2 (Bulk Density Determined by Spreadsheet) is chosen as a mitigation measure for building the pile, records of the filling parameters entered into the District-approved spreadsheet to determine the bulk density shall be maintained. [District Rules 2201 and 4570]

23. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall harvest corn used for the pile at an average moisture content of at least 65% and harvest other silage crops for the pile at an average moisture content of at least 60%. [District Rules 2201 and 4570]

24. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records of the average percent moisture of crops harvested for silage shall be maintained. [District Rules 2201 and 4570]

25. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall adjust setting of equipment used to harvest crops for the pile to incorporate the following parameters for Theoretical Length of Chop (TLC) and roller opening, as applicable: 1) Corn with no processing: TLC not exceeding 1/2 inch, 2) Processed Corn: TLC not exceeding 3/4 inch and roller opening of 1-4 mm, 3) Alfalfa/Grass: TLC not exceeding 1.0 inch, 4) Other silage crops: TLC not exceeding 1/2 inch. [District Rules 2201 and 4570]

26. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records that equipment used to harvest crops for the pile was set to the required TLC and roller opening for the type of crop harvested shall be maintained. [District Rules 2201 and 4570]

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

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

29. Permittee shall select and implement at least two of the following mitigation measures for management of silage piles at the facility: Option 1) manage silage piles such that only one silage pile has an uncovered face and the total exposed surface area is less than 2,150 square feet, or manage multiple uncovered silage piles such that the total exposed surface area of all uncovered silage piles is less than 4,300 square feet; Option 2) use a shaver/facer to remove silage from the silage pile, or shall use another method to maintain a smooth vertical surface on the working face of the silage pile; or Option 3) inoculate silage with homolactic lactic acid bacteria in accordance with manufacturer recommendations to achieve a concentration of at least 100,000 colony forming units per gram of wet forage, apply propionic acid, benzoic acid, sorbic acid, sodium benzoate, or potassium sorbate at the rate specified by the manufacturer to reduce yeast counts when forming silage piles, or apply other additives at rates that have been demonstrated to reduce alcohol concentrations in silage and/or VOC emissions from silage and have been approved by the District and EPA. Records of the options chosen for managing each silage pile shall be maintained. [District Rules 2201 and 4570]

30. If Option 1 (Limiting Exposed Area of Silage) is chosen as a mitigation measure for managing silage piles, the permittee shall calculate and record the maximum (largest part of pile) total exposed area of each silage pile. Records of the maximum calculated area shall be maintained. [District Rules 2201 and 4570]

31. For each silage pile that Option 2 (Shaver/Facer or Smooth Face) is chosen as a mitigation measure for managing the pile, the permittee shall maintain records that a shaver/facer was used to remove silage from the pile or shall visually inspect the pile at least daily to verify that the working face was smooth and maintain records of the visual inspections. [District Rules 2201 and 4570]

32. For each silage pile that Option 3 (Silage Additives) is chosen as a mitigation measure for managing the pile, records shall be maintained of the type additive (e.g. inoculants, preservative, other District & EPA-approved additive), the quantity of the additive applied to the pile, and a copy of the manufacturers instructions for application of the additive. [District Rules 2201 and 4570]

CONDITIONS CONTINUE ON NEXT PAGE

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

34. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

Appendix B

Current PTOs

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: C-7013-2-1 **EXPIRATION DATE:** 12/31/2018

EQUIPMENT DESCRIPTION:
COW HOUSING - 3,200 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 3,430 MATURE COWS (MILK AND DRY); 10 SUPPORT STOCK (HEIFERS AND BULLS); AND 6 FREESTALL BARNS WITH A FLUSH/SCRAPE SYSTEM

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
4. Permittee shall pave feedlanes for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for support stock. [District Rules 2201 and 4570]
5. The freestall lanes and walkways shall be flushed at least four times per day. [District Rules 2201 and 4570]
6. Permittee shall maintain records sufficient to demonstrate that freestall lanes and walkways are flushed at least four times per day. [District Rules 2201 and 4570]
7. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 2201]
8. 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 2201]
9. Uneaten feed shall be re-fed to the animals or removed from the area where animals stand to eat feed on a daily basis to prevent decomposition. Uneaten feed shall be properly disposed after removal. [District Rule 2201]
10. Permittee shall maintain records sufficient to demonstrate that uneaten feed was removed from the feed lanes and properly disposed of each day. [District Rule 2201]
11. Permittee shall remove manure that is not dry from individual cow freestall beds or shall rake, harrow, scrape, or grade freestall bedding at least once every seven (7) days. [District Rules 2201 and 4570]
12. Permittee shall record either of the following: 1) the dates when manure that is not dry is removed from individual cow freestall beds or 2) the dates when the freestall bedding is raked, harrowed, scraped, or graded. [District Rules 2201 and 4570]
13. Permittee shall groom (harrow, rake, or scrape) exercise pens sufficiently to maintain a dry surface, except during periods of rainy weather. [District Rule 2201]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

14. Permittee shall maintain records of dates when exercise pens are groomed. [District Rule 2201]
15. Permittee shall slope exercise pen surfaces at least 3% where the available space for each animal is 400 square feet or less and at least 1.5% where the available space for each animal is more than 400 square feet. [District Rule 2201]
16. Permittee shall maintain records to demonstrate that exercise pen surfaces are sloped properly. [District Rule 2201]
17. Inspection for potholes and other sources of emissions shall be done on a monthly basis. Records of pothole inspections shall be maintained. [District Rule 2201]
18. Firm, stable soil that is not easily eroded shall be used for exercise pen surfaces. A supply of fill soil shall be kept on site in order to fill areas where erosion and gouging occurs. [District Rule 2201]
19. 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]
20. Fence lines shall be inspected weekly to remove any ridges or build-up of manure that form under them. Records of fence line inspections and fence line manure build-up removal shall be maintained. [District Rule 2201]
21. Permittee shall maintain a record of the number of animals of each species and production group at the facility and shall maintain quarterly records of any changes to this information. [District Rules 2201 and 4570]
22. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]
23. 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

PERMIT UNIT: C-7013-3-1 **EXPIRATION DATE:** 12/31/2018

EQUIPMENT DESCRIPTION:
LIQUID MANURE HANDLING SYSTEM CONSISTING OF TWO SETTLING BASINS; MECHANICAL SEPARATOR(S); THREE PHOTOTROPHIC TREATMENT LAGOONS (1100'X200'X20' EACH), AND ONE STORAGE POND; MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION AND SPRINKLER SYSTEM

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. 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. All liquid manure shall be treated using a phototrophic lagoon treatment system; or an equivalent treatment system. [District Rule 2201]
5. Permittee shall remove solids from the waste system with a solid separator system, prior to the waste entering the lagoon. [District Rules 2201 and 4570]
6. Permittee shall only apply liquid manure that has been treated with an anaerobic treatment lagoon, an aerobic lagoon or a digester system. [District Rule 4570]
7. Permittee shall maintain records that only liquid manure treated with an anaerobic treatment lagoon or aerobic lagoon or digester system is applied to fields. [District Rule 4570]
8. Permittee shall maintain records of operation for the phototrophic lagoons and associated nutrient management system in order to demonstrate that the system has been designed and is operating according to the applicable nutrient management standards. [District Rule 2201]
9. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]
10. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: C-7013-4-1 **EXPIRATION DATE:** 12/31/2018

EQUIPMENT DESCRIPTION:
SOLID MANURE HANDLING OPERATION CONSISTING OF MANURE STOCK PILES; WINDROW COMPOSTING; SOLID MANURE APPLICATION TO LAND AND OFFSITE HAULING

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. 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 incorporate all solid manure within seventy-two (72) hours of land application. [District Rule 4570]
5. Permittee shall maintain records to demonstrate that all solid manure has been incorporated within seventy-two (72) hours of land application. [District Rule 4570]
6. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]
7. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: C-7013-8-1 **EXPIRATION DATE:** 12/31/2018

EQUIPMENT DESCRIPTION:
FEED STORAGE AND HANDLING OPERATION CONSISTING OF COMMODITY BARN(S), SILAGE PILE(S), AND TOTAL MIXED RATION FEEDING

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]
4. If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
5. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 4570]
6. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rule 4570]
7. Permittee shall push feed so that it is within three feet of feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals. [District Rule 4570]
8. Permittee shall maintain an operating plan or record that requires feed to be pushed within three feet of feedlane fence within two hours of putting out the feed, or use of a feed trough or other structure designed to maintain feed within reach of the animals. [District Rule 4570]
9. Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rule 4570]
10. Permittee shall maintain an operating plan or record of when feeding of total mixed rations began within two hours of grinding and mixing rations. [District Rule 4570]
11. Permittee shall store grain in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rule 4570]
12. Permittee shall maintain records demonstrating grain is/was stored in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rule 4570]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

13. 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]
14. 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]
15. For total mixed rations (TMR) that contain at least 30% by weight of silage, permittee shall ensure that TMR contains at least 45% moisture. [District Rule 4570]
16. For total mixed rations (TMR) that contain at least 30% by weight of silage, permittee shall maintain records demonstrating rations that contain at least 45% moisture. [District Rule 4570]
17. For bagged silage/feedstuff, permittee shall utilize a sealed feed storage system (e.g., ag bag). [District Rule 4570]
18. 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]
19. 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]
20. 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]
21. 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]
22. 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]
23. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall 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]
24. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records of the average percent moisture of crops harvested for silage shall be maintained. [District Rule 4570]
25. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall 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]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

26. 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]

27. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall 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]

28. 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]

29. 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]

30. 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]

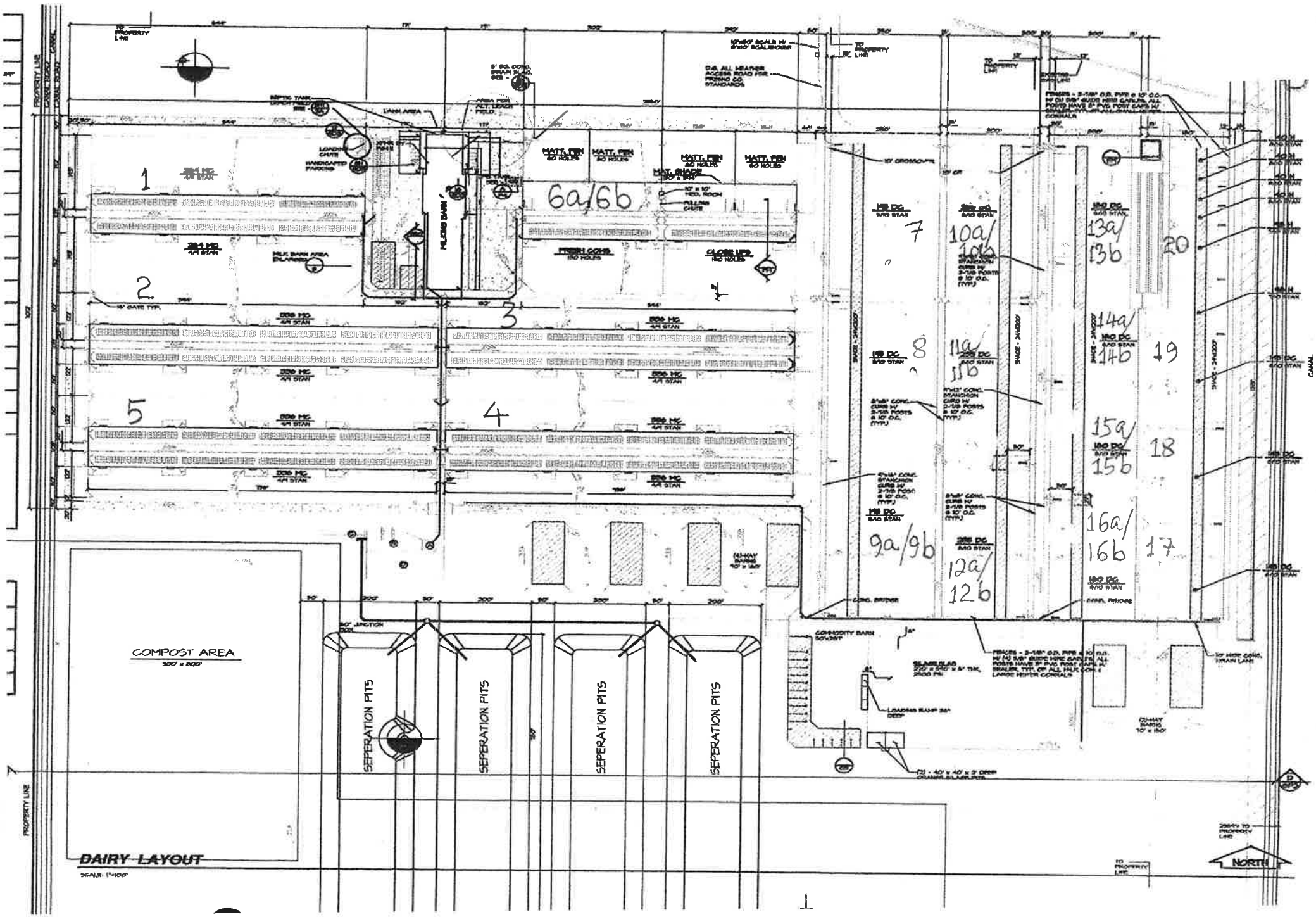
31. For each silage pile that Option 2 (Shaver/Facer or Smooth Face) is chosen as a mitigation measure for managing the pile, the permittee shall maintain records that a shaver/facer was used to remove silage from the pile or shall visually inspect the pile at least daily to verify that the working face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

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

33. 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]

APPENDIX C

Project Site Plan



DAIRY LAYOUT

SCALE: 1"=100'

Appendix D

BACT Guidelines

San Joaquin Valley Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.7.X*

Last Update: 2016

Emissions Unit: Dairy Cow Housing - Open Corrals

Pollutant	Achieved in Practice or contained in SIP	Technologically Feasible	Alternate Basic Equipment
PM_{10}	- Concrete feed lanes and walkways; - Scraping of open corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions; - Shade structures in open corrals; - Feeding heifers in corrals near dusk (within 1 hour of dusk); and - Windbreaks controlling dust from corrals (when feasible, supported by soil conditions, and there is adequate space at existing facilities) or an alternative measure with equivalent PM control (e.g. sprinkling/water application over at least 25% of the corral surface or average corral surface moisture content (wet-based) ≥ 16%)		Freestall Barns for Milk and Dry Cows, Saudi Style Barns for Milk and Dry Cows, Loafing Barns
VOC	- Concrete feed lanes and walkways; - Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, Scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning lanes and walkways for support stock (heifers) at least once per day); - Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines; - Properly sloping corrals (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing corrals to maintain a dry surface; - Scraping corrals and exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions; and - Rule 4570 Measures		
Ammonia	- Concrete feed lanes and walkways; - Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, Scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning lanes and walkways for support stock (heifers) at least once per day); - Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines; - Properly sloping corrals (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing corrals to maintain a dry surface; and - Scraping corrals and exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions;		

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.

***This is a Summary Page for this Class of Source** **4th Quarter 2016**

San Joaquin Valley Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.7.X*

Last Update: December 18, 2013

Emissions Unit: Liquid Manure Handling at Dairies

Pollutant	Achieved in Practice or contained in SIP	Technologically Feasible	Alternate Basic Equipment
VOC	Anaerobic treatment lagoon designed according to NRCS Guideline, and solids removal/separation system (mechanical separator(s) or settling basin(s)/weeping wall(s))	1) Aerobic treatment lagoon or mechanically aerated lagoon; 2) Covered lagoon digester vented to a control device with minimum 95% control	
Ammonia	All animals fed in accordance with NRC or other District-approved guidelines		

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.

***This is a Summary Page for this Class of Source** **4th Quarter 2016**

San Joaquin Valley Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.7.X*

Last Update: December 18, 2013

Emissions Unit: Liquid/Slurry Manure Land Application

Pollutant	Achieved in Practice or contained in SIP	Technologically Feasible	Alternate Basic Equipment
VOC	Irrigation of crops using liquid/slurry manure from the secondary lagoon/holding/storage pond preceded by an uncovered anaerobic treatment lagoon designed to meet Natural Resources Conservation Service (NRCS) standards	1) Irrigation of crops using liquid manure from an aerobic treatment lagoon or mechanically aerated lagoon (95% VOC control efficiency) 2) Irrigation of crops using liquid manure from a holding/storage pond after being treated in a covered lagoon/digester (80% VOC control efficiency)	
Ammonia	All animals fed in accordance with NRC or other District-approved guidelines		

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.

***This is a Summary Page for this Class of Source** **4th Quarter 2016**

San Joaquin Valley Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.7.X*

Last Update: December 18, 2013

Emissions Unit: Solid Manure Handling at Dairies

Pollutant	Achieved in Practice or contained in SIP	Technologically Feasible	Alternate Basic Equipment
VOC	All animals fed in accordance with NRC or other District-approved guidelines		
Ammonia	All animals fed in accordance with NRC or other District-approved guidelines		

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.

***This is a Summary Page for this Class of Source** **4th Quarter 2016**

San Joaquin Valley Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.7.X*

Last Update: December 18, 2013

Emissions Unit: Solid Manure Land Application

Pollutant	Achieved in Practice or contained in SIP	Technologically Feasible	Alternate Basic Equipment
VOC	Rapid incorporation of solid manure into the soil after land application	1) Land Application of Solid Manure Processed by Either an Open or Enclosed Negatively-Aerated Static Pile (ASP) Vented to a biofilter (or equivalent) ≥ 80% destruction efficiency With Rapid Incorporation of the Manure Into the Soil After Land Application; 2) Land Application of Solid Manure Processed by In-Vessel/Enclosed Negatively-Aerated Static Piles vented to biofilter ≥ 80% destruction efficiency 3) Land Application of Solid Manure Processed by Open Negatively-Aerated Static Piles vented to biofilter ≥ 80% destruction efficiency 4) Land Application of Solid Manure Processed by an Open Negatively-Aerated Static Piles (ASP) (With Thick Layer of Bulking Agent or Equivalent) With Rapid Incorporation of the Manure Into the Soil After Land Application	
Ammonia	Rapid incorporation of solid manure into the soil after land application, and all animals fed in accordance with NRC or other District-approved guidelines		

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.

***This is a Summary Page for this Class of Source** **4th Quarter 2016**

San Joaquin Valley Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.7.X*

Last Update: 2015

Emissions Unit: Dairy Feed Storage and Handling System – Total Mixed Ration (TMR)

Pollutant	Achieved in Practice or contained in SIP	Technologically Feasible	Alternate Basic Equipment
VOC	District Rule 4570 Measures		

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.

Appendix E

BACT Analysis

BACT ANALYSIS

I. Top-Down BACT Analysis for Cow Housing

1. VOC Emissions

a. Step 1 - Identify all control technologies

The following options have been identified as possible controls for VOC emissions from cow housing (open corrals):

- Concrete feed lanes and walkways;
- Flushing feed lanes and walkways for mature cows (milk and dry cows) at least four times per day and flushing feed lanes and walkways for support stock at least once per day;
- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
- Properly sloping corrals (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet) or managing corrals to maintain a dry surface;
- Scraping corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions; and
- Rule 4570 measures.

Description of Control Technologies

Concrete feed lanes and walkways

Dairy cows spend a large proportion of time on the feed lanes and walkways. A significant proportion of manure is consequently deposited in these areas. The concrete lanes and walkways are necessary for an effective flush system, which in turn is a key component of management practices used for the control of VOC and ammonia emissions (see below).

Increased flushing of feed lanes and walkways

Many dairy operations use a flush system to remove manure from the feed lanes and walkways. The flush system introduces a large volume of water at the head of the paved area, and the cascading water carries the manure downslope. The required volume of flush water varies with the size and slope of the area to be flushed.

In addition to cleaning the feed lanes and walkways, the flush system also serves as an emissions control method. Many of the VOCs emitted from fresh cow manure, such as alcohols (ethanol and methanol) and many Volatile Fatty Acids (VFAs), are highly soluble in water. Therefore, a large proportion of these compounds will dissolve in the flush water instead of being emitted directly from the housing areas. The flush water then carries the

manure and the dissolved volatile compounds into an anaerobic treatment system where they are digested and converted into less polluting byproducts by microbial activity.

Feed lanes and walkways are typically flushed once or twice per day in the mature cow housing areas; and as infrequently as once a week in the support stock housing areas. Flushing the lanes four times per day for mature cows and once per day for support stock will increase the frequency with which manure is removed from the housing areas, which should result in a higher percentage of soluble volatile compounds being captured in the flush water, and therefore higher control efficiency. Although the control efficiency may actually be much higher, increasing the cleaning frequency of the lanes will be conservatively assumed to have a control efficiency of 10% for VOCs emitted from manure in cow housing areas, until better data becomes available.

Feeding all animals in accordance with 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 VOC emissions can be reduced by reducing the quantity of undigested nutrients in the manure. Many of the VOCs emitted from Confined Animal Facilities, including dairies, originate from the decomposition of undigested protein in animal waste.[14] 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 cows in accordance with National Research Council (NRC) or other District-approved guidelines will be conservatively assumed to have a control efficiency of only 5-10% for both enteric[15] and manure VOC emissions.

Properly sloping corrals

Accumulation of water on corral surfaces, due to rain or on-farm activities, could result in anaerobic conditions and thereby increase emissions. Keeping corral surfaces dry and properly aerated, on the other hand, promotes the aerobic conditions that reduce

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

[15] Enteric emissions are those emitted directly from the animal (primarily via belching and flatulence), due to feed digestion processes.

emissions. Proper slope design is therefore required to ensure that drainage of any water deposited on the exercise pen surfaces will be as rapid as possible.

Scraping of corrals with a pull-type scraper

Frequent scraping of the 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

All the options identified in step 1 are technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

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

- Concrete feed lanes and walkways;
- Flushing feed lanes and walkways for mature cows (milk and dry cows) at least four times per day and flushing feed lanes and walkways for support stock at least once per day;
- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
- Properly sloping corrals (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet) or managing corrals to maintain a dry surface;
- Scraping corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions; and
- Rule 4570 measures.

d. Step 4 - Cost Effectiveness Analysis

- Concrete feed lanes and walkways;
- Flushing feed lanes and walkways for mature cows (milk and dry cows) at least four times per day and flushing feed lanes and walkways for support stock at least once per day;
- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
- Properly sloping corrals (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet) or managing corrals to maintain a dry surface;

- Scraping corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions; and
- Rule 4570 measures.

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

e. Step 5 - Select BACT

The applicant has proposed all of the following control practices:

- Concrete feed lanes and walkways;
- Flushing feed lanes and walkways for mature cows (milk and dry cows) at least four times per day and flushing feed lanes and walkways for support stock at least once per day;
- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
- Properly sloping corrals (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet) or managing corrals to maintain a dry surface;
- Scraping corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions; and
- Rule 4570 measures.

The proposal satisfies BACT for this category.

2. Ammonia (NH_3) Emissions

a. Step 1 - Identify all control technologies

The following options have been identified as possible controls for ammonia emissions from cow housing (open corrals):

- Concrete feed lanes and walkways;
- Flushing feed lanes and walkways for mature cows (milk and dry cows) at least four times per day and flushing feed lanes and walkways for support stock at least once per day;
- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
- Properly sloping corrals (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet) or managing corrals to maintain a dry surface; and

- Scraping corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions.

Description of Control Technologies

Concrete feed lanes and walkways

Dairy cows spend a large proportion of time on the feed lanes and walkways. A significant proportion of manure is consequently deposited in these areas. The concrete lanes and walkways are necessary for an effective flush system, which in turn is a key component of management practices used for the control of VOC and ammonia emissions (see below).

Increased Flushing for feed lanes and walkways

Many dairy operations use a flush system to remove manure from the feed lanes and walkways. The flush system introduces a large volume of water at the head of the paved area, and the cascading water carries the manure downslope. The required volume of flush water varies with the size and slope of the area to be flushed.

In addition to cleaning the feed lanes and walkways, the flush system also serves as an emissions control method. Ammonia is highly soluble in water. Therefore, a large proportion of ammonia in manure will dissolve in the flush water instead of being emitted directly from the housing areas. The flush water then carries the manure and the dissolved ammonia into the liquid manure storage system, where ammonia can be sequestered until it is applied to cropland as a nitrogen fertilizer.

Feed lanes and walkways are typically flushed once or twice per day in the mature cow housing areas; and as infrequently as once a week in the support stock housing areas. Flushing the lanes four times per day for mature cows and once per day for support stock will increase the frequency with which manure is removed from the housing areas, which should result in a higher percentage of ammonia being captured in the flush water, and therefore higher control efficiency.

Feeding all animals in accordance with 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 present, hence the lower the level of nitrogen the lower the level of microbial action and the lower the production of ammonia.

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 VOC and ammonia. The latest National Research Council (NRC) guidelines for the selection of an optimal bovine diet should be followed to the maximum extent possible. The diet

recommendations made in this publication seek to achieve the maximum uptake of protein by the animal and the minimum carryover of nitrogen into the manure.

Properly sloping corrals

Accumulation of water on corral surfaces, due to rain or on-farm activities, could result in anaerobic conditions and thereby increase emissions. Keeping corral surfaces dry and properly aerated, on the other hand, promotes the aerobic conditions that reduce emissions. Proper slope design is therefore required to ensure that drainage of any water deposited on the exercise pen surfaces will be as rapid as possible.

b. Step 2 - Eliminate technologically infeasible options

All the options identified in step 1 are technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

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

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

d. Step 4 - Cost Effectiveness Analysis

- Concrete feed lanes and walkways;
- Flushing feed lanes and walkways for mature cows (milk and dry cows) at least four times per day and flushing feed lanes and walkways for support stock at least once per day;
- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
- Properly sloping corrals (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet) or managing corrals to maintain a dry surface; and

- Scraping corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions.

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

e. Step 5 - Select BACT

The applicant has proposed all of the following control practices:

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

The proposal satisfies BACT for this category.

3. PM_{10} Emissions

a. Step 1 - Identify all control technologies

The following options have been identified as possible controls for PM_{10} emissions from cow housing (open corrals):

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

Description of Control Technologies:

Concrete Feed Lanes and Walkways

Constructing the feed lanes and walkways of concrete causes the dairy animals to spend an increased amount of time on a paved surface rather than dry dirt, thus reducing 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.

Scraping of Corrals With a Pull-Type Scraper

Other than the paved feed lanes and walkways, corral surfaces are composed of earth and deposited manure, both of which have the potential for particulate matter emissions due to wind or animal activities. Frequent scraping of these surfaces will reduce the amount of dry manure that may be pulverized by the cows' hooves and subsequently emitted as PM_{10}.

Feeding Heifers Near Dusk

Heifers are generally most active during late evening hours when the heat of the day has subsided slightly. This increased evening activity results in dust and associated PM10 emissions. This high propensity for increased evening activity can be counteracted by scheduling the afternoon feeding at this time, such that majority of the heifers will be occupied at the feeding lanes instead of moving around the dryer dirt areas of the corrals.

Corral Sprinklers

When done at a rate sufficient to match the evaporation rate, sprinkling will keep corral surfaces consistently moist. This will reduce PM_{10} emissions by preventing any loose soil and dried manure from being entrained into the air by wind movement and/or cow activities. Water application rates must be properly adjusted, since excess water could potentially increase VOC and NH_3 emissions; and may also pose a health risk for the animals.

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

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

d. Step 4 - Cost Effectiveness Analysis

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

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

e. Step 5 - Select BACT

The applicant has proposed all of the following control practices:

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

The proposal satisfies BACT for this category.

II. Top-Down BACT Analysis for the Liquid Manure Handling System -Lagoons & Storage Ponds

1. VOC Emissions

a. Step 1 - Identify all control technologies

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

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

Description of Control Technologies

1) Aerobic Treatment Lagoon or Mechanically Aerated Lagoon

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

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

2) Covered Lagoon Digester

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

As stated above, the gas generated in the covered lagoon anaerobic digester can be captured and then sent to a suitable combustion device. During combustion, gaseous

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

3) Anaerobic Treatment Lagoon and Solids Removal/Separation System

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

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

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

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

A properly designed anaerobic treatment lagoon will reduce the volatile solids (VS) by at least 50%. This will reduce the biological oxygen demand (BOD) and increase the efficiency at which organic compounds are converted into methane and carbon dioxide rather than VOC. Although the VS reduction is expected to be at least 50%, a conservative control efficiency of 40% will be assumed, until better data becomes available.

Solids Removal/Separation - Mechanical Separator(s)

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) Aerobic treatment lagoon or mechanically aerated lagoon (95% control efficiency)

2) Covered lagoon digester vented to a control device (80% control efficiency)

3) Anaerobic treatment lagoon designed to meet Natural Resources Conservation Service (NRCS) standards (40% control efficiency)

4) Solids Removal/Separation

d. Step 4 - Cost Effectiveness Analysis

Aerobic Treatment Lagoon or Mechanically Aerated Lagoon

Aerobic Treatment Lagoon

NRCS Practice Standard Code 359 requires that naturally aerobic lagoons be designed to have a minimum treatment surface area as determined on the basis of daily BOD_5 loading per unit of lagoon surface. The standard specifies that the maximum loading rate of naturally aerobic lagoons shall not exceed the loading rate indicated by the NRCS Agricultural Waste Management Field Handbook (AWMFH) or the maximum loading rate according to state regulatory requirements, whichever is more stringent. According to Figure 10-30 (August 2009) of the latest version of the AWMFH, the maximum aerobic lagoon loading rate for the San Joaquin Valley is 45 - 55 lb-BOD_5/acre-day. According to Table 4-5 (March 2008) of the NRCS AWMFH, the total daily manure produced by a milk cow will have 2.9 lb-BOD_5/day. Assuming that at least 80% of the manure will be flushed to the lagoon system, the minimum lagoon surface area required for a naturally aerobic lagoon treating manure from 3,200 milk cows in the San Joaquin Valley can be calculated as follows:

BOD_5 loading (lb/day) = 3,200 milk cows x 2.9 lb-BOD_5/cow-day x 0.80
= 7,424 lb-BOD_5/day

Minimum Surface Area (acres) = 7,424 lb-BOD_5/day ÷ 55 lb-BOD_5/acre-day
= 135 acres

As shown above, the minimum surface area required for a naturally aerobic lagoon to treat manure from the proposed number of milk cows is 135 acres. This does not include the additional surface area that would be required to treat manure from support stock. Based on the space requirements alone it is clear that this option cannot reasonably be required and no further analysis is needed.

Mechanically Aerated Lagoon

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

Biological Oxygen Demand (BOD_5)

In order to effectively calculate the cost of this control option, the energy requirement for complete aeration must be determined. It should be noted that approximately 1.5

to 2.5 pounds of oxygen is required to digest 1 pound of Biological Oxygen Demand (BOD_5) with additional oxygen required for conversion of ammonia to nitrate (nitrification). It is generally accepted that at least twice the BOD should be provided for complete aeration. According to Dr. Ruihong Zhang of the University of California, Davis, 2.4 lb (1.1 kg) of oxygen per cow must be provided each day for removal of BOD and an additional 3 lb (1.4 kg) per cow for oxidation of 70% of the nitrogen.

The proposed rule specifies that an aerobic lagoon be designed and operated in accordance with NRCS Practice Standard Code 359. NRCS Practice Standard Code 359 requires that mechanically aerated lagoons use aeration equipment that provides a minimum of one pound of oxygen for each pound of daily BOD_5 loading. As discussed above, the total daily manure produced by a milk cow will have a BOD_5 of 2.9 lb/day and a lagoon handling flushed manure from 3,200 milk cows will have a loading rate of approximately 7,424 lb- BOD_5/day (3,368 kg-BOD_5/day).

Energy Requirement

Based on the data gathered in a UC Davis study on aerator performance for wastewater lagoons, aeration efficiencies for mechanical aerators ranged from 0.10 to 0.68 kg of oxygen provided per kW-hr of energy utilized. The most efficient aerator tested that had been installed in dairy lagoons had an aeration efficiency of 0.49 kg-O_2/kW-hr. These efficiency tests were performed in clean water and lower aeration efficiencies are expected in liquid manure because of the significant amount of solids that it contains. The yearly energy requirement for a mechanically aerated lagoon system treating flushed manure from 3,200 milk cows is calculated as follows:

3,368 kg-BOD_5/day ÷ (0.68 kg-O_2/kW-hr) x (365 day/year) = 1,807,824 kW-hr/year.

Cost of Electricity

The cost of electricity will be based upon the average price for industrial electricity in California as of July 2017, as taken from the Energy Information Administration (EIA) website:[16]

Average cost of electricity = $0.1222/kW-hr

The electricity cost for complete aeration is calculated as follows:

1,807,824 kW-hr/year x $0.1222/kW-hr = $220,916/year

VOC Emissions Reductions

It will be conservatively assumed that a mechanically aerated lagoon providing 1 lb of oxygen for every 1 lb of BOD_5 loading will control 90% of the VOC emissions from the lagoon/storage pond. However, as noted above, it is generally accepted that the oxygen provided should be twice the BOD_5 loading rate for complete aeration. Thus, the actual control from providing 1 lb of oxygen for every 1 lb of BOD_5 loading is probably in the 50% range.

[16] http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_06_b

The annual VOC emissions reductions are calculated as:

[Number of cows] x [Lagoon/Storage Pond VOC EF (lb/cow-year)] x [Complete Aeration Control Efficiency for Lagoon/Storage Pond]
= 3,200 cows x 1.3 lb-VOC/cow-yr x 90% control
= 3,744 lb-VOC/yr

Cost of Reductions

Cost of reductions = ($220,916/year)/[(3,744 lb-VOC/year)(1 ton/2000 lb)]
= $118,011/ton

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

Covered Lagoon Digester

Capital Cost for Installation

The capital cost estimates for installation of a covered lagoon digester are based on information from the United States EPA AgSTAR publication "Anaerobic Digestion Capital Costs for Dairy Farms" (May 2010)[17] and the California Energy Commission (CEC) Public Interest Energy Research (PIER) Program Dairy Methane Digester System Program Evaluation Report (Feb 2009).[18] The formula in the AgSTAR publication results in a capital cost of $1,032 per cow. This estimate excludes costs of solids separation after digestion, hydrogen sulfide removal, and utility charges including line upgrades and interconnection costs and fees. Based on information from installations in California, the CEC PIER Dairy Methane Digester Program Evaluation Report gives an average cost of $585 per cow for installation of covered lagoon anaerobic digesters (see Table 9 - Total Project Costs and Cost per Cow and per kW).

For the purposes of this analysis, the more conservative capital cost of $585/cow will be used. Thus, the installation capital cost for the proposed herd of 3,200 milk cows is at least $1,872,000 ($585/cow x 3,200 cows).

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

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

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

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

Where:

A = Equivalent annual capital cost of the control equipment

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

i = Interest rate (assumed to be 10%)

n = Equipment life (assumed to be 10 years)

$A = [\$1,872,000 \times 0.1(1.1)^{10}]/[(1.1)^{10}-1]$
$= \$304,659/year$

Potential Production of Electricity

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

The potential quantity of electricity produced is calculated as follows:

Electrical Produced = 670.3 kW-hr/(milk cow-yr) x 3,200 milk cows
= 2,144,960 kW-hr/yr

Potential Cost Savings from Production of Electricity

The value of electricity generated will be calculated using the previously cited EIA rate of $0.1222/kW-hr.

Potential Cost Savings 2,144,960 kW-hr/yr x $0.1222/kW-hr
= $262,114/yr

The annualized capital cost less the potential savings from electricity produced is $42,545 ($304,659 - $262,114).

VOC Emissions Reductions

The annual VOC emissions reductions are calculated as:

[Number of cows] x [Lagoon/Storage Pond VOC EF (lb/cow-year)] x [Covered Lagoon Digester Efficiency for Lagoon/Storage Pond]

3,200 cows x 1.3 lb-VOC/cow-yr x 80% control
= 3,328 lb-VOC/yr

Cost of Reductions

Cost of reductions = ($42,545/year)/[(3,328 lb-VOC/year)(1 ton/2000 lb)]
= $25,568/ton

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

Anaerobic Treatment Lagoon and Solids Removal/Separation System

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

e. Step 5 - Select BACT

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

2. NH_3 Emissions

a. Step 1 - Identify all control technologies

The following option was identified as a possible control for NH_3 emissions from the lagoons & storage ponds:

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

Description of Control Technology

1) All 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, which will reduce ammonia emissions from the liquid manure in the lagoon and storage pond.

b. Step 2 - Eliminate technologically infeasible options

The option listed in Step 1 above is technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

The remaining option is listed below:

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

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

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

NH_3 Emissions

a. Step 1 - Identify all control technologies

The following option has been identified as a possible control option for NH_3 emissions from land application of liquid manure:

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

Description of Control Technology

1) All 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, which will reduce ammonia emissions from liquid manure applied to cropland.

b. Step 2 - Eliminate technologically infeasible options

The option listed in Step 1 above is technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

The remaining option is listed below:

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

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

IV. Top-Down BACT Analysis for Solid Manure Storage

NH_3 Emissions

a. Step 1 - Identify all control technologies

The following option has been identified as a possible control option for NH_3 emissions from solid manure storage:

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

Description of Control Technology

1) All 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, which will reduce ammonia emissions from liquid manure applied to cropland.

b. Step 2 - Eliminate technologically infeasible options

The option listed in Step 1 above is technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

The remaining option is listed below:

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

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

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

V. Top-Down BACT Analysis for Solid Manure Land Application

NH_3 Emissions

a. Step 1 - Identify all control technologies

The following options have been identified as possible controls for NH_3 emissions from land application of solid manure:

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

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

Description of Control Technology

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

Various types of spreading techniques, such as box spreaders, flail type spreaders, side discharge spreaders, and spinner spreaders, are used to apply solid manure to cropland. Regardless of which technique is used, this practice requires the immediate incorporation of the manure into the soil, reducing emissions and surface run-off while minimizing the loss of nitrogen into the atmosphere. Based on a study by a local Valley dairy, there is a great potential of reducing emissions by incorporating slurry manure rapidly into the soil. A similar reduction may be obtained by the rapid incorporation of solid manure. This technology is expected to yield a NH3 control efficiency ranging from 49% to upwards of 98%.[19]

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

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

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

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

[19] Page 81 of "Recommendations to the San Joaquin Valley Air Pollution Control Officer Regarding Best Available Control Technology for Dairies in the San Joaquin Valley" January 31, 2006 (http://www.valleyair.org/busind/pto/dpag/dpag_idx.htm).

d. Cost Effectiveness Analysis

Rapid incorporation of solid manure into the soil after land application

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

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

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

e. Select BACT

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

VI. Top-Down BACT Analysis for Feed Storage and Handling – Total Mixed Ration (TMR) Feeding

VOC Emissions

a. Step 1 - Identify all control technologies

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

1) District Rule 4570 measures

Description of Control Technology

District Rule 4570 measures

District Rule 4570 requires the implementation of various management practices to reduce VOC emissions from TMR. These practices include pushing feed so that it is within three feet of feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals, so the area of the feed is minimized and the feed can be consumed by the cows in a shorter time period instead of continuing to emit VOCs; beginning feeding total mixed rations within two hours of grinding and mixing rations, reducing the time that fresh feed emits VOCs; storing grain in a weatherproof storage structure or under a weatherproof covering from October through May; feeding stream-flaked, dry rolled, cracked or ground corn or other ground cereal grains; removal of uneaten wet feed from feeding areas; and preparing TMR with a minimum moisture content, which reduces VOC since most of the compounds emitted are higly soluble in water.

b. Step 2 - Eliminate technologically infeasible options

The option identified in step 1 is technologically feasible.

c. Step 3 - Rank remaining options by control effectiveness

Only one option was previously identified in step 1:

1) District Rule 4570 measures

d. Step 4 - Cost Effectiveness Analysis

District Rule 4570 Measures

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

e. Step 5 - Select BACT

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

APPENDIX F

RMR and AAQA Summary

San Joaquin Valley Air Pollution Control District
Risk Management Review

To:	Jonah Aiyabei – Permit Services
From:	Cheryl Lawler – Technical Services
Date:	May 16, 2016
Facility Name:	Charles Van Der Kooi Dairy
Location:	13695 W. Elkhorn Avenue, Riverdale
Application #(s):	C-7013- 2-4, 3-4, 4-4, and 8-2
Project #:	C-1133052

A. RMR SUMMARY

RMR Summary			
Categories	**Dairy Expansion (Units 2-4, 3-4, 4-4)**	**Project Totals**	**Facility Totals**
Prioritization Score	0.29	0.29	0.47
Acute Hazard Index	N/A	N/A	N/A
Chronic Hazard Index	N/A	N/A	N/A
Maximum Individual Cancer Risk	N/A	N/A	N/A
T-BACT Required?	**No**		
Special Permit Requirements?	**No**		

B. RMR REPORT

I. Project Description

Technical Services performed an Ambient Air Quality Analysis (AAQA) and a Risk Management Review (RMR) for the expansion of an existing dairy operation. The expansion will consist of the construction of a total of 14 open corrals.

II. Analysis

Toxic emissions for the dairy expansion were calculated using emission factors derived from the District's evaluation of dairy research studies conducted by California colleges and universities. PM based toxic emissions for the cow housing were calculated using emission factors generated from using the worst case composite of the 1997 EPA speciation of Kern County feedlot soil. Emissions were input into the San Joaquin Valley APCD's Hazard Assessment and Reporting Program (SHARP). In accordance with the District's Risk Management Policy for Permitting New and Modified Sources (APR 1905, May 28, 2015), risks from the project were prioritized using the procedures in the 1990 CAPCOA Facility Prioritization Guidelines.

For this project, the "ag worker" receptors resulted in the highest prioritization score which was over 1.0 from the long-term Cancer prioritization score. However, because "ag workers" are not considered long-term receptors, the Cancer prioritization score was not used. The other two prioritization scores calculated for this project (Acute & Chronic) were less than 1.0 (see RMR Summary Table). Therefore, no further analysis was necessary.

For Unit 1-4 (Milk Parlor), there is no increase in the number of milk cows at the dairy proposed; and for Unit 8-2 (Feed Storage & Handling), there are no emissions associated with this process. Therefore, no further analysis was required for these two units.

The following parameters were used for the review:

Analysis Parameters Unit 2-4 (Corrals 7 & 8) (each corral)			
# of Cows	125*	**Closest Receptor (m)**	1829
PM10 (lb/hr)	0.03	**Ammonia (lb/hr)**	0.15
PM10 (lb/yr)	242	**Ammonia (lb/yr)**	1339
Unit 2-4 (Corrals 9, 10, 11, & 12) (each corral)			
# of Cows	215*	**Closest Receptor (m)**	1829
PM10 (lb/hr)	0.07	**Ammonia (lb/hr)**	0.14
PM10 (lb/yr)	604	**Ammonia (lb/yr)**	1190
PM10 (lb/yr)	604	**Ammonia (lb/yr)**	1190
Unit 2-4 (Corrals 13, 14, 15, & 16) (each corral)			
# of Cows	240*	**Closest Receptor (m)**	1829
PM10 (lb/hr)	0.10	**Ammonia (lb/hr)**	0.15
PM10 (lb/yr)	888	**Ammonia (lb/yr)**	1329
Unit 2-4 (Corrals 17, 18, & 19) (each corral)			
# of Cows	80*	**Closest Receptor (m)**	1829
PM10 (lb/hr)	0.03	**Ammonia (lb/hr)**	0.05
PM10 (lb/yr)	296	**Ammonia (lb/yr)**	443
Unit 2-4 (Corral 20)			
# of Cows	380*	**Closest Receptor (m)**	1829
PM10 (lb/hr)	0.06	**Ammonia (lb/hr)**	0.04
PM10 (lb/yr)	521	**Ammonia (lb/yr)**	344

*Used to calculate VOC TAC emissions

Analysis Parameters Unit 3-4 Liquid Manure Handling			
# of Cows	2690*	**Closest Receptor (m)**	1829
Ammonia (lb/hr)	0.38	**Ammonia(lb/yr)**	3315

*Used to calculate VOC TAC emissions

Analysis Parameters Unit 4-4 Solid Manure Handling			
Closest Receptor (m)	1829	**Ammonia (lb/hr)**	0.225
		Ammonia(lb/yr)	1938

Analysis Parameters (Units 3-4 & 4-4) Land Application*			
Unit 3-4 Land Application Ammonia (lb/hr)	0.29	**Unit 3-4 Land Application Ammonia (lb/yr)**	2555
Unit 4-4 Land Application Ammonia (lb/hr)	0.12	**Unit 4-4 Land Application Ammonia (lb/yr)**	1022

*Ammonia emissions for both liquid manure and dry manure application were evaluated based on farmland application area. The risk from the type of land application was associated with its respective unit.

AAQA

In addition to the RMR, Technical Services performed modeling for the criteria pollutant PM_{10} using AERMOD. The total emission rate used was 7,861 lbs 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	Annual
Net Value	8.28	0.34
Interim Significance Level	10.4[1]	2.08[1]
Result	Pass	Pass

[1]The District has decided on an interim basis to use a SIL threshold for fugitive dust sources of 10.4 $\mu g/m^3$ for the 24-hour average concentration and 2.08 $\mu g/m^3$ for the annual concentration.

III. Conclusion

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

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

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

IV. Attachments

A. RMR Request Form & Attachments
B. Project Emails
C. Emission Calculations Worksheets
D. Prioritization
E. Facility Summary
F. AAQA Results

Appendix G

Dairy Emissions Calculations

Rev. April 21, 2015

Pre-Project Facility Information

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

Pre-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals
Milk Cows	3,200				3,200
Dry Cows	230				230
Support Stock (Heifers and Bulls)	10				10
Large Heifers					0
Medium Heifers					0
Small Heifers					0
Bulls					0

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

Total Herd Summary	
Total Milk Cows	3,200
Total Mature Cows	3,430
Support Stock (Heifers and Bulls)	10
Total Calves	0
Total Dairy Head	3,440

Pre-Project Silage Information

Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	1	15	90
Alfalfa			
Wheat	1	18	100

Post-Project Facility Information

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

Post-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals
Milk Cows	3,200				3,200
Dry Cows	230		250		480
Support Stock (Heifers and Bulls)			1,200		1,200
Large Heifers			860		860
Medium Heifers					0
Small Heifers					0
Bulls					0

	Calf Hutches				Calf Corrals		
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	Total # of Calves
Calves						380	380

Total Herd Summary	
Total Milk Cows	3,200
Total Mature Cows	3,680
Support Stock (Heifers and Bulls)	2,060
Total Calves	380
Total Dairy Head	6,120

Post-Project Silage Information

Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	1	15	90
Alfalfa			
Wheat	1	18	100

[1] As discussed in the main engineering evaluation, the facility's phototrophic lagoon treatment system will be considered at least equivalent to an anaerobic treatment system for PE calculations and BACT purposes.

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

VOC Mitigation Measures and Control Efficiencies

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

Cow Housing				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	VOC Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Enteric Emissions Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%
		Total Control Efficiency	10%	10%
		Corrals/Pens Mitigations		
☐	☑	Feed according to NRC guidelines	0%	10%
☐	☑	Inspect water pipes and troughs and repair leaks at least once every seven days. Note: If selected for dairies > 999 milk cows, CE is already included in EF.	0%	0%
☐	☑	**Dairies:** Clean manure from corrals at least four times per year with at least 60 days between cleaning, or clean corrals at least once between April and July and at least once between September and December. Note: If selected for dairies > 999 milk cows, CE is already included in EF. Note: No additional control given for increased cleaning frequency (e.g. BACT requirement). **Heifer/Calf Ranches:** Scrape corrals twice a year with at least 90 days between cleanings, excluding in-corral mounds. Note: No additional control given for increased cleaning frequency (e.g. BACT requirement).	0%	0%
☐	☑	Scrape, vacuum, or flush concrete lanes in corrals at least once every day for mature cows and every seven days for support stock, or clean concrete lanes such that the depth of manure does not exceed 12 inches at any point or time. Note: No additional control given for increased cleaning frequency (e.g. BACT requirement).	0%	10%
☐	☑	Implement one of the following: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 sq ft or less and slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 sq ft; 2) maintain corrals to ensure proper drainage preventing water from standing more than 48 hrs; 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface. Note: If selected for dairies > 999 milk cows, CE already included in EF.	0%	0%
☐	☐	Install shade structures such that they are constructed with a light permeable roofing material. Note: If selected for dairies > 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.	0%	5%
☐	☐	Install all shade structures uphill of any slope in the corral. Note: If selected for dairies > 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.		
☐	☐	Clean manure from under corral shades at least once every 14 days, when weather permits access into corral. Note: If selected for dairies > 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.		
☐	☑	Install shade structure so that the structure has a North/South orientation. Note: If selected for dairies > 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.		
☐	☑	Manage corrals such that the manure depth in the corral does not exceed 12 inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. The manure facility must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF.	0%	0%
☐	☐	Knockdown fence line manure build-up prior to it exceeding a height of 12 inches at any time or point. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. The facility must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible.	0%	0%
☐	☐	Use lime or a similar absorbent material in the corral according to the manufacturer's recommendation to minimize moisture in the corrals.	0%	0%
☐	☐	Apply thymol to the corral soil in accordance with the manufacturer's recommendation.	0%	0%
		Total Control Efficiency	0.00%	23.05%
		Bedding Mitigations		

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

Liquid Manure Handling

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

Solid Manure Handling

Measure Proposed?		Mitigation Measure(s) per Emissions Point	VOC Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Solid Manure Storage Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%
☐	☐	Within 72 hours of removal from housing, either a) remove dry manure from the facility, or b) cover dry manure outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed 24 hours per event.	0%	0%
		Total Control Efficiency	10.00%	10.00%
		Separated Solids Piles Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%
☐	☐	Within 72 hours of removal from the drying process, either a) remove separated solids from the facility, or b) cover separated solids outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed 24 hours per event.	0%	0%
		Total Control Efficiency	10.00%	10.00%
		Solid Manure Land Application Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%
☑	☑	Incorporate all solid manure within 72 hours of land application. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF. Note: No additional control given for rapid manure incorporation (e.g. BACT requirement).	0%	0%
☐	☐	Only apply solid manure that has been treated with an anaerobic treatment lagoon, aerobic lagoon or digester system.	0%	0%
☐	☐	Apply no solid manure with a moisture content of more than 50%	0%	0%
		Total Control Efficiency	10.00%	10.00%

Silage and TMR

Measure Proposed?		Mitigation Measure(s) per Emissions Point	VOC Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Corn/Alfalfa/Wheat Silage Mitigations		

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

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

		TMR Mitigations		
☑	☑	**(D)** Push feed so that it is within 3 feet of feedlane fence within 2 hrs of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the cows.	10%	10%
☑	☑	**(D)** Begin feeding total mixed rations within 2 hrs of grinding and mixing rations. Note: If selected for dairies > 999 milk cows, control efficiency already included in EF.	0%	0%
☑	☑	Feed steam-flaked, dry rolled, cracked or ground corn or other ground cereal grains.	10%	10%
☐	☐	Remove uneaten wet feed from feed bunks within 24 hrs after then end of a rain event.	0%	0%
☑	☑	**(D)** For total mixed rations that contain at least 30% by weight of silage, feed animals total mixed rations that contain at least 45% moisture.	10%	10%
☑	☑	Feed according to NRC guidelines. Note: If selected for dairies, control efficiency already included in EF.	0%	0%
		Total Control Efficiency	27.10%	27.10%

Ammonia Mitigation Measures and Control Efficiencies

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

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

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

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

lb/hd-yr Dairy Emissions Factors for Holstein Cows

			Milk Cows				Dry Cows				Large Heifers (15 to 24 months)				Medium Heifers (7 to 14 months)				Small Heifers (3 to 6 months)				Calves (0 - 3 months)				Bulls			
			Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled	
			<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2
Milking Parlor	VOC	Enteric Emissions in Milking Parlors	0.43	0.41	0.37	0.37	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
		Milking Parlor Floor	0.04	0.03	0.03	0.03	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
		Total	**0.47**	**0.44**	**0.40**	**0.40**	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
	NH3	Total	**0.19**	**0.19**	**0.14**	**0.14**	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
Cow Housing	VOC	Enteric Emissions in Cow Housing	3.89	3.69	3.32	3.32	2.33	2.23	2.01	2.01	1.81	1.71	1.54	1.54	1.23	1.17	1.05	1.05	0.69	0.65	0.58	0.58	0.32	0.31	0.28	0.28	1.10	1.04	0.94	0.94
		Corrals/Pens	10.00	6.60	6.60	5.08	5.40	3.59	3.59	2.76	4.20	2.76	2.76	2.12	2.85	1.88	1.88	1.45	1.60	1.04	1.04	0.80	0.75	0.50	0.50	0.39	2.55	1.67	1.67	1.29
		Bedding	1.05	1.00	0.81	0.81	0.57	0.54	0.44	0.44	0.44	0.42	0.34	0.34	0.30	0.28	0.23	0.23	0.17	0.16	0.13	0.13	0.08	0.08	0.06	0.06	0.27	0.25	0.20	0.20
		Lanes	0.84	0.80	0.65	0.65	0.45	0.44	0.35	0.35	0.35	0.33	0.27	0.27	0.24	0.23	0.18	0.18	0.13	0.13	0.10	0.10	0.06	0.06	0.05	0.05	0.21	0.20	0.16	0.16
		Total	**15.78**	**12.09**	**11.38**	**9.86**	**8.75**	**6.80**	**6.39**	**5.57**	**6.81**	**5.22**	**4.91**	**4.27**	**4.62**	**3.56**	**3.35**	**2.91**	**2.59**	**1.98**	**1.86**	**1.62**	**1.22**	**0.95**	**0.89**	**0.78**	**4.13**	**3.16**	**2.97**	**2.59**
	NH3	Enteric Emissions in Cow Housing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Corrals/Pens	41.90	41.90	15.08	15.08	21.20	21.20	7.63	7.63	11.00	11.00	3.96	3.96	7.90	7.90	2.84	2.84	6.00	6.00	2.16	2.16	1.80	1.80	0.65	0.65	15.30	15.30	5.51	5.51
		Bedding	6.30	6.30	2.37	2.37	3.20	3.20	1.20	1.20	1.70	1.70	0.64	0.64	1.20	1.20	0.45	0.45	0.90	0.90	0.34	0.34	0.30	0.30	0.11	0.11	2.30	2.30	0.87	0.87
		Lanes	5.10	5.10	3.67	3.67	2.60	2.60	1.87	1.87	1.30	1.30	0.94	0.94	1.00	1.00	0.72	0.72	0.70	0.70	0.50	0.50	0.20	0.20	0.14	0.14	1.90	1.90	1.37	1.37
		Total	**53.30**	**53.30**	**21.13**	**21.13**	**27.00**	**27.00**	**10.71**	**10.71**	**14.00**	**14.00**	**5.54**	**5.54**	**10.10**	**10.10**	**4.02**	**4.02**	**7.60**	**7.60**	**3.00**	**3.00**	**2.30**	**2.30**	**0.90**	**0.90**	**19.50**	**19.50**	**7.74**	**7.74**
Liquid Manure Handling	VOC	Lagoons/Storage Ponds	1.52	1.30	1.05	0.70	0.82	0.71	0.57	0.38	0.64	0.54	0.44	0.29	0.43	0.37	0.30	0.20	0.24	0.21	0.17	0.11	0.11	0.10	0.08	0.05	0.40	0.33	0.27	0.18
		Liquid Manure Land Application	1.64	1.40	0.76	0.76	0.89	0.76	0.41	0.41	0.69	0.58	0.32	0.32	0.47	0.40	0.22	0.22	0.26	0.22	0.12	0.12	0.12	0.11	0.06	0.06	0.42	0.35	0.19	0.19
		Total	**3.16**	**2.70**	**1.81**	**1.46**	**1.71**	**1.47**	**0.98**	**0.79**	**1.33**	**1.13**	**0.76**	**0.61**	**0.90**	**0.77**	**0.52**	**0.42**	**0.51**	**0.43**	**0.29**	**0.23**	**0.24**	**0.21**	**0.14**	**0.11**	**0.82**	**0.68**	**0.46**	**0.37**
	NH3	Lagoons/Storage Ponds	8.20	8.20	1.18	1.18	4.20	4.20	0.60	0.60	2.20	2.20	0.32	0.32	1.50	1.50	0.22	0.22	1.20	1.20	0.17	0.17	0.35	0.35	0.05	0.05	3.00	3.00	0.43	0.43
		Liquid Manure Land Application	8.90	8.90	3.72	3.72	4.50	4.50	1.88	1.88	2.30	2.30	0.96	0.96	1.70	1.70	0.71	0.71	1.30	1.30	0.54	0.54	0.37	0.37	0.15	0.15	3.23	3.23	1.35	1.35
		Total	**17.10**	**17.10**	**4.90**	**4.90**	**8.70**	**8.70**	**2.48**	**2.48**	**4.50**	**4.50**	**1.28**	**1.28**	**3.20**	**3.20**	**0.93**	**0.93**	**2.50**	**2.50**	**0.72**	**0.72**	**0.72**	**0.72**	**0.20**	**0.20**	**6.23**	**6.23**	**1.78**	**1.78**
Solid Manure Handling	VOC	Solid Manure Storage	0.16	0.15	0.14	0.14	0.09	0.08	0.07	0.07	0.07	0.06	0.06	0.06	0.05	0.04	0.04	0.04	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.04	0.04	0.04	0.04
		Separated Solids Piles	0.06	0.06	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02
		Solid Manure Land Application	0.39	0.33	0.30	0.30	0.21	0.18	0.16	0.16	0.16	0.14	0.12	0.12	0.11	0.09	0.08	0.08	0.06	0.05	0.05	0.05	0.03	0.03	0.02	0.02	0.10	0.08	0.07	0.07
		Total	**0.61**	**0.54**	**0.49**	**0.49**	**0.33**	**0.29**	**0.26**	**0.26**	**0.26**	**0.23**	**0.20**	**0.20**	**0.17**	**0.15**	**0.14**	**0.14**	**0.10**	**0.09**	**0.08**	**0.08**	**0.05**	**0.04**	**0.04**	**0.04**	**0.16**	**0.14**	**0.13**	**0.13**
	NH3	Solid Manure Storage	0.95	0.95	0.95	0.95	0.48	0.48	0.48	0.48	0.25	0.25	0.25	0.25	0.18	0.18	0.18	0.18	0.13	0.13	0.13	0.13	0.04	0.04	0.04	0.04	0.35	0.35	0.35	0.35
		Separated Solids Piles	0.38	0.38	0.38	0.38	0.19	0.19	0.19	0.19	0.10	0.10	0.10	0.10	0.07	0.07	0.07	0.07	0.05	0.05	0.05	0.05	0.02	0.02	0.02	0.02	0.14	0.14	0.14	0.14
		Solid Manure Land Application	2.09	2.09	1.50	1.50	1.06	1.06	0.76	0.76	0.55	0.55	0.40	0.40	0.39	0.39	0.28	0.28	0.30	0.30	0.22	0.22	0.09	0.09	0.06	0.06	0.76	0.76	0.55	0.55
		Total	**3.42**	**3.42**	**2.83**	**2.83**	**1.73**	**1.73**	**1.43**	**1.43**	**0.90**	**0.90**	**0.75**	**0.75**	**0.64**	**0.64**	**0.53**	**0.53**	**0.48**	**0.48**	**0.40**	**0.40**	**0.15**	**0.15**	**0.12**	**0.12**	**1.25**	**1.25**	**1.04**	**1.04**

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

		Silage Type	Uncontrolled	EF1	EF2
Feed Storage and Handling	VOC	Corn Silage	34,681	21,155	21,155
		Alfalfa Silage	17,458	10,649	10,649
		Wheat Silage	43,844	26,745	26,745
		TMR	13,056	9,518	9,518

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

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

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

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

PM10 Mitigation Measures and Control Efficiencies

Control Measure	PM10 Control Efficiency
Shaded corrals (milk and dry cows)	16.7%
Shaded corrals (heifers and bulls)	8.3%
Downwind shelterbelts	12.5%
Upwind shelterbelts	10%
Freestall with no exercise pens and non-manure based bedding	90%
Freestall with no exercise pens and manure based bedding	80%
Fibrous layer in dusty areas (i.e. hay, etc.)	10%
Bi-weekly corral/exercise pen scraping and/or manure removal using a pull type manure harvesting equipment in morning hours when moisture in air except during periods of rainy weather	15%
Sprinkling of open corrals/exercise pens	50%
Feeding young stock (heifers and calves) near dusk	10%

Pre-Project PM10 Mitigation Measures

Pre-Project PM10 Mitigation Measures														
	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows in Housing Structure	Maximum Design Capacity of Structure	# of Combined Housing Units in row	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk
1	1	freestall	milk cows	528	528	1	☐	☐	☐	☐	☐	☐	☑	☐	☐
2	2	freestall	milk cows	672	672	1	☐	☐	☐	☐	☐	☐	☑	☐	☐
3	3	freestall	milk cows	672	672	1	☐	☐	☐	☐	☐	☐	☑	☐	☐
4	4	freestall	milk cows	672	672	1	☐	☐	☐	☐	☐	☐	☑	☐	☐
5	5	freestall	milk cows	656	656	1	☐	☐	☐	☐	☐	☐	☑	☐	☐
6	6a	freestall	dry cows	230	230	1	☐	☐	☐	☐	☐	☐	☑	☐	☐
7	6b	freestall	support stock	10	10	1	☐	☐	☐	☐	☐	☐	☑	☐	☐
			Pre-Project Total # of Cows	3,440											

Pre-Project PM10 Control Efficiencies and Emission Factors

	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows in Housing Structure	Maximum Design Capacity of Structure	Uncontrolled EF (lb/hd-yr)	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk	Controlled EF (lb/hd-yr)
1	1	freestall	milk cows	528		1.370							15%			1.17
2	2	freestall	milk cows	672		1.370							15%			1.17
3	3	freestall	milk cows	672		1.370							15%			1.17
4	4	freestall	milk cows	672		1.370							15%			1.17
5	5	freestall	milk cows	656		1.370							15%			1.17
6	6a	freestall	dry cows	230		1.370							15%			1.17
7	6b	freestall	support stock	10		1.370							15%			1.17
			Pre-Project Total # of Cows	3,440												

Post-Project PM10 Mitigation Measures

Post-Project PM10 Mitigation Measures

	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows in Housing Structure	Maximum Design Capacity of Structure	# of Combined Housing Units in row	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk
1	1	freestall	milk cows	528	528	1	☐	☐	☐	FALSE	FALSE	☐	TRUE	FALSE	☐
2	2	freestall	milk cows	672	672	1	☐	☐	☐	☐	FALSE	☐	TRUE	FALSE	☐
3	3	freestall	milk cows	672	672	1	☐	☐	☐	☐	FALSE	☐	TRUE	FALSE	☐
4	4	freestall	milk cows	672	672	1	☐	☐	☐	☐	FALSE	☐	TRUE	FALSE	☐
5	5	freestall	milk cows	656	656	1	☐	☐	☐	☐	FALSE	☐	TRUE	FALSE	☐
6	6a	freestall	dry cows	230	230	1	☐	☐	☐	☐	FALSE	☐	TRUE	FALSE	☐

Post-Project PM10 Mitigation Measures for New Housing Units at an Expanding Dairy

	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows in Housing Structure	Maximum Design Capacity of Structure	# of Combined Housing Units in row	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk
1	7	open corral	dry cows	125	125	1	TRUE	☐	☐	☐	☐	☐	TRUE	TRUE	☐
2	8	open corral	dry cows	125	125	1	TRUE	☐	☐	☐	☐	☐	TRUE	TRUE	☐
3	9a/9b	open corral	large heifers	215	215	1	TRUE	☐	☐	☐	☐	☐	TRUE	TRUE	TRUE
4	10a/10b	open corral	large heifers	215	215	1	TRUE	☐	☐	☐	☐	☐	TRUE	TRUE	TRUE
5	11a/11b	open corral	large heifers	215	215	1	TRUE	☐	☐	☐	☐	☐	TRUE	TRUE	TRUE
6	12a/12b	open corral	large heifers	215	215	1	TRUE	☐	☐	☐	☐	☐	TRUE	TRUE	TRUE
7	13a/13b	open corral	support stock	240	240	1	TRUE	☐	☐	☐	☐	☐	TRUE	TRUE	TRUE
8	14a/14b	open corral	support stock	240	240	1	TRUE	☐	☐	☐	☐	☐	TRUE	TRUE	TRUE
9	15a/15b	open corral	support stock	240	240	1	TRUE	☐	☐	☐	☐	☐	TRUE	TRUE	TRUE
10	16a/16b	open corral	support stock	240	240	1	TRUE	☐	☐	☐	☐	☐	TRUE	TRUE	TRUE
11	17	open corral	support stock	80	80	1	TRUE	☐	☐	☐	☐	☐	TRUE	TRUE	TRUE
12	18	open corral	support stock	80	80	1	TRUE	☐	☐	☐	☐	☐	TRUE	TRUE	TRUE
13	19	open corral	support stock	80	80	1	TRUE	☐	☐	☐	☐	☐	TRUE	TRUE	TRUE
14	20	open corral	calves	380	380	1	FALSE	☐	☐	☐	☐	☐	☐	☐	☐
		Post-Project Total # of Cows		6,120		(The post-project total includes		3,430	dairy cows already on-site and		2690	new cows from the expansion.)			

Note: Corrals with a/b designations may eventually be split, for ease of management, but are being evaluated as single corrals (worst-case BACT scenario) at this point in order to allow the applicant flexibility to decide which corrals to split. A maximum of four additional corrals will be created from splits of the a/b corrals. Since all BACT measures proposed/required will be applied regardless of whether a corral is eventually split or not, these proposed splits will not result in any change in PE or other NSR requirements.

Post-Project PM10 Control Efficiencies and Emission Factors

	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows in Housing Structure	Maximum Design Capacity of Structure	Uncontrolled EF (lb/hd-yr)	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk	Controlled EF (lb/hd-yr)
1	1	freestall	milk cows	528		1.370							15%			1.17
2	2	freestall	milk cows	672		1.370							15%			1.17
3	3	freestall	milk cows	672		1.370							15%			1.17
4	4	freestall	milk cows	672		1.370							15%			1.17
5	5	freestall	milk cows	656		1.370							15%			1.17
6	6a	freestall	dry cows	230		1.370							15%			1.17

Post-Project PM10 Control Efficiencies and Emission Factors for New Housing Emissions Units

	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows in Housing Structure	Maximum Design Capacity of Structure	Uncontrolled EF (lb/hd-yr)	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non-manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk	Controlled EF (lb/hd-yr)
1	7	open corral	dry cows	125		5.460	16.7%						15%	50%		1.93
2	8	open corral	dry cows	125		5.460	16.7%						15%	50%		1.93
3	9a/9b	open corral	large heifers	215		8.010	8.3%						15%	50%	10%	2.81
4	10a/10b	open corral	large heifers	215		8.010	8.3%						15%	50%	10%	2.81
5	11a/11b	open corral	large heifers	215		8.010	8.3%						15%	50%	10%	2.81
6	12a/12b	open corral	large heifers	215		8.010	8.3%						15%	50%	10%	2.81
7	13a/13b	open corral	support stock	240		10.550	8.3%						15%	50%	10%	3.70
8	14a/14b	open corral	support stock	240		10.550	8.3%						15%	50%	10%	3.70
9	15a/15b	open corral	support stock	240		10.550	8.3%						15%	50%	10%	3.70
10	16a/16b	open corral	support stock	240		10.550	8.3%						15%	50%	10%	3.70
11	17	open corral	support stock	80		10.550	8.3%						15%	50%	10%	3.70
12	18	open corral	support stock	80		10.550	8.3%						15%	50%	10%	3.70
13	19	open corral	support stock	80		10.550	8.3%						15%	50%	10%	3.70
14	20	open corral	calves	380		1.370										1.37

Pre-Project Potential to Emit - Cow Housing

	Pre-Project Potential to Emit - Cow Housing											
	Housing Name(s) or #(s)	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
1	1	milk cows	528	11.38	21.13	1.17	16.5	6,009	30.6	11,156	1.7	615
2	2	milk cows	672	11.38	21.13	1.17	21.0	7,647	38.9	14,198	2.1	783
3	3	milk cows	672	11.38	21.13	1.17	21.0	7,647	38.9	14,198	2.1	783
4	4	milk cows	672	11.38	21.13	1.17	21.0	7,647	38.9	14,198	2.1	783
5	5	milk cows	656	11.38	21.13	1.17	20.5	7,465	38.0	13,860	2.1	764
6	6a	dry cows	230	6.39	10.71	1.17	4.0	1,470	6.7	2,463	0.7	268
7	6b	support stock	10	4.91	5.54	1.17	0.1	49	0.2	55	0.0	12
	Pre-Project Total # of Cows		3,440				104.1	37,934	192.2	70,128	10.8	4,008

Pre-Project Totals						
Total # of Cows	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
3,440	104.1	37,934	192.2	70,128	10.8	4,008

Calculations:

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

Post-Project Potential to Emit - Cow Housing

	Post-Project Potential to Emit - Cow Housing											
	Housing Name(s) or #(s)	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
1	1	milk cows	528	9.86	21.13	1.17	14.3	5,206	30.6	11,156	1.7	615
2	2	milk cows	672	9.86	21.13	1.17	18.2	6,626	38.9	14,198	2.1	783
3	3	milk cows	672	9.86	21.13	1.17	18.2	6,626	38.9	14,198	2.1	783
4	4	milk cows	672	9.86	21.13	1.17	18.2	6,626	38.9	14,198	2.1	783
5	5	milk cows	656	9.86	21.13	1.17	17.7	6,468	38.0	13,860	2.1	764
6	6a	dry cows	230	5.57	10.71	1.17	3.5	1,281	6.7	2,463	0.7	268
7	6b	support stock	0	4.27	5.54	0.00	0.0	0	0.0	0	0.0	0
	Post-Project # of Cows (non-expansion)		3,430				90.1	32,833	192.0	70,073	10.8	3,996

	Post-Project Potential to Emit - Cow Housing: New Freestalls at Existing Dairy											
	Housing Name(s) or #(s)	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
1	7	dry cows	125	5.57	10.71	1.93	1.9	696	3.7	1,339	0.7	242
2	8	dry cows	125	5.57	10.71	1.93	1.9	696	3.7	1,339	0.7	242
3	9a/9b	large heifers	215	4.27	5.54	2.81	2.5	918	3.3	1,190	1.7	604
4	10a/10b	large heifers	215	4.27	5.54	2.81	2.5	918	3.3	1,190	1.7	604
5	11a/11b	large heifers	215	4.27	5.54	2.81	2.5	918	3.3	1,190	1.7	604
6	12a/12b	large heifers	215	4.27	5.54	2.81	2.5	918	3.3	1,190	1.7	604
7	13a/13b	support stock	240	4.27	5.54	3.70	2.8	1,025	3.6	1,329	2.4	888
8	14a/14b	support stock	240	4.27	5.54	3.70	2.8	1,025	3.6	1,329	2.4	888
9	15a/15b	support stock	240	4.27	5.54	3.70	2.8	1,025	3.6	1,329	2.4	888
10	16a/16b	support stock	240	4.27	5.54	3.70	2.8	1,025	3.6	1,329	2.4	888
11	17	support stock	80	4.27	5.54	3.70	0.9	342	1.2	443	0.8	296
12	18	support stock	80	4.27	5.54	3.70	0.9	342	1.2	443	0.8	296
13	19	support stock	80	4.27	5.54	3.70	0.9	342	1.2	443	0.8	296
14	20	calves	380	0.78	0.90	1.37	0.8	296	0.9	344	1.4	521
	Total # of Cows From Expansion		2,690				28.5	10,486	39.5	14,427	21.6	7,861

Post-Project Totals						
Total # of Cows	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
6,120	118.6	43,319	231.5	84,500	32.4	11,857

Calculations:

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

Pre-Project Potential to Emit (PE1)

Pre-Project Herd Size							
Herd	**Flushed Freestalls**	**Scraped Freestalls**	**Flushed Corrals**	**Scraped Corrals**	**Total # of Animals**		
Milk Cows	3,200	0	0	0	3,200		
Dry Cows	230	0	0	0	230		
Support Stock (Heifers and Bulls)	10	0	0	0	10		
Large Heifers	0	0	0	0	0		
Medium Heifers	0	0	0	0	0		
Small Heifers	0	0	0	0	0		
Bulls	0	0	0	0	0		
	Calf Hutches				**Calf Corrals**		
	Aboveground Flushed	**Aboveground Scraped**	**On-Ground Flushed**	**On-Ground Scraped**	**Flushed**	**Scraped**	**Total # of Calves**
Calves	0	0	0	0	0	0	0

Silage Information				
Feed Type	**Maximum # Open Piles**	**Maximum Height (ft)**	**Maximum Width (ft)**	**Open Face Area (ft^2)**
Corn	1	15	90	995
Alfalfa	0	0	0	
Wheat	1	18	100	1,342

Milking Parlor				
Cow	VOC		NH3	
Milk Cows	lb/day	lb/yr	lb/day	lb/yr
	3.5	1,280	1.2	438

Cow Housing						
Cow	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Total	104.1	37,934	192.2	70,128	10.8	4,008

Liquid Manure Handling						
Cow	VOC		NH3		H2S*	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	12.8	4,672	43.0	15,680	1	378
Dry Cows	0.5	182	1.6	570	0.1	29
Support Stock (Heifers and Bulls)	0.0	6	0.0	13	0.1	38
Large Heifers	0.0	0	0.0	0	0.1	27
Medium Heifers	0.0	0	0.0	0	0	0
Small Heifers	0.0	0	0.0	0	0	0
Calves	0.0	0	0.0	0	0	2
Bulls	0.0	0	0.0	0	0	0
Total	13.3	4,860	44.6	16,263	1.3	474

Solid Manure Handling				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	4.3	1,568	24.8	9,056
Dry Cows	0.2	60	0.9	329
Support Stock (Heifers and Bulls)	0.0	2	0.0	8
Large Heifers	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0
Calves	0.0	0	0.0	0
Bulls	0.0	0	0.0	0
Total	4.5	1,630	25.7	9,392

Feed Handling and Storage		
	Daily PE (lb-VOC/day)	Annual PE (lb-VOC/yr)
Corn Emissions	6.2	2,261
Alfalfa Emissions	0.0	0
Wheat Emissions	10.6	3,855
TMR	68.3	24,912
Total	85.1	31,027

Calculations for milking parlor:

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

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

Calculations for cow housing:

See detailed calculations under Cow Housing Calculations worksheet.

Calculations for liquid manure and solid manure handling:

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

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

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

Calculations for silage emissions:

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

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

Calculation for TMR emissions:

Annual PE = (# cows) x (EF1) x (0.658 m^3) x (525,600 min/yr) x (2.20E-9 lb/µg)

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

Calves are not included in TMR calculation.

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

Total Daily Pre-Project Potential to Emit (lb/day)							
Permit	**NOx**	**SOx**	**PM10**	**CO**	**VOC**	**NH3**	**H2S**
Milking Parlor	0.0	0.0	0.0	0.0	3.5	1.2	0.0
Cow Housing	0.0	0.0	10.8	0.0	104.1	192.2	0.0
Liquid Manure	0.0	0.0	0.0	0.0	13.3	44.6	1.3
Solid Manure	0.0	0.0	0.0	0.0	4.5	25.7	0.0
Feed Handling	0.0	0.0	0.0	0.0	85.1	0.0	0.0
Total	0.0	0.0	10.8	0.0	210.5	263.7	1.3

Major Source Emissions (lb/yr)					
Permit	**NOx**	**SOx**	**PM10**	**CO**	**VOC**
Milk Parlor	0	0	0	0	0
Cow Housing	0	0	0	0	0
Liquid Manure	0	0	0	0	2,330
Solid Manure	0	0	0	0	0
Feed Handling	0	0	0	0	0
Total	0	0	0	0	2,330

Total Annual Pre-Project Potential to Emit (lb/yr)							
Permit	**NOx**	**SOx**	**PM10**	**CO**	**VOC**	**NH3**	**H2S**
Milking Parlor	0	0	0	0	1,280	438	0
Cow Housing	0	0	4,008	0	37,934	70,128	0
Liquid Manure	0	0	0	0	4,860	16,263	474
Solid Manure	0	0	0	0	1,630	9,392	0
Feed Handling	0	0	0	0	31,027	0	0
Total	0	0	4,008	0	76,731	96,221	474

Post-Project Potential to Emit (PE2)

Post-Project Herd Size							
Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals		
Milk Cows	3,200	0	0	0	3,200		
Dry Cows	230	0	250	0	480		
Support Stock (Heifers and Bulls)	0	0	1,200	0	1,200		
Large Heifers	0	0	860	0	860		
Medium Heifers	0	0	0	0	0		
Small Heifers	0	0	0	0	0		
Bulls	0	0	0	0	0		
	Calf Hutches				Calf Corrals		
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	Total # of Calves
Calves	0	0	0	0	0	380	380

Silage Information				
Feed Type	Maximum # Open Piles	Maximum Height (ft)	Maximum Width (ft)	Open Face Area (ft^2)
Corn	1	15	90	995
Alfalfa	0	0	0	
Wheat	1	18	100	1,342

Milking Parlor				
Cow	VOC		NH3	
Milk Cows	lb/day	lb/yr	lb/day	lb/yr
Total	3.5	1,280	1.2	438

Cow Housing						
	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Total	118.6	43,319	231.5	84,500	32.4	11,857

Liquid Manure Handling						
Cow	VOC		NH3		H2S	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	12.8	4,672	43.0	15,680	1	378
Dry Cows	1.0	379	3.3	1,190	0.1	29
Support Stock (Heifers and Bulls)	2.0	732	4.2	1,536	0.1	38
Large Heifers	1.4	525	3.0	1,101	0.1	27
Medium Heifers	0.0	0	0.0	0	0	0
Small Heifers	0.0	0	0.0	0	0	0
Calves	0.1	42	0.2	76	0	2
Bulls	0.0	0	0.0	0	0	0
Total	17.3	6,350	53.7	19,583	1.3	474

Solid Manure Handling				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	4.3	1,568	24.8	9,056
Dry Cows	0.3	125	1.9	686
Support Stock (Heifers and Bulls)	0.7	240	2.5	900
Large Heifers	0.5	172	1.8	645
Medium Heifers	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0
Calves	0.0	15	0.1	46
Bulls	0.0	0	0.0	0
Total	5.8	2,120	31.1	11,333

Feed Handling and Storage		
	Daily PE (lb-VOC/day)	Annual PE (lb-VOC/yr)
Corn Emissions	6.2	2,261
Alfalfa Emissions	0.0	0
Wheat Emissions	10.6	3,855
TMR	113.9	41,567
Total	130.7	47,683

Calculations for milking parlor:

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

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

Calculations for cow housing:

See detailed calculations under Cow Housing Calculations worksheet.

Calculations for liquid manure and solid manure handling:

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

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

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

Calculations for silage emissions:

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

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

Calculation for TMR emissions:

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

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

Calves are not included in TMR calculation.

Total Daily Post-Project Potential to Emit (lb/day)							
Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0.0	0.0	0.0	0.0	3.5	1.2	0.0
Cow Housing	0.0	0.0	32.4	0.0	118.6	231.5	0.0
Liquid Manure	0.0	0.0	0.0	0.0	17.3	53.7	1.3
Solid Manure	0.0	0.0	0.0	0.0	5.8	31.1	0.0
Feed Handling	0.0	0.0	0.0	0.0	130.7	0.0	0.0
Total	0.0	0.0	32.4	0.0	275.9	317.5	1.3

Major Source Emissions (lb/yr)					
Permit	NOx	SOx	PM10	CO	VOC
Milk Parlor	0	0	0	0	0
Cow Housing	0	0	0	0	0
Liquid Manure	0	0	0	0	3,040
Solid Manure	0	0	0	0	0
Feed Handling	0	0	0	0	0
Total	0	0	0	0	3,040

Total Annual Post-Project Potential to Emit (lb/yr)							
Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	1,280	438	0
Cow Housing	0	0	11,857	0	43,319	84,500	0
Liquid Manure	0	0	0	0	6,350	19,583	474
Solid Manure	0	0	0	0	2,120	11,333	0
Feed Handling	0	0	0	0	47,683	0	0
Total	0	0	11,857	0	100,752	115,854	474

APPENDIX H

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	3300	ft
Width	200	ft
Depth	18	ft
Slope	2	ft

(3 lagoons @ 1,100 ft)

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

Primary Lagoon Volume	**9,643,104 ft3**

INSTRUCTIONS

* only input yellow fields

Step 1 Enter primary lagoon dimensions on this sheet
Step 2 Go to "Net Volatile Solids Loading" sheet and enter number of animals flushing manure to lagoon
Step 3 Adjust % in flush and separation as necessary (see notes on sheet)
Step 4 Go to "Minimum Treatment Volume"
Step 5 Minimum treatment volume should be less than lagoon volume to be considered anaerobic treatment lagoon
Step 6 Go to "Hydraulic Retention Time"
Step 7 Adjust fresh water as applicable
Step 8 Hydraulic retention time should be greater than 34 days to be considered anaerobic treatment lagoon.

Lagoon Design Check in Accordance with NRCS Guideline #359

Net Volatile Solids loading Calculation

Net Volatile Solids (VS) Loading of Treatment Lagoons									
Breed: Holstein Type 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 Cows - FS Barns	230	x	9.2	x	71%	x	50%	=	**751**
Dry Cows - Corrals	250	x	9.2	x	48%	x	50%	=	**552**
Support Stock	2,060	x	7.1	x	48%	x	50%	=	**3,510**
Calves (0 - 3 months old)	380	x	1.0	x	48%	x	50%	=	**91**
Bulls	0	x	9.2	x	48%	x	50%	=	**0**
Total for Dairy									**24,217**

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

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

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

Lagoon Design Check in Accordance with NRCS Guideline #359

Minimum Treatment Volume Calculation

MTV = TVS/VSLR

Where:

MTV = Minimum Treatment Volume (ft^3)

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

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

Minimum Treatment Volume in Primary Lagoon					
Breed: Holstein **Category**	**Net VS Loading (lb/day)**		**VSLR** (lb/ft3-day)[1]		**MTV (ft^3)**
Milk Cows	19,312	÷	0.011	=	**1,755,636**
Dry Cows - FS Barns	751	÷	0.011	=	**68,289**
Dry Cows - Corrals	552	÷	0.011	=	**50,182**
Support Stock	3,510	÷	0.011	=	**319,113**
Calves (0 - 3 months old)	91	÷	0.011	=	**8,291**
Bulls	0	÷	0.011	=	**0**
Total for Dairy					**2,201,511**

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

Lagoon Design Check in Accordance with NRCS Guideline #359

Sludge Accumulation Volume

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

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

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

SAV = VPL - MTV

Where:

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

SAV =	**VPL**	**-**	**MTV**	
SAV =	**9,643,104**	**2,201,511**	**=**	**7,441,593 (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 - FS Barns	230	x	1.30	ft^3	=	299	ft^3/day
Dry Cows - Corrals	250	x	0.78	ft^3	=	195	ft^3/day
Support Stock	2,060	x	0.78	ft^3	=	1,607	ft^3/day
Calves (0 - 3 months old)	380	x	0.15	ft^3	=	57	ft^3/day
Bulls	0	x	1.30	ft^3	=	-	ft^3/day
Total	6,120					**9,838**	**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	+	9,838	ft3		
~~milk cow * day~~			7.48 ~~gal~~			day		
				=	**31,228.2**	**ft3/day**		

Formula:

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

HRT:

⇨

2,201,511 ~~ft3~~	day	=		=	**70.4975861**	**days**
	31,228.2 ~~ft3~~					

APPENDIX I

PE Calculations for Unit C-7013-10

Potential to Emit (PE) Calculations
Permit Unit C-7013-10-0

Equipment Listing

1,125 BHP DIESEL-FIRED SOLAR SATURN TURBINE POWERING A 750 KW EMERGENCY STANDBY GENERATOR

Emission Control Technology Evaluation

This turbine was installed in 2004, before the facility was subject to permits. No manufacturer data or specification sheets were available. The turbine was manufactured in 1982, and this line of equipment has long since been discontinued by the manufacturer, hence making it difficult to establish or verify the equipment specifications. It will therefore be assumed the turbine is not equipped with any control devices.

Based on the current fuel standards, all diesel used in California is assumed to be ultra low sulfur diesel. The use of ultra low sulfur diesel fuel (0.0015% by weight sulfur maximum) reduces SO_X emissions by over 99% from standard diesel fuel.

PE Calculations

A. Assumptions

- Maximum operating schedule: 100 hrs/year non-emergency use (Current PTO)
- Density of diesel fuel: 7.1 lb/gal
- Higher heating value of diesel fuel: 0.137 MMBtu/gal
- Turbine thermal efficiency: ~25% (AP-42 and project #S-1083805)

B. Emission Factors

The emission factors (EF) are taken from project #S-1083805, which was finalized on March 10, 2015. The project involved new source review, including a new BACT determination, for a similar model diesel-fired emergency standby Solar Saturn turbine, which could not be grandfathered into permit due to the installation date. Further research of the equipment type under project #S-1083805 resulted in more reliable values (manufacturer data) for NOx and CO emissions. The emission factors are summarized below:

Solar Saturn Diesel-fired Gas Turbine Emission Factors			
Pollutant	**EF (lb/MMBtu)**	**EF (lb/kW-hr)**	**Source**
NO_X	-	0.01163	Manufacturer
SO_X	0.002*	0.0000273**	Mass Balance Equation Below
PM_{10}	0.012	0.0001638**	AP-42 (4/00) Table 3.1-2a
CO	-	0.02302	Manufacturer
VOC	0.00041	0.0000056**	AP-42 (4/00) Table 3.1-2a

*0.000015 lb-S/lb-fuel x (7.1 lb-fuel/gal) x (2 lb-SO_2/1 lb-S) x (1 gal/0.137 MMBtu) = 0.002 lb/MMBtu

**lb/kW-hr = lb/10^6 Btu x 3,412 Btu/kW-hr x 1/Thermal Efficiency

C. Annual PE

The PE values are calculated as follows:

Annual PE = EF (lb/kW-hr) x Rating (kW) x Operation Hours (hrs/yr)

The annual PE is summarized in the following table:

Annual PE Summary				
Pollutant	**EF (lb/kW-hr)**	**Rating (kW)**	**Operation Hours (hrs/yr)**	**PE lb/yr**
NO_X	0.01163	750	100	872
SO_X	0.0000273	750	100	2
PM_{10}	0.0001638	750	100	12
CO	0.02302	750	100	1,727
VOC	0.0000056	750	100	0

APPENDIX J

BACT Calculations

BACT Applicability

Milking Parlor					
VOC Emissions					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	3.5	3.5	0.40	0.40	0.0
				Total	0.0
NH3 Emissions					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	1.2	1.2	0.14	0.14	0.0
				Total	0.0

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

Liquid Manure Handling					
VOC Emissions - Lagoon/Storage Pond(s)					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	6.1	6.1	0.70	0.70	0.0
Dry Cows	0.5	0.2	0.38	0.38	0.3
Support Stock (Heifers and Bulls)	1.0	0.0	0.29	0.29	1.0
Large Heifers	0.7	0.0	0.29	0.29	0.7
Medium Heifers	0.0	0.0	0.20	0.20	0.0
Small Heifers	0.0	0.0	0.11	0.11	0.0
Calves	0.1	0.0	0.05	0.05	0.1
Bulls	0.0	0.0	0.18	0.18	0.0
BACT triggered for VOC for Lagoon/Storage Ponds				Total	2.1
VOC Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	6.6	6.6	0.76	0.76	0.0
Dry Cows	0.5	0.3	0.41	0.41	0.2
Support Stock (Heifers and Bulls)	1.0	0.0	0.32	0.32	1.0
Large Heifers	0.7	0.0	0.32	0.32	0.7
Medium Heifers	0.0	0.0	0.22	0.22	0.0
Small Heifers	0.0	0.0	0.12	0.12	0.0
Calves	0.1	0.0	0.06	0.06	0.1
Bulls	0.0	0.0	0.19	0.19	0.0
				Total	2.0
NH3 Emissions - Lagoon/Storage Pond(s)					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	10.4	10.4	1.18	1.18	0.0
Dry Cows	0.8	0.4	0.60	0.60	0.4
Support Stock (Heifers and Bulls)	1.0	0.0	0.32	0.32	1.0
Large Heifers	0.7	0.0	0.32	0.32	0.7
Medium Heifers	0.0	0.0	0.22	0.22	0.0
Small Heifers	0.0	0.0	0.17	0.17	0.0
Calves	0.1	0.0	0.05	0.05	0.1
Bulls	0.0	0.0	0.43	0.43	0.0
BACT triggered for NH3 for Lagoon/Storage Ponds				Total	2.2
NH3 Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	32.6	32.6	3.72	3.72	0.0
Dry Cows	2.5	1.2	1.88	1.88	1.3
Support Stock (Heifers and Bulls)	3.2	0.0	0.96	0.96	3.2
Large Heifers	2.3	0.0	0.96	0.96	2.3
Medium Heifers	0.0	0.0	0.71	0.71	0.0
Small Heifers	0.0	0.0	0.54	0.54	0.0
Calves	0.2	0.0	0.15	0.15	0.2
Bulls	0.0	0.0	1.35	1.35	0.0
BACT triggered for NH3 for Liquid Manure Land Application				Total	7.0
H2S Emissions - Lagoon/Storage Pond(s)					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	1.0	1.0	0.12	0.12	0.0
Dry Cows	0.1	0.1	0.06	0.06	0.0
Support Stock (Heifers and Bulls)	0.1	0.1	0.03	0.03	0.0
Large Heifers	0.1	0.1	0.03	0.03	0.0
Medium Heifers	0.0	0.0	0.02	0.02	0.0
Small Heifers	0.0	0.0	0.02	0.02	0.0
Calves	0.0	0.0	0.01	0.01	0.0
Bulls	0.0	0.0	0.04	0.04	0.0
				Total	0.0

Solid Manure Handling					
VOC Emissions - Solid Manure Storage/Separated Solids Piles					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	1.7	1.7	0.19	0.19	0.0
Dry Cows	0.1	0.1	0.10	0.10	0.0
Support Stock (Heifers and Bulls)	0.3	0.0	0.10	0.08	0.3
Large Heifers	0.2	0.0	0.08	0.08	0.2
Medium Heifers	0.0	0.0	0.05	0.05	0.0
Small Heifers	0.0	0.0	0.03	0.03	0.0
Calves	0.0	0.0	0.01	0.01	0.0
Bulls	0.0	0.0	0.05	0.05	0.0
				Total	0.5
VOC Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	2.6	2.6	0.30	0.30	0.0
Dry Cows	0.2	0.1	0.16	0.16	0.1
Support Stock (Heifers and Bulls)	0.4	0.0	0.12	0.12	0.4
Large Heifers	0.3	0.0	0.12	0.12	0.3
Medium Heifers	0.0	0.0	0.08	0.08	0.0
Small Heifers	0.0	0.0	0.05	0.05	0.0
Calves	0.0	0.0	0.02	0.02	0.0
Bulls	0.0	0.0	0.07	0.07	0.0
				Total	0.8
NH3 Emissions - Solid Manure Storage/Separated Solids Piles					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	11.7	11.7	1.33	1.33	0.0
Dry Cows	0.9	0.4	0.67	0.67	0.5
Support Stock (Heifers and Bulls)	1.2	0.0	0.35	0.35	1.2
Large Heifers	0.8	0.0	0.35	0.35	0.8
Medium Heifers	0.0	0.0	0.25	0.25	0.0
Small Heifers	0.0	0.0	0.18	0.18	0.0
Calves	0.1	0.0	0.06	0.06	0.1
Bulls	0.0	0.0	0.49	0.49	0.0
BACT triggered for NH3 for Solid Manure Storage				Total	2.6
NH3 Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	13.2	13.2	1.50	1.50	0.0
Dry Cows	1.0	0.5	0.76	0.76	0.5
Support Stock (Heifers and Bulls)	1.3	0.0	0.40	0.40	1.3
Large Heifers	0.9	0.0	0.40	0.40	0.9
Medium Heifers	0.0	0.0	0.28	0.28	0.0
Small Heifers	0.0	0.0	0.22	0.22	0.0
Calves	0.1	0.0	0.06	0.06	0.1
Bulls	0.0	0.0	0.55	0.55	0.0
BACT triggered for NH3 for Solid Manure Land Application				Total	2.8

Feed Storage and Handling					
VOC Emissions - Silage					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Corn Silage	6.2	6.2	21,155	21,155	0.0
Alfalfa Silage	0.0	0.0	10,649	10,649	0.0
Wheat Silage	10.6	10.6	26,745	26,745	0.0
				Total	0.0
VOC Emissions - TMR					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
TMR	113.9	68.3	9,518	9,518	45.6
BACT triggered for VOC for TMR				Total	45.6

Cow Housing - VOC Emissions

	Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)	BACT Triggered?
1	1	14.3	16.5	9.86	11.38	0.0	No
2	2	18.2	21.0	9.86	11.38	0.0	No
3	3	18.2	21.0	9.86	11.38	0.0	No
4	4	18.2	21.0	9.86	11.38	0.0	No
5	5	17.7	20.5	9.86	11.38	-0.1	No
6	6a	3.5	4.0	5.57	6.39	0.0	No
7	6b	0.0	0.1	4.27	4.91	-0.1	No

New Units from Expansion

	Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)	BACT Triggered?
1	7	1.9	0.0	5.57	0.00	1.9	No
2	8	1.9	0.0	5.57	0.00	1.9	No
3	9a/9b	2.5	0.0	4.27	0.00	2.5	Yes
4	10a/10b	2.5	0.0	4.27	0.00	2.5	Yes
5	11a/11b	2.5	0.0	4.27	0.00	2.5	Yes
6	12a/12b	2.5	0.0	4.27	0.00	2.5	Yes
7	13a/13b	2.8	0.0	4.27	0.00	2.8	Yes
8	14a/14b	2.8	0.0	4.27	0.00	2.8	Yes
9	15a/15b	2.8	0.0	4.27	0.00	2.8	Yes
10	16a/16b	2.8	0.0	4.27	0.00	2.8	Yes
11	17	0.9	0.0	4.27	0.00	0.9	No
12	18	0.9	0.0	4.27	0.00	0.9	No
13	19	0.9	0.0	4.27	0.00	0.9	No
14	20	0.8	0.0	0.78	0.00	0.8	No

Cow Housing - NH3 Emissions

Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)	BACT Triggered?
1	30.6	30.6	21.13	21.13	0.0	No
2	38.9	38.9	21.13	21.13	0.0	No
3	38.9	38.9	21.13	21.13	0.0	No
4	38.9	38.9	21.13	21.13	0.0	No
5	38.0	38.0	21.13	21.13	0.0	No
6a	6.7	6.7	10.71	10.71	0.0	No
6b	0.0	0.2	5.54	5.54	-0.2	No

New Units from Expansion

Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)	BACT Triggered?
7	3.7	0.0	10.71	0.00	3.7	Yes
8	3.7	0.0	10.71	0.00	3.7	Yes
9a/9b	3.3	0.0	5.54	0.00	3.3	Yes
10a/10b	3.3	0.0	5.54	0.00	3.3	Yes
11a/11b	3.3	0.0	5.54	0.00	3.3	Yes
12a/12b	3.3	0.0	5.54	0.00	3.3	Yes
13a/13b	3.6	0.0	5.54	0.00	3.6	Yes
14a/14b	3.6	0.0	5.54	0.00	3.6	Yes
15a/15b	3.6	0.0	5.54	0.00	3.6	Yes
16a/16b	3.6	0.0	5.54	0.00	3.6	Yes
17	1.2	0.0	5.54	0.00	1.2	No
18	1.2	0.0	5.54	0.00	1.2	No
19	1.2	0.0	5.54	0.00	1.2	No
20	0.9	0.0	0.90	0.00	0.9	No

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

	Cow Housing - PM10 Emissions						
	Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)	BACT Triggered?
1	1	1.7	1.7	1.17	1.17	0.0	No
2	2	2.1	2.1	1.17	1.17	0.0	No
3	3	2.1	2.1	1.17	1.17	0.0	No
4	4	2.1	2.1	1.17	1.17	0.0	No
5	5	2.1	2.1	1.17	1.17	0.0	No
6	6a	0.7	0.7	1.17	1.17	0.0	No
7	6b	0.0	0.0	0.00	1.17	0.0	No
	New Units from Expansion						
	Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)	BACT Triggered?
1	7	0.7	0.0	1.93	0.00	0.7	No
2	8	0.7	0.0	1.93	0.00	0.7	No
3	9a/9b	1.7	0.0	2.81	0.00	1.7	No
4	10a/10b	1.7	0.0	2.81	0.00	1.7	No
5	11a/11b	1.7	0.0	2.81	0.00	1.7	No
6	12a/12b	1.7	0.0	2.81	0.00	1.7	No
7	13a/13b	2.4	0.0	3.70	0.00	2.4	Yes
8	14a/14b	2.4	0.0	3.70	0.00	2.4	Yes
9	15a/15b	2.4	0.0	3.70	0.00	2.4	Yes
10	16a/16b	2.4	0.0	3.70	0.00	2.4	Yes
11	17	0.8	0.0	3.70	0.00	0.8	No
12	18	0.8	0.0	3.70	0.00	0.8	No
13	19	0.8	0.0	3.70	0.00	0.8	No
14	20	1.4	0.0	1.37	0.00	1.4	No

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

APPENDIX K

QNEC

Quarterly Net Emissions Change (QNEC)

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

QNEC = PE2 - PE1, where:

QNEC = Quarterly Net Emissions Change for each emissions unit, lb/qtr
PE2 = Post-Project Potential to Emit for each emissions unit, lb/qtr
PE1 = Pre-Project Potential to Emit for each emissions unit, lb/qtr

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

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

	Cow Housing					
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	11,857	0	43,319	84,500
Daily PE2 (lb/day)	0.0	0.0	32.4	0.0	118.6	231.5
Quarterly Net Emissions Change (lb/qtr) 1:	0.0	0.0	1,962.25	0.0	1,346.25	3,593.00
2:	0.0	0.0	1,962.25	0.0	1,346.25	3,593.00
3:	0.0	0.0	1,962.25	0.0	1,346.25	3,593.00
4:	0.0	0.0	1,962.25	0.0	1,346.25	3,593.00

	Liquid Manure Handling						
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Annual PE2 (lb/yr)	0	0	0	0	6,350	19,583	474
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	17.3	53.7	1.3
Quarterly Net Emissions Change (lb/qtr) 1:	0.0	0.0	0.0	0.0	372.50	830.00	0.00
2:	0.0	0.0	0.0	0.0	372.50	830.00	0.00
3:	0.0	0.0	0.0	0.0	372.50	830.00	0.00
4:	0.0	0.0	0.0	0.0	372.50	830.00	0.00

	Solid Manure Handling					
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	0	0	2,120	11,333
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	5.8	31.1
Quarterly Net Emissions Change (lb/qtr) 1:	0.0	0.0	0.0	0.0	122.50	485.25
2:	0.0	0.0	0.0	0.0	122.50	485.25
3:	0.0	0.0	0.0	0.0	122.50	485.25
4:	0.0	0.0	0.0	0.0	122.50	485.25

	Feed Storage and Handling					
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	0	0	47,683	0
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	130.7	0.0
Quarterly Net Emissions Change (lb/qtr) 1:	0.0	0.0	0.0	0.0	4,164.00	0.0
2:	0.0	0.0	0.0	0.0	4,164.00	0.0
3:	0.0	0.0	0.0	0.0	4,164.00	0.0
4:	0.0	0.0	0.0	0.0	4,164.00	0.0