San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

JAN 2 7 2017

Tom Barcellos
Barcellos Farms
PO Box 142
Tipton, CA 93272

Re: Notice of Preliminary Decision - Authorities to Construct
Facility Number: S-6032
Project Number: S-1153665

Dear Mr. Barcellos:

Enclosed for your review and comment is the District's analysis of Barcellos Farms's application for an Authority to Construct for an expansion of an existing dairy operation at 14851 Road 168, Porterville. The expansion includes increasing the dairy herd size; constructing a new milking parlor; four freestall barns, two loafing barns, and 213 calf hutches; and converting the dairy's manure handling system from flush to scrape.

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 Ms. Sandra Lowe-Leseth of Permit Services at (559) 230-5834.

Sincerely,

Arnaud Marjollet
Director of Permit Services

AM:sll

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

Herd Expasion, New Milking Parlor, New Freestall Barns, New Loafing Barns, and Solids Separation System (Weeping Wall System)

Facility Name:	Barcellos Farms	Date:	January 4, 2017
Mailing Address:	P.O. Box 142 Tipton, CA 93272	Engineer:	Sandra Lowe-Leseth
		Lead Engineer:	Joven Refuerzo
Contact Person:	Tom Barcellos		
Telephone:	559-730-6895		
Application #:	S-6032-1-1 through S-6032-5-1		
Project #:	S-1153665		
Deemed Complete:	October 17, 2016		

I. Proposal

Barcellos Farms has requested Authority to Construct (ATC) permits for the expansion of an existing dairy operation. Per the CEQA documents filed by the County of Tulare, the herd expansion of Barcellos Farms is due to the consolidation of the herds from three other dairy facilities to the existing Road 168 site. The current and proposed herd profile is listed below.

- Current dairy herd profile:
  - 1,045 milk cows, not to exceed a combined total of 1,225 mature cows (milk and dry); 150 support stock (heifers and bulls) and 325 calves (0 – 3 months)
- Proposed dairy herd profile
  - 1,744 milk cows, not to exceed a combined total of 2,168 mature cows (milk and dry); 1,750 support stock (heifers and bulls), and 405 calves (0 – 3 months)

The proposed expansion will include the construction of four freestall barns (freestalls #1 through #4) and two loafing barns - a maternity barn and a hospital barn. In addition, a new 50-stall rotary milking parlor will be installed. The applicant originally proposed a 40-stall rotary milking parlor, but in an email dated January 4, 2017, the applicant is revising the new milking parlor configuration to a 50-stall rotary milking parlor to improve production efficiency for the post-project operation. The new freestalls, loafing barns, and milking parlor will be constructed on land that is not currently being used for dairy operations.

The existing housing units will not be physically expanded, but their existing capacities will be better utilized to accommodate the increased numbers of support stock. The existing milking parlor will be used as a special needs milking parlor and the existing

maternity and special needs corrals will be used as cow housing with no special designation. There are four existing corrals that do not have shade structures. The facility will be required to construct shade structures in these corrals as a result of the health risk assessment (HRA) and ambient air quality analysis (AAQA).

Additionally, the dairy will convert from a flush dairy, which uses water to remove manure from the concreted areas of the cow housing, to a scrape dairy, where manure is removed from the concreted feed lanes and walkways of the cow housing using a scraper. Both the existing milking parlor and the proposed milking parlor will use water to flush manure from the parlors.

The lagoon will be modified to have four weeping walls. Manure flushed from the milking parlors and manure scraped from the cow housing will be loaded into the weeping walls to separate manure solids from liquids prior to the waste stream entering the proposed anaerobic lagoon.

The Permits to Operate (PTOs) for the existing operation are included in Appendix A. The draft ATC permits for the proposed modifications are included in Appendix B. The 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 milking operation (S-6032-1), cow housing (S-6032-2), liquid manure handling (S-6032-3), solid manure handling (S-6032-4), and feed storage and handling (S-6032-5). These modifications are due to an increase in production rate, which also necessitates a change 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}).

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

Barcellos Farms is located at 14851 Road 168 in Porterville (Tulare County). 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 Barcellos Farms 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

[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.

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 rotary. Barcellos Farms is proposing a new 50-stall rotary milking parlor as well as continuing to use the existing 16-stall flat 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.

Cow Housing:

Milk cows at Barcellos Farms are currently housed in open corrals with shade structures. One part of this project is to build four freestalls specifically to house 1,600 of the proposed 1,744 milk cows. The remaining milk cows, along with the dry cows and heifers will be housed in open corrals, most of which already have shade structures. Calves (animals three months old or less) are housed in individual calf hutches. Two loafing barns will be constructed: one as a maternitybarn and one as a hospital barn.

The applicant is proposing that most of the milk cows will be housed in proposed freestall barns. In freestall barns, cows are grouped in large pens with free access to feed bunks, waterers, and stalls for resting. A standard freestall barn design consists of a feed alley through the center of the barn, with a feed bunk on either side. The rest of the barn floor is divided into rows of individual resting stalls. Various bedding materials are used in the stalls or pens for animal comfort and to prevent animal injury. In addition, loose dirt exercise pens adjoining the barns are typically provided, but are not essential. Manure from feed lanes will be removed by an automatic scraping system.

A maternity loafing barn and a hospital loafing barn are proposed. A loafing barn is a housing structure consisting of a large fenced confinement area with paved feed lanes and a roof-type shade structure covering at least 50% of the confinement area. Like the proposed freestall barns, manure from feed lanes will be removed by an automatic scraping system. Manure from the fenced confinement area is removed by scraping with a box-type scraper.

In the existing configuration, all animals except young calves are housed in open corrals. Most of the corrals have shade structures. In the proposed configuration, the existing corrals will remain in use and shade structures will be constructed in the four existing corrals without shade structures

Calves (0 - 3 months old) are housed in aboveground hutches with a scrape system for manure removal. Hutches typically house individual calves or a small group of calves,

depending on the age of the calves and the degree of care required. All hutches are grouped together in rows.

Detailed pre-project and post project housing arrangements are shown in Appendix D ('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 proposed liquid manure handling system will consist of a four weeping walls and one anaerobic treatment lagoon, with land application of treated liquid manure. The operator is changing from a flush dairy to a scrape dairy. The new freestall barns and new loafing barns will have manure removed using an automatic scraper. The existing corrals have manure removed from the feedlanes using a flush system. These will be modified so that the lanes and walkways are scraped.

Solids Separation:

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

Anaerobic Treatment Lagoon

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

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

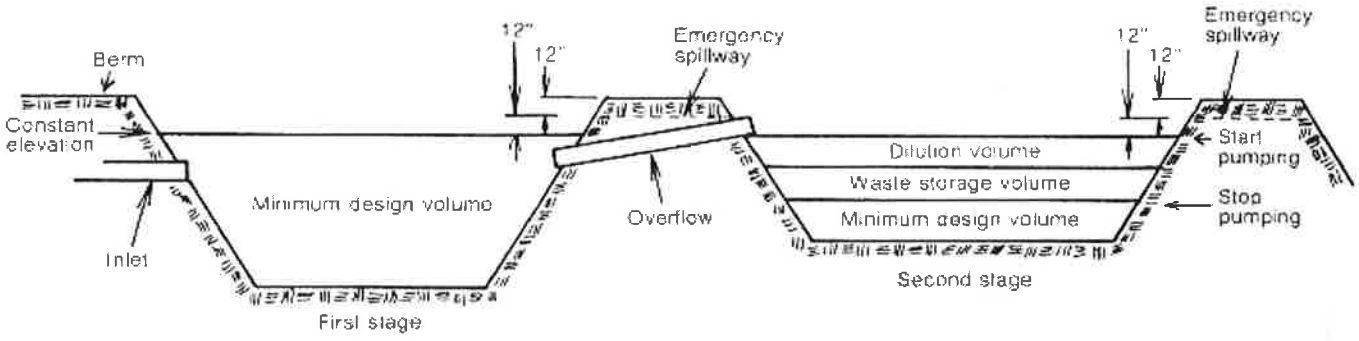
1) Minimum treatment volume – The minimum design volume must account for all potential sludge, treatment, precipitation, and runoff volumes;

2) Minimum hydraulic retention time – The retention time of the material in the lagoon must be adequate to provide environmentally safe utilization of waste;

3) Maximum Volatile Solids (VS) loading rate – The VS loading rate shall be based on maximum daily loading considering all waste sources that will be treated by the lagoon. The suggested loading rate for the San Joaquin Valley is 6.5-11 lb-VS/1000 ft^3/day depending on the type of system and solids separation; and

4) Minimum operating depth of at least 12 feet – Maximizing the depth of the lagoon has the following advantages: 1) The surface area in contact with the atmosphere is minimized, which will reduce volatilization of air pollutants; 2) The smaller surface area reduces the effects of the environment on the lagoon, which provides a more stable and favorable environment for anaerobic bacteria; 3) There is better mixing of lagoon due to rising gas bubbles; 4) and a deeper lagoon requires less land for the required treatment volume.

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



Instead of a primary treatment lagoon and a separate storage pond, Barcellos Farms will use one lagoon that meets the anaerobic treatment design requirements discussed above. Irrigation effluent will be drawn from the treatment lagoon, but a constant minimum volume must be maintained at all times. The lagoon will not be fully emptied or drawn down to a level below that corresponding to the dairy's

required minimum treatment volume in order to sustain the microbial activity required for anaerobic treatment.

Land Application:

Liquid manure from the anaerobic treatment lagoon will be applied to cropland as fertilizer/irrigation water. The application is done through flood irrigation, at agronomic rates in conformance with a nutrient management plan that has been 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.

Feed Storage and Handling:

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 Description:

S-6032-1-0: 1,045 COW MILKING OPERATION WITH ONE 16 STALL FLAT BARN MILKING PARLOR

S-6032-2-0 COW HOUSING – 1,045 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 1,225 MATURE COWS (MILK AND DRY COWS); 1,225 TOTAL SUPPORT STOCK (HEIFERS, CALVES, AND BULLS)

S-6032-3-0 LIQUID MANURE HANDLING SYSTEM CONSISTING OF ONE STORAGE POND

S-6032-4-0 SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; SOLID MANURE HAULED OFFSITE

S-6032-5-0 FEED STORAGE AND HANDLING CONSISTING OF COMMODITY BARNS AND SILAGE PILES

Proposed Modification:

S-6032-1-1: MODIFICATION OF 1,045 COW MILKING OPERATION WITH ONE 16 STALL FLAT BARN MILKING PARLOR: INCREASE NUMBER OF MILK COWS TO 1,744; INSTALL A NEW 50-STALL ROTARY MILK PARLOR; CONVERT THE EXISTING 16-STALL FLAT MILKING PARLOR TO A SPECIAL NEEDS MILKING PARLOR

S-6032-2-1: MODIFICATION OF COW HOUSING – 1,045 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 1,225 MATURE COWS (MILK AND DRY COWS); 1,225 TOTAL SUPPORT STOCK (HEIFERS, CALVES, AND BULLS): INCREASE HERD SIZE - MILK COWS FROM 1,045 TO 1,744, COMBINED TOTAL MATURE COWS FROM 1,225 TO 2,168, SUPPORT STOCK FROM 1,225 TO 1,750, CALVES FROM 325 TO TO 405; INSTALL 4 FREESTALL BARNS, ONE MATERNITY LOAFING BARN, ONE HOSPITAL LOAFING BARN, AND 213 CALF HUTCHES; CONVERT FROM FLUSHING ALL COW HOUSING TO SCRAPING ALL COW HOUSING; ADD SHADE STRUCTURES TO EXISTING NON-SHADED CORRALS

S-6032-3-1: MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF ONE STORAGE POND: INSTALL 4 WEEPING WALLS AND DESIGNATE EXISTING STORAGE POND AS AN ANAEROBIC TREATMENT LAGOON; ALLOW FOR LAND APPLICATION OF LIQUID MANURE; AND ALLOW AN INCREASE IN THROUGHPUT DUE TO HERD EXPANSION AUTHORIZED BY ATC S-6032-2-1

S-6032-4-1: MODIFICATION OF SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; SOLID MANURE HAULED OFFSITE: ALLOW LAND APPLICATION THROUGH SOLIDS SPREADING AND ALLOW FOR AN INCREASE IN THROUGHPUT DUE TO HERD EXPANSION AUTHORIZED BY ATC S-6032-2-1

S-6032-5-1: MODIFICATION OF FEED STORAGE AND HANDLING CONSISTING OF COMMODITY BARNS AND SILAGE PILES: ALLOW FOR INCREASE IN TOTAL MIXED RATION FEEDING DUE TO HERD EXPANSION AUTHORIZED BY ATC S-6032-2-1

Post-Project Equipment Description:

S-6032-1-1: 1,744 COW MILKING OPERATION WITH ONE 50-STALL ROTARY MILKING PARLOR AND ONE 16-STALL FLAT SPECIAL NEEDS MILKING PARLOR

S-6032-2-1: COW HOUSING – 1,744 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 2,168 MATURE COWS (MILK AND DRY COWS); 1,750 SUPPORT STOCK (HEIFERS AND BULLS); 405 CALVES (0 – 3 MONTHS) IN ABOVEGROUND HUTCHES; FOUR FREESTALLS AND TWO LOAFING BARNS WITH SCRAPE SYSTEM

S-6032-3-1: LIQUID MANURE HANDLING SYSTEM CONSISTING OF FOUR WEEPING WALLS AND ONE ANAEROBIC TREATMENT LAGOON (350' X 170' X 35'); MANURE IS LAND APPLIED THROUGH FLOOD IRRIGATION

S-6032-4-1: SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; SOLID MANURE APPLICATION TO LAND AND HAULED OFFSITE

S-6032-5-1: FEED STORAGE AND HANDLING CONSISTING OF COMMODITY BARNS, SILAGE PILES AND TOTAL MIXED RATION FEEDING

VI. Emission Control Technology Evaluation

Particulate Matter (PM), Volatile Organic Compounds (VOCs), and Ammonia (NH_3) are the major pollutants of concern from dairy operations. Hydrogen sulfide (H_2S) is also emitted from anaerobic processes on dairies. Gaseous pollutant emissions at a dairy result from the ruminant digestive processes (enteric emissions), the decomposition and fermentation of feed, and also from the decomposition of organic material in dairy manure. Volatile Organic Compounds are formed as intermediate metabolites when organic matter in manure degrades. Ammonia volatilization is the result of the microbial decomposition of nitrogenous compounds in manure. Hydrogen sulfide and other reduced sulfur compounds are produced when sulfur-containing compounds in manure decompose anaerobically. The quantity of enteric emissions depends directly on the number and types of cows. The quantity of emissions from manure decomposition depends on the amount of manure generated, which also depends on the number and types of cows; therefore, the total herd size and composition is the critical factor in quantifying emissions from a dairy.

Rule 4570 and the District's draft BACT guideline for dairies contain work practices that reduce emissions. These work practices are called mitigation measures. The following discussion reviews the mitigation measures that will be used by the dairy operator.

Milking Parlors (S-6032-1)

A flush/spray system is used to wash out the manure from the milking parlor before, during, or after each group of cows is milked. 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.

Cow Housing (S-6032-2)

Freestall Barns

The facility currently complies with the Phase II mitigation measure requirements of District Rule 4570, as previously processed. However, since this project results in the first freestall barns at this dairy, the facility will now become subject to the freestall mitigation measure requirements of District Rule 4570. The applicant has proposed freestall mitigation measures, which will be discussed in the Compliance Section of this application review, under subsection District Rule 4570.

Frequent Scraping of Lanes, Walkways, and Corral Surfaces

Frequent scraping is used for the removal of manure from the lanes and walkways in the freestall barns, loafing barns, and from the surface of open corrals. Frequent scraping of the feed lanes, walkways, and the exercise pen/corral surfaces will reduce the amount of dry manure on the surfaces that may be pulverized by the cows' hooves and emitted as PM_{10}. This practice will also reduce the chance of anaerobic conditions developing in the manure pack of exercise pens and corral surface, potentially reducing VOC emissions.

Shade Structures

The dry cows and heifers at Barcellos Farms will be housed in open corrals with concrete lanes. Providing shade for the animals reduces movement and unnecessary activity during hot weather, which reduces PM_{10} emissions. Barcellos Farms has already installed shade structures in the existing corrals except for corrals #1, #2, #8 and #9. In order to meet HRA/AAQA thresholds, the operator will install shade structures in the four existing corrals that are currently without shade.

Feeding Heifers/Calves at or Near Dusk

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

Application of Water to Exercise Pens/Corrals

Applying water to exercise pens/corral surfaces reduces PM_{10} emissions. Wetting the corral surface reduces dust by maintaining adequate moisture in the layer of manure

and earth on the pen/corral surface. Studies have shown that increasing the moisture of the pen/corral surface greatly reduces the entrainment of PM_{10} into the atmosphere as a result of animal movement.

Feeding Animals in Accordance with the NRC Guidelines

All animals will be fed in accordance with National Research Council (NRC) guidelines using routine nutritional analysis for rations. Feeding the cows in accordance with NRC guidelines minimizes undigested protein and other undigested nutrients in the manure, which would emit NH_3 and VOCs upon decomposition.

Rule 4570 Mitigation Measures

Best Available Retrofit Control Technology (BARCT) for VOC emissions is implemented through District Rule 4570 – Confined Animal Facilities.

The facility currently complies with all applicable Phase II mitigation measure requirements of District Rule 4570 (see project S-1105196). The proposed freestall barns, loafing barns, and open corrals will comply with all applicable Rule 4570 mitigation measures. All mitigation measures are expected to control VOC emissions and many of the measures will also control NH_3.

Liquid Manure Handling System (S-6032-3)

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

Feeding Animals in Accordance with the NRC Guidelines

As discussed previously, feeding according to NRC guidelines minimizes NH_3 and VOCs.

Solids Separation:

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

The liquid manure handling system will be modified to have four weeping walls for solids separation. Weeping wall is a general term for different types of manure structures with porous walls, panels or screened outlets that allow wastewater and urine to weep or seep out of the sand-laden manure. The liquids drain into the liquid manure storage pond or treatment lagoon. The liquid fraction can be applied to land with irrigation equipment. The drained manure remaining on the inlet side of the weeping wall is handled as a solid during removal from the weeping wall and during land application.

Anaerobic Treatment Lagoon System:

A properly designed and operated anaerobic treatment lagoon system reduces VOC emissions by optimizing the anaerobic activity that favors the complete conversion of organic compounds in the manure into methane, carbon dioxide, and water instead of partial conversion into various intermediate metabolites that are predominantly VOC. Pursuant to the design check analysis shown in Appendix E, the existing storage pond can be redesignated as an anaerobic treatment lagoon system. The lagoon is expected to meet the standard requirements.

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 System (S-6032-4)

Feeding Animals in Accordance with the NRC Guidelines

As discussed previously, feeding according to NRC guidelines minimizes NH_3 and VOCs.

Rapid Incorporation of Solid Manure Applied to Land

Based on the information currently available, emissions from solid manure applied to cropland are small in comparison to other sources. However, to ensure that any possible emissions are minimized, this dairy will be required to incorporate solid manure applied to cropland immediately (within two hours) after application. Immediate incorporation of the manure into the soil will reduce any volatilization of gaseous pollutants, including ammonia and VOC. Reduction in gaseous emissions is achieved by minimizing the amount of time that the manure is exposed to the atmosphere. Once manure has been incorporated into the soil, VOCs, ammonia, and any hydrogen sulfide are absorbed onto particles of soil providing the opportunity for soil microbes to oxidize these compounds into carbon dioxide, water, nitrates, and sulfates[2].

[2] 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)

Feed Storage and Handling (S-6032-5)

District Rule 4570 Mitigation Measures

The facility currently complies with all applicable Phase II mitigation measure requirements of District Rule 4570, as previously processed under District project S-1105196. All mitigation measures result in VOC emissions reductions. Reductions in ammonia (NH_3) emissions are also expected.

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 lagoon (permit unit S-6032-3) is the only source of non-fugitive emissions.
- The conditions on the existing Permits to Operate are based on the Rule 4570 Phase II mitigation measures originally proposed via application/project #S-1105196.
- Modifications to specific mitigation measures will be made, as necessary, to accommodate New Source Review requirements and health risk assessment requirements from the current project.
- All PM_{10} emissions will be allocated to the cow housing permit unit (S-6032-2).
- All H_2S emissions will be allocated to the lagoon in the liquid manure handling permit unit S-6032-3.
- The PM_{10} control efficiency for shade structures is from a District document titled "Dairy/Feedlot PM_{10} Mitigation Practices and their Control Efficiencies."[3]
- The PM_{10} emission factors are from a District document titled "Dairy and Feedlot PM_{10} Emissions Factors,"[4] 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

[3] http://www.valleyair.org/busind/pto/dpag/Dairy_PM10_Control_Efficiencies.pdf
[4] http://www.valleyair.org/busind/pto/dpag/FYI_%20Dairy_Feedlot_PM10_Emission_Factor.pdf

2012."[5] 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.[6] 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 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 D ('Dairy Emission Factors' sheet).

C. Calculations

All emission calculations for this project are included in Appendix D.

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 D. A summary of the PE1 is shown in the table below:

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
S-6032-1-0	0	0	1.1	418	0.4	143	0	0
S-6032-2-0	18.7	6,987	35.6	12,984	75.9	27,592	0	0
S-6032-3-0	0	0	8.3	2,990	40.1	14,646	0.9	289
S-6032-4-0	0	0	1.6	602	9.2	3,366	0	0
S-6032-5-0	0	0	35.5	12,967	0.0	0	0	0

[5] http://www.valleyair.org/busind/pto/emission_factors/2012-Final-Dairy-EE-Report/FinalDairyEFReport(2-23-12).pdf
[6] http://www.arb.ca.gov/ei/areasrc/livestockemisfwp.pdf

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 D. A summary of the PE2 is shown in the following table.

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
S-6032-1-1	0	0	1.9	698	0.7	239	0	0
S-6032-2-1	19.4	7,183	74.8	27,343	149.7	54,773	0	0
S-6032-3-1	0	0	10.9	3,993	32.6	11,918	0.9	289
S-6032-4-1	0	0	3.5	1,296	18.9	6,903	0	0
S-6032-5-1	0	0	91.6	33,429	0.0	0	0	0

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

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

Pre-Project Stationary Source Potential to Emit [SSPE1] (lb/year)							
	NO_X	SO_X	PM_{10}	CO	VOC	NH_3	H_2S
S-6032-1-0	0	0	0	0	418	143	0
S-6032-2-0	0	0	6,987	0	12,984	27,592	0
S-6032-3-0	0	0	0	0	2,990	14,646	289
S-6032-4-0	0	0	0	0	602	3,366	0
S-6032-5-0	0	0	0	0	12,967	0	0
Pre-Project SSPE (SSPE1)	**0**	**0**	**6,987**	**0**	**29,961**	**45,747**	**289**

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

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

Post-Project Stationary Source Potential to Emit [SSPE2] (lb/year)							
	NO_X	SO_X	PM_{10}	CO	VOC	NH_3	H_2S
S-6032-1-1	0	0	0	0	698	239	0
S-6032-2-1	0	0	7,183	0	27,343	54,773	0
S-6032-3-1	0	0	0	0	3,993	11,918	289
S-6032-4-1	0	0	0	0	1,296	6,903	0
S-6032-5-1	0	0	0	0	33,429	0	0
Post-Project SSPE (SSPE2)	**0**	**0**	**7,183**	**0**	**66,759**	**73,833**	**289**

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-equivalent opening. 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 on the following pages:

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. One face of the pile 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**
S-6032-3-0 - Lagoon only	0	0	0	0	1,440	289
Non-Fugitive SSPE1	0	0	0	0	1,440	289

Non-Fugitive SSPE2 (lb/year)						
Category	**NO_X**	**SO_X**	**PM_{10}**	**CO**	**VOC**	**H_2S**
S-6032-3-1 - Lagoon only	0	0	0	0	1,911	289
Non-Fugitive SSPE2	0	0	0	0	1,911	289

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)	0	0	0	0	0	1,440
SSPE2 (lb/yr)	0	0	0	0	0	1,911
Major source threshold (lb/yr)	20,000	140,000	140,000	140,000	200,000	20,000
Major Source? (Y/N)	No	No	No	No	No	No

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.[7] The PSD major source determination is summarized in the following table:

PSD Major Source Determination						
Category	**NO_2**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**	**CO**	**VOC**
Estimated facility PE before project increase (tpy)	0	0	0	0	0	<1.0
PSD major source threshold (tpy)	250	250	250	250	250	250
PSD major source? (Y/N)	No	No	No	No	No	No

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

As shown on the previous page, the facility is not an existing PSD major source for any regulated NSR pollutant expected to be emitted at this facility.

6. Baseline Emissions (BE)

The BE calculation (in lb/year) is performed pollutant-by-pollutant for each unit within the project to calculate the 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, this project does not constitute an SB 288 major modification.

8. Federal Major Modification

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

Since this facility is not a Major Source for any pollutants, 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:[8]

- PM
- PM_{10}
- 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	<1.0	<1.0
PSD major source threshold (tpy)	250	250	250	250
New PSD major source? (Y/N)	No	No	No	No

As shown in the table on the previous page, the potential to emit for the project, by itself, does not exceed any PSD major source threshold. Therefore Rule 2410 is 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 emissions profile screen. Detailed QNEC calculations are included in Appendix K.

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

VIII. Compliance

Rule 1070 Inspections

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

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

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

Rule 2010 Permits Required

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

Pursuant to Section 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 exceeding two pounds per day,
b. The relocation from one Stationary Source to another of an existing emissions unit with a potential to emit exceeding two pounds per day,
c. Modifications to an existing emissions unit with a valid Permit to Operate resulting in an AIPE exceeding two pounds per day, and/or
d. Any new or modified emissions unit, in a stationary source project, which results in an SB 288 Major Modification or a Federal Major Modification, as defined by the rule.

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

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

As outlined in Section I, the proposed expansion includes the construction of a milking parlor, four new freestalls, and two new loafing barns. As shown in the calculations in Appendix D, the PE for some emissions units exceeds 2 lb/day. BACT is triggered for the emissions units with PE greater than 2 lb/day. The affected emission units and pollutants are summarized below

S-6032-2: Cow Housing

New freestalls: VOC and NH_3
New loafing barns: VOC and NH_3

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

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

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

Substituting back into the original equation:

AIPE = PE2 – (PE1 * (EF2 / EF1))

Detailed AIPE calculations for each emissions unit are shown in Appendix F. The AIPE is greater than 2 lb/day for some emission units, and therefore BACT is triggered for these units. The affected emission units and pollutants are summarized below:

S-6032-3: Liquid Manure Handling

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

S-6032-4: Solid Manure Handling

Solid manure storage: NH_3
Land application: NH_3

S-6032-5: Feed Handling and Storage

Total Mixed Rations (TMR): VOC

d. SB 288/Federal Major Modification

As discussed in Sections VII.C.7 and VII.C.8 above, this project does not constitute an SB 288 and/or Federal Major Modification. Therefore, BACT is not triggered for any pollutant.

2. Top-Down BACT Analysis

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

Pursuant to the attached top-down BACT analysis (Appendix I), BACT is satisfied with the following:

S-6032-2: Cow Housing – Freestall Barns

VOC: 1) Concrete feed lanes and walkways;

2) Scraping feed lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning 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 exercise pens/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 exercise pens/corrals to ensure proper drainage;

5) Scraping exercise pens/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) Scraping feed lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and scraping 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 exercise pens/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 exercise pens/corrals to ensure proper drainage; and

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

S-6032-2: Cow Housing – Loafing Barns

VOC: 1) Concrete feed lanes and walkways;

2) Scraping feed lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and scraping 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 per animal) or managing corrals to maintain a dry surface;

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

6) District Rule 4570 Mitigation Measures

NH_3: 1) Concrete feed lanes and walkways;

2) Scraping feed lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and scraping 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 exercise pens/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 exercise pens/corrals to ensure proper drainage; and

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

S-6032-3: Liquid Manure Handling System - Lagoons:

VOC: 1) Anaerobic treatment lagoon designed according to NRCS guidelines, and

2) 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.

S-6032-3: Liquid Manure Handling System - Land Application:

VOC: 1) Irrigation of crops using liquid/slurry manure from an uncovered anaerobic treatment lagoon designed to meet Natural Resources Conservation Service (NRCS) standards.

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

S-6032-4-1: Solid Manure Handling System – Solid Manure Storage:

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

S-6032-4-1: Solid Manure Handling System – Land Application:

NH_3: 1) Solid manure incorporated into the soil within two hours of land application, and

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

S-6032-5: Feed Storage and Handling - Total mixed ration (TMR) feeding:

VOC: 1) Implement District Rule 4570 Management practices for feed.

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	0	0	7,183	0	66,759
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 above, this facility is not a major source for any pollutant. Therefore, offsets are not required.

C. Public Notification

1. Applicability

Public noticing is required for:

a. New Major Sources, Federal Major Modifications, and SB 288 Major Modifications,
b. Any new emissions unit with a Potential to Emit greater than 100 pounds during any one day for any one pollutant,
c. Any project which results in the offset thresholds being surpassed, and/or
d. Any project with an SSIPE of greater than 20,000 lb/year for any pollutant.
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, this project does not constitute an SB 288 or Federal Major Modification; therefore, public noticing for SB 288 or Federal Major Modification purposes is not required.

b. PE > 100 lb/day

As shown in the calculations in Appendix D, 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.

Offset Thresholds				
Pollutant	SSPE1 (lb/year)	SSPE2 (lb/year)	Offset Threshold	Public Notice Required?
NO_X	0	0	20,000 lb/year	No
SO_X	0	0	54,750 lb/year	No
PM_{10}	6,987	7,183	29,200 lb/year	No
CO	0	0	200,000 lb/year	No
VOC	29,961	66,759	20,000 lb/year	No

As detailed above, there were no thresholds surpassed with this project; therefore public noticing is not required for offset purposes.

d. SSIPE > 20,000 lb/year

Public notification is required for any permitting action that results in a SSIPE of more than 20,000 lb/year of any affected pollutant. According to District policy, the SSIPE = SSPE2 – SSPE1. The SSIPE is compared to the SSIPE Public Notice thresholds in the following table.

SSIPE Public Notice Thresholds					
Pollutant	SSPE2 (lb/year)	SSPE1 (lb/year)	SSIPE (lb/year)	SSIPE Public Notice Threshold	Public Notice Required?
NO_x	0	0	0	20,000 lb/year	No
SO_x	0	0	0	20,000 lb/year	No
PM_{10}	7,183	6,987	196	20,000 lb/year	No
CO	0	0	0	20,000 lb/year	No
VOC	66,759	29,961	36,798	20,000 lb/year	Yes
NH_3	73,833	45,747	28,086	20,000 lb/year	Yes
H_2S	289	289	0	20,000 lb/year	No

As demonstrated on the previous page, the SSIPEs for VOC and NH_3 are greater than 20,000 lb/year; therefore public noticing for SSIPE purposes is required.

e. Title V Significant Permit Modification

Since this facility does not have a Title V operating permit, this change is not a Title V significant modification, and therefore public noticing is not required.

2. Public Notice Action

As discussed above, public noticing is required for this project for the SSIPEs for VOC and NH_3 being greater than 20,000 lb/year. Therefore, public notice documents will be submitted to the California Air Resources Board (CARB) and a public notice will be published in a local newspaper of general circulation prior to the issuance of the ATC for this equipment.

D. Daily Emission 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.

Proposed DEL Conditions:

S-6032-1: Milking Operation

- {modified 4484} Permittee shall flush or hose down milk parlor immediately prior to, immediately after, or during each milking. [District Rules 2201 and 4570]

S-6032-2: Cow Housing

- {modified 4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201, 4102, and 4570]

- {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. [District Rules 2201, 4102, and 4570]

- {modified 4487} Permittee shall scrape feed lanes and walkways for mature cows with an automatic scraper (or equivalent) at least four times per day and scrape feed lanes and walkways for support stock (heifers) at least once per day. [District Rules 2201, 4102, and 4570]

- {modified 4496} Freestall barns shall not have exercise pens, corrals, or drylots at any time. [District Rules 2201 and 4570]

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

- {modified 4554} Permittee shall implement at least one of the following exercise pen/corral mitigation measures: 1) slope the surfaces of exercise pens/corrals at least 3% where the available space for each animal is 400 square feet or less and at least 1.5% where the available space for each animal is more than 400 square; 2) maintain exercise pens/corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape exercise pens/corrals sufficiently to maintain a dry surface except during periods of rainy weather. [District Rules 2201, 4102, and 4570]

- All open corrals shall be equipped with shade structures. [District Rules 2201 and 4102]

- Shade structures shall be installed in any of the following ways: 1) constructed with a light permeable roofing material; 2) uphill of any slope in the corral; 3) installed so that the structure has a North/South orientation. OR Permittee shall clean manure from under corral shades at least once every fourteen (14) days, when weather permits access into the corral. [District Rules 2201 and 4570]

- Calves housed in corrals and heifers shall be fed near (within one hour of) dusk. [District Rule 2201]

- Permittee shall scrape exercise pen/corral surfaces every two weeks using a pull-type scraper during morning hours, except when prevented by wet conditions. [District Rule 2201, 4102 and 4570]

- 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]

- Permittee shall apply water to exercise pens and corrals using sprinklers or other method approved by the District such that one of the following

benchmarks is met: (1) at least 25% of the corral surface is wet or (2) the average surface moisture content of the area is equal to or greater than 16% (wet basis). [District Rule 2201]

S-6032-3: Liquid Manure Handling and Storage

- {modified 4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201, 4102, and 4570]
- Permittee shall use an anaerobic treatment lagoon designed according to NRCS Guideline No. 359. [District Rules 2201 and 4570]
- {modified 4538} Permittee shall remove solids with a solid separator system, prior to the manure entering the lagoon. [District Rules 2201, 4102, and 4570]
- {modified 4535} If liquid manure is used to irrigate crops, the liquid manure shall be taken from an uncovered anaerobic treatment lagoon designed to meet Natural Resources Conservation Service (NRCS) standards. A minimum liquid manure depth of 18 feet shall be retained in the lagoon at all times. [District Rules 2201 and 4570]
- {modified 4550} Permittee shall not allow liquid manure to stand in the fields for more than twenty-four (24) hours after irrigation. [District Rules 2201, 4102, and 4570]

S-6032-4: Solid Manure Handling and Storage

- {modified 4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201, 4102, and 4570]
- {modified 4526} Within seventy two (72) hours of removal of solid manure from housing, permittee shall either 1) remove dry manure from the facility, or 2) cover dry manure outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed twenty-four (24) hours per event. [District Rules 2201 and 4570]
- {modified 4541} Permittee shall incorporate all solid manure within two (2) hours of land application. [District Rules 2201 and 4570]

S-6032-5: Feed Storage and Handling

- {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 4464} Permittee shall remove uneaten wet feed from feed bunks within twenty-four (24) hours after the end of a rain event. [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 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 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 is not required to demonstrate compliance with Rule 2201.

2. Monitoring

No monitoring is required to demonstrate compliance with Rule 2201.

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:

General Condition (all permits)

- {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]

S-6032-1: Milking Operation

- {modified 4485} Permittee shall provide verification that milk parlor is flushed or hosed down immediately prior to, immediately after, or during each milking. [District Rules 2201 and 4570]

S-6032-2: 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 Rules 2201 and 4102]

- {modified 4488} Permittee shall maintain records sufficient to demonstrate that feed lanes and walkways are scraped at least four times per day for mature cows and at least once per day for support stock (heifers). [District Rules 2201, 4102, and 4570]

- {modified 4497} Permittee shall maintain records, such as design specifications, or provide other verification that freestall barns have no exercise pens, corrals, or drylots. [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 4455} Permittee shall either 1) maintain sufficient records to demonstrate that corrals are maintained to ensure proper drainage preventing water from standing for more than forty-eight hours or 2) maintain records of dates pens are groomed (i.e., harrowed, raked, or scraped, etc.). [District Rules 2201 and 4570]

- {modified 4512} If permittee has selected to comply using shades constructed with a light permeable roofing material, then permittee shall maintain records, such as design specifications, demonstrating that the shade structures are equipped with such roofing material or if permittee has selected to comply by cleaning the manure from under the corral shades, then permittee shall maintain records demonstrating that manure is cleaned from under the shades at least once every fourteen (14) days, as long as weather permits access to corrals. [District Rules 2201 and 4570]

- Permittee shall maintain sufficient records to demonstrate that calves housed in corrals and heifers were fed within one hour of dusk. [District Rule 2201]

- Permittee shall maintain sufficient records to demonstrate that exercise pen/corral surfaces are scraped every two weeks using a pull-type scraper during morning hours, except when prevented by wet conditions. [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 keep records demonstrating that pen/corral sprinkling benchmarks have been met. [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]

S-6032-3: Liquid Manure Handling

- {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 4536} Permittee shall maintain records, such as design specifications, calculations, including Minimum Treatment Volume (MTV), Hydraulic Retention Time (HRT) demonstrating that the anaerobic treatment lagoon meets the requirements listed in the NRCS Field Office Technical Guide Code 359. [District Rules 2201 and 4102]

- {modified 4549} Permittee shall maintain records that only liquid manure treated with an anaerobic treatment lagoon is applied to fields. [District Rules 2201 and 4570]

- {modified 4551} Permittee shall maintain records to demonstrate liquid manure did not stand in the fields for more than twenty-four (24) hours after irrigation. [District Rules 2201, 4102, and 4570]

S-6032-4: Solid Manure Handling

- {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 4527} Permittee shall keep records of dates when manure is removed from the facility or permittee shall maintain records to demonstrate that dry manure piles outside the pens are covered with a weatherproof covering from October through May. [District Rules 2201 and 4570]

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

S-6032-5: Feed Handling and Storage

- {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 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]

- {modified 4459} 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]

- {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 4465} Permittee shall maintain records demonstrating that uneaten wet feed was removed from feed bunks within twenty-four (24) hours after the end of a rain event. [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 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 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]

4. Reporting

No reporting is required to demonstrate compliance with Rule 2201.

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 J of this evaluation.

Barcellos Farms 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. above, this project does not result in a new PSD major source or PSD major modification. No further discussion is required.

Rule 2520 Federally Mandated Operating Permits

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

Rule 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 J of this evaluation, this facility's total prioritization score, including the proposed project, is greater than one. An HRA was therefore required to determine the short-term acute and long-term chronic exposure risk.

The cancer risk for the proposed project is summarized in the following table:

HRA Summary		
Permit Unit	**Cancer Risk (per million)**	**T-BACT Required?**
S-6032-1-1	0.22	No
S-6032-2-1	9.38	Yes
S-6032-3-1	4.55	Yes
S-6032-4-1	0	No

BACT for Toxic Emissions Control (T-BACT)

BACT for toxic emissions control (T-BACT) is required if the cancer risk exceeds one in one million. As shown in the table above, T-BACT is required for cow housing and for liquid manure handling and storage.

T-BACT is triggered for VOC and PM_{10} emissions from the four new freestalls and two new loafing barns. T-BACT is also triggered for VOC emissions from the liquid manure handling.

T-BACT for cow housing is satisfied with BACT for VOC and PM_{10} for the dairy cow housing unit. T-BACT for the lagoon is satisfied with BACT for VOC for liquid manure handling. See Appendix I for details.

Compliance with the District's Risk Management Policy is therefore expected.

District policy APR 1905 also specifies that the increase in emissions associated with a proposed new source or modification not have acute or chronic indices, or a cancer risk greater than the District's significance levels (i.e. acute and/or chronic indices greater than 1 and a cancer risk greater than 20 in a million). As outlined in

the RMR summary in Appendix J, the risk increases for the proposed project were determined to be less than significant.

Rule 4550 Conservation Management Practices (CMP)

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

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

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

The facility received District approval for its CMP plan on September 28, 2015. Continued compliance with the requirements of District Rule 4550 is 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.

Section 5.1.2 states that a thirty-day public noticing and commenting period shall be required for all large CAFs receiving their initial Permit-to-Operate or Authority-to-Construct. For dairies, the threshold for large CAF is 1,000 milk cows.

The applicant submitted a Confined Animal Feeding Operation (CAFO) Modification form to increase the dairy's design capacity from less than 1,000 milk cows to greater than 1,000 milk cows. However, the facility has always had less than 1,000 milk cows at the facility, and the public notice requirement was not triggered. With this project, the facility is anticipating that the number of milk cows physically at the facility will be greater than 1,000 milk cows, which will triggering the Rule 4570 public notice requirement. A public notice for large CAF (Rule 4570) will be published concurrently with the public notice required by Rule 2201 in a local newspaper of general circulation prior to the issuance of these ATCs.

The facility was issued ATC permits to implement the requirements of this rule under project #S-1105196. The applicant has not proposed any changes to the previously selected mitigation measures. Except where a new type of operation is installed, or conditions are superseded by BACT/T-BACT provisions, the permit conditions from project # S-1105196 will be incorporated into the ATC permits issued under this project. The permit conditions are detailed 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, 4102, and 4570]

Milking Parlor

- {modified 4484} Permittee shall flush or hose milk parlor immediately prior to, immediately after, or during each milking. [District Rules 2201 and 4570]

- {modified 4485} Permittee shall provide verification that milk parlors are flushed or hosed prior to, immediately after, or during each milking. [District Rules 2201 and 4570]

Cow Housing

- {modified 4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201, 4102, 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 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. [District Rules 2201, 4102, and 4570]

- {modified 4487} Permittee shall scrape feed lanes and walkways for mature cows (milk and dry cows) at least four times per day and scrape feed lanes and walkways for support stock at least once per day. [District Rules 2201, 4102, and 4570]

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

- {modified 4496} Freestall barns shall not have exercise pens, corrals, or drylots at any time. [District Rules 2201 and 4570]

- {modified 4497} Permittee shall maintain records, such as design specifications, or provide other verification that freestall barns have no exercise pens, corrals, or drylots. [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 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]

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

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

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

- {4511} Shade structures shall be installed in any of the following ways: 1) constructed with a light permeable roofing material; 2) uphill of any slope in the corral; 3) installed so that the structure has a North/South orientation. OR Permittee shall clean manure from under corral shades at least once every fourteen (14) days, when weather permits access into the corral. [District Rules 2201 and 4570]

- {4512} If permittee has selected to comply using shades constructed with a light permeable roofing material, then permittee shall maintain records, such as design specifications, demonstrating that the shade structures are equipped with such roofing material or if permittee has selected to comply by cleaning the manure from under the corral shades, then permittee shall maintain records demonstrating that manure is cleaned from under the shades at least once every fourteen (14) days, as long as weather permits access to corrals. [District Rules 2201 and 4570]

- Calves housed in corrals and heifers shall be fed near (within one hour of) dusk. [District Rule 2201]

- Permittee shall maintain sufficient records to demonstrate that calves housed in corrals and heifers were fed within one hour of dusk. [District Rule 2201]

- Permittee shall scrape exercise pen/corral surfaces every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions. [District Rule 2201, 4102 and and 4570]

- Permittee shall maintain sufficient records to demonstrate that exercise pen/corral surfaces are scraped every two weeks using a pull-type scraper during morning hours, except when prevented by wet conditions. [District Rules 2201 and 4570]

- 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]

- 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 apply water to exercise pens and corrals using sprinklers or other method approved by the District such that one of the following benchmarks is met: (1) at least 25% of the corral surface is wet or (2) the average surface moisture content of the area is equal to or greater than 16% (wet basis). [District Rules 2201 and 4102]

- Permittee shall keep records demonstrating that the pen/corral sprinkling benchmarks have been met. [District Rules 2201 and 4102]

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

Liquid Manure

- {modified 4454} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201, 4102, 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 4535} Permittee shall use an anaerobic treatment lagoon designed according to NRCS Guideline No. 359. [District Rules 2201 and 4570]

- {modified 4536} Permittee shall maintain records, such as design specifications, calculations, including Minimum Treatment Volume (MTV), Hydraulic Retention Time (HRT) demonstrating that the anaerobic treatment lagoon meets the requirements listed in the NRCS Field Office Technical Guide Code 359. [District Rules 2201 and 4570]

- {modified 4537} Permittee shall test any other parameters determined necessary by the APCO, ARB, and EPA to demonstrate compliance with rule requirements as frequently as determined necessary by the APCO, ARB, and EPA. [District Rules 2201 and 4570]

- {modified 4538} Permittee shall remove solids with a solid separator system, prior to the manure entering the lagoon. [District Rules 2201, 4102, and 4570]

- {modified 4535} If liquid manure is used to irrigate crops, the liquid manure shall be taken from an uncovered anaerobic treatment lagoon designed to meet Natural Resources Conservation Service (NRCS) standards. A minimum liquid manure depth of 18 feet shall be retained in the lagoon at all times. [District Rules 2201 and 4570]

- {modified 4549} Permittee shall maintain records that only liquid manure treated with an anaerobic treatment lagoon is applied to fields. [District Rules 2201 and 4570]

- {modified 4550} Permittee shall not allow liquid manure to stand in the fields for more than twenty-four (24) hours after irrigation. [District Rules 2201 and 4570]

- {modified 4551} Permittee shall maintain records to demonstrate liquid manure did not stand in the fields for more than twenty-four (24) hours after irrigation. [District Rules 2201 and 4570]

Solid Manure

- {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 4526} Within seventy two (72) hours of removal of solid manure from housing, permittee shall either 1) remove dry manure from the dairy, or 2) cover dry

manure outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed twenty-four (24) hours per event. [District Rules 2201 and 4570]

- {modified 4527} Permittee shall keep records of dates when manure is removed from the dairy or permittee shall maintain records to demonstrate that dry manure piles outside the pens are covered with a weatherproof covering from October through May. [District Rules 2201 and 4570]

- {modified 4528} If weatherproof coverings are used, permittee shall maintain records, such as manufacturer warranties or other documentation, demonstrating that the weatherproof covering over dry manure are installed, used, and maintained in accordance with manufacturer recommendations and applicable standards listed in NRCS Field Office Technical Guide Code 313 or 367, or any other applicable standard approved by the APCO, ARB, and EPA. [District Rules 2201 and 4570]

- {modified 4541} Permittee shall incorporate all solid manure within two (2) 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 (2) hours of land application. [District Rules 2201 and 4570]

Feed Storage and Handling

- {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 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]

- {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 or 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 4464} Permittee shall remove uneaten wet feed from feed bunks within twenty-four (24) hours after the end of a rain event. [District Rules 2201 and 4570]
- {modified 4463} Permittee shall maintain records demonstrating that uneaten wet feed was removed from feed bunks within twenty-four (24) hours after the end of a rain event. [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 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 manufacturers 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 this site is not located within 1,000 feet of a school. Therefore, pursuant to California Health and Safety Code 42301.6, a school notice is not required.

California Environmental Quality Act (CEQA)

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

Greenhouse Gas (GHG) Significance Determination

District is a Responsible Agency

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

District CEQA Findings

The County of Tulare (County) is the public agency having principal responsibility for approving the proposed consolidation of four dairy facilities (i.e. merging three dairy facilities with this existing Barcellos dairy facility) and also approving for this Barcellos dairy facility the remodel of the cow housing to accommodate more animals by installing

four freestall barns and 213 calf hutches; the modification of the corrals and liquid manure handling, and the conversion the dairy from one that flushes to one that scrapes manure (Project). As such, the County served as the Lead Agency for the Project. Consistent with CEQA Guidelines §15301, a Notice of Exemption (NOE) was prepared and adopted by the County. For the NOE the County and the applicant entered into a Memorandum of Terms and Conditions and Agreement to allow three other dairy facilities to merge into the Barcellos dairy facility with no change in the total number of herd animals and for the newly merged Barcellos facility to make some operational improvements while still complying with zoning as one legal conforming use.

The District is a Responsible Agency for the Project because of its discretionary approval power over the Project via its Permits Rule (Rule 2010) and New Source Review Rule (Rule 2201), (CEQA Guidelines §15381).

The District has considered the Lead Agency's NOE and finds that it adequately characterizes the Project's potential impact on air quality. In addition, all feasible and cost-effective control measures to reduce potential impacts on air quality resulting from project related stationary source emissions have been applied to the Project as part of BACT. Furthermore, the District has conducted an engineering evaluation of the project and finds that through a combination of project design elements, compliance with applicable District rules and regulations, and compliance with District air permit conditions, project specific stationary source emissions would be reduced to the extent feasible. The District does not have authority over any of the other project impacts and has, therefore, determined that no additional findings are required.

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 is 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 project is to merge three existing dairy facilities with the existing Barcellos dairy. The merger will not result in an overall increase in the total number of animals in the herd size. However by merging the herd size from the three existing dairy facilities with the Barcellos dairy, it will increase the herd size at the Barcellos dairy, which will result in an increase in criteria pollutant emissions. In addition, typically dairies are an operation of potential public concern in the Valley. Therefore, the District concludes that an Indemnification Agreement and Letter of Credit is required for this project.

IX. Recommendation

Compliance with all applicable rules and regulations is expected. Pending a successful NSR and Rule 4570 Public Noticing period, issue ATCs S-6032-1-1; '-2-1; '-3-1; '-4-1; and '-5-1 subject to the permit conditions on the attached draft ATCs in Appendix B.

X. Billing Information

Annual Permit Fees			
Permit Number	**Fee Schedule**	**Fee Description**	**Annual Fee**
S-6032-1-1	3020-06	Milk Parlor	$116.00
S-6032-2-1	3020-06	Cow Housing	$116.00
S-6032-3-1	3020-06	Liquid Manure Handling System	$116.00
S-6032-4-1	3020-06	Solid Manure Handling System	$116.00
S-6032-5-1	3020-06	Feed Handling and Storage	$116.00

Appendices

A: Current Permits to Operate
B: Draft Authorities to Construct
C: Project Site Plans
D: Dairy Emission Factors/Potential to Emit
E: Lagoon Check Calculations
F: AIPE/BACT Calculations
G: CO2e/GHG Calculations
H: BACT Guidelines
I: Top-Down BACT Analysis
J: HRA Summary/Risk Management Review and AAQA
K: Quarterly Net Emissions Change

APPENDIX A
Current Permits to Operate

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: S-6032-1-0 **EXPIRATION DATE:** 12/31/2017

EQUIPMENT DESCRIPTION:
1,045 COW MILKING OPERATION WITH ONE 16 STALL FLAT BARN MILKING PARLOR

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
4. Permittee shall flush or hose milk parlor immediately prior to, immediately after, or during each milking. [District Rule 4570]
5. Permittee shall provide verification that milk parlors are flushed or hosed prior to, immediately after, or during each milking. [District Rule 4570]
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: S-6032-2-0 **EXPIRATION DATE:** 12/31/2017

EQUIPMENT DESCRIPTION:
COW HOUSING - 1,045 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 1,225 MATURE COWS (MILK AND DRY COWS); 1,225 TOTAL SUPPORT STOCK (HEIFERS, CALVES, AND BULLS)

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, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers. [District Rule 4570]
5. Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rule 4570]
6. Permittee shall maintain records demonstrating that water pipes and troughs are inspected and leaks are repaired at least once every seven (7) days. [District Rule 4570]
7. Permittee shall clean manure from corrals at least four (4) times per year with at least sixty (60) days between each cleaning, or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rule 4570]
8. Permittee shall demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning or demonstrate that corrals are cleaned at least once between April and July and at least once between September and December. [District Rule 4570]
9. Permittee shall implement at least one of the following corral mitigation measures: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 square feet or less and shall slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 square feet per animal; 2) maintain corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface except during periods of rainy weather. [District Rule 4570]
10. Permittee shall either 1) maintain sufficient records to demonstrate that corrals are maintained to ensure proper drainage preventing water from standing for more than forty-eight hours or 2) maintain records of dates pens are groomed (i.e., harrowed, raked, or scraped, etc.). [District Rule 4570]
11. Permittee shall clean concreted lanes such that the depth of manure does not exceed twelve (12) inches at any point or time. [District Rule 4570]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

12. Permittee shall measure and document the depth of manure on the concrete lanes at least once every ninety (90) days. [District Rule 4570]
13. Shade structures shall be installed in any of the following ways: 1) constructed with a light permeable roofing material; 2) uphill of any slope in the corral; 3) installed so that the structure has a North/South orientation. OR Permittee shall clean manure from under corral shades at least once every fourteen (14) days, when weather permits access into the corral. [District Rule 4570]
14. Permittee shall manage corrals such that the manure depth in the corral does not exceed twelve (12) inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rule 4570]
15. Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rule 4570]
16. Permittee shall maintain a record of the number of animals of each species and production group at the facility and shall maintain quarterly records of any changes to this information. [District Rule 4570]
17. 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]
18. 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: S-6032-3-0 **EXPIRATION DATE:** 12/31/2017

EQUIPMENT DESCRIPTION:
LIQUID MANURE HANDLING SYSTEM CONSISTING OF ONE STORAGE POND

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 not allow liquid manure to stand in the fields for more than twenty-four (24) hours after irrigation. [District Rule 4570]
5. Permittee shall maintain records to demonstrate liquid manure did not stand in the fields for more than twenty-four (24) hours after irrigation. [District Rule 4570]
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: S-6032-4-0 **EXPIRATION DATE:** 12/31/2017

EQUIPMENT DESCRIPTION:
SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; SOLID MANURE HAULED OFFSITE

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. 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: S-6032-5-0 **EXPIRATION DATE:** 12/31/2017

EQUIPMENT DESCRIPTION:
FEED STORAGE AND HANDLING CONSISTING OF COMMODITY BARNS AND SILAGE PILES

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
4. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 4570]
5. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rule 4570]
6. Permittee shall push feed so that it is within three feet of feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals. [District Rule 4570]
7. 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]
8. Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rule 4570]
9. 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]
10. Permittee shall store grain in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rule 4570]
11. Permittee shall maintain records demonstrating grain is/was stored in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rule 4570]
12. Permittee shall remove uneaten wet feed from feed bunks within twenty-four (24) hours after the end of a rain event. [District Rule 4570]
13. Permittee shall maintain records demonstrating that uneaten wet feed was removed from feed bunks within twenty-four (24) hours after the end of a rain event. [District Rule 4570]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

14. For bagged silage/feedstuff, permittee shall utilize a sealed feed storage system (e.g., ag bag). [District Rule 4570]
15. Permittee shall cover all silage piles, except for the area where feed is being removed from the pile, with a plastic tarp that is at least five (5) mils (0.005 inches) thick, multiple plastic tarps with a cumulative thickness of at least 5 mils (0.005 inches), or an oxygen barrier film covered with a UV resistant material. Silage piles shall be covered within seventy-two (72) hours of last delivery of material to the pile. Sheets of material used to cover silage shall overlap so that silage is not exposed where the sheets meet. [District Rule 4570]
16. Permittee shall maintain records of the thickness and type of cover used to cover each silage pile. Permittee shall also maintain records of the date of the last delivery of material to each silage pile and the date each pile is covered. [District Rule 4570]
17. Permittee shall select and implement one of the following mitigation measures for building each silage pile at the facility: Option 1) build the silage pile such that the average bulk density is at least 44 lb/cu ft for corn silage and 40 lb/cu ft for other silage types, as measured in accordance with Section 7.11 of District Rule 4570; Option 2) Adjust filling parameters when creating the silage pile to achieve an average bulk density of at least 44 lb/cu ft for corn silage and at least 40 lb/cu ft for other silage types as determined using a District-approved spreadsheet; or Option 3) build silage piles using crops harvested with the applicable minimum moisture content, maximum Theoretical Length of Chop (TLC), and roller opening identified in District Rule 4570, Table 4.1, 1.d and manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. Records of the option chosen as a mitigation measure for building each silage pile shall be maintained. [District Rule 4570]
18. For each silage pile that Option 1 (Measured Bulk Density) is chosen as a mitigation measure for building the pile, records of the measured bulk density shall be maintained. [District Rule 4570]
19. For each silage pile that Option 2 (Bulk Density Determined by Spreadsheet) is chosen as a mitigation measure for building the pile, records of the filling parameters entered into the District-approved spreadsheet to determine the bulk density shall be maintained. [District Rule 4570]
20. 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]
21. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records of the average percent moisture of crops harvested for silage shall be maintained. [District Rule 4570]
22. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall adjust setting of equipment used to harvest crops for the pile to incorporate the following parameters for Theoretical Length of Chop (TLC) and roller opening, as applicable: 1) Corn with no processing: TLC not exceeding 1/2 inch, 2) Processed Corn: TLC not exceeding 3/4 inch and roller opening of 1-4 mm, 3) Alfalfa/Grass: TLC not exceeding 1.0 inch, 4) Other silage crops: TLC not exceeding 1/2 inch. [District Rule 4570]
23. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, records that equipment used to harvest crops for the pile was set to the required TLC and roller opening for the type of crop harvested shall be maintained. [District Rule 4570]
24. For each silage pile that Option 3 (Moisture, TLC, Roller Opening, & Material Delivery) is chosen as a mitigation measure for building the pile, the permittee shall manage silage material delivery such that the thickness of the layer of un-compacted material delivered on top of the pile is no more than six (6) inches. [District Rule 4570]
25. 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]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

26. Permittee shall implement the following mitigation measures for management of silage piles at the facility: Option 1) manage silage piles such that only one silage pile has an uncovered face and the total exposed surface area is less than 2,150 square feet, or manage multiple uncovered silage piles such that the total exposed surface area of all uncovered silage piles is less than 4,300 square feet; Option 2) use a shaver/facer to remove silage from the silage pile, or shall use another method to maintain a smooth vertical surface on the working face of the silage pile; or Option 3) inoculate silage with homolactic lactic acid bacteria in accordance with manufacturer recommendations to achieve a concentration of at least 100,000 colony forming units per gram of wet forage, apply propionic acid, benzoic acid, sorbic acid, sodium benzoate, or potassium sorbate at the rate specified by the manufacturer to reduce yeast counts when forming silage piles, or apply other additives at rates that have been demonstrated to reduce alcohol concentrations in silage and/or VOC emissions from silage and have been approved by the District and EPA. Records of the options chosen for managing each silage pile shall be maintained. [District Rule 4570]
27. If Option 1 (Limiting Exposed Area of Silage) is chosen as a mitigation measure for managing silage piles, the permittee shall calculate and record the maximum (largest part of pile) total exposed area of each silage pile. Records of the maximum calculated area shall be maintained. [District Rule 4570]
28. 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]
29. 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]
30. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]
31. 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
Draft Authorities to Construct

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-6032-1-1

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: BARCELLOS FARMS
MAILING ADDRESS: PO BOX 142
TIPTON, CA 93272

LOCATION: 14851 ROAD 168
PORTERVILLE, CA 93257

EQUIPMENT DESCRIPTION:
MODIFICATION OF 1,045 COW MILKING OPERATION WITH ONE 16 STALL FLAT BARN MILKING PARLOR: INCREASE NUMBER OF MILK COWS TO 1,744; INSTALL A NEW 50-STALL ROTARY MILK PARLOR; CONVERT THE EXISTING 16-STALL FLAT MILKING PARLOR TO A SPECIAL NEEDS MILKING PARLOR

CONDITIONS

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

CONDITIONS CONTINUE ON NEXT PAGE

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

Seyed Sadredin, Executive Director / APCO

DRAFT

Arnaud Marjollet, Director of Permit Services

S-6032-1-1 : Jan 4 2017 9:04AM – LOWELES : Joint Inspection NOT Required

6. {4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]

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

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: S-6032-2-1

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: BARCELLOS FARMS
MAILING ADDRESS: PO BOX 142
TIPTON, CA 93272

LOCATION: 14851 ROAD 168
PORTERVILLE, CA 93257

EQUIPMENT DESCRIPTION:
MODIFICATION OF COW HOUSING - 1,045 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 1,225 MATURE COWS (MILK AND DRY COWS); 1,225 TOTAL SUPPORT STOCK (HEIFERS, CALVES, AND BULLS): INCREASE HERD SIZE - MILK COWS FROM 1,045 TO 1,744, COMBINED TOTAL MATURE COWS FROM 1,225 TO 2,168, SUPPORT STOCK FROM 1,225 TO 1,750, CALVES FROM 325 TO TO 405; INSTALL 4 FREESTALLS, ONE MATERNITY LOAFING BARN, ONE HOSPITAL LOAFING BARN, AND 213 CALF HUTCHES; CONVERT FROM FLUSHING ALL COW HOUSING TO SCRAPING ALL COW HOUSING; ADD SHADE STRUCTURES TO EXISTING NON-SHADED CORRALS

CONDITIONS

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

CONDITIONS CONTINUE ON NEXT PAGE

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

Seyed Sadredin, Executive Director / APCO

Arnaud Marjollet, Director of Permit Services

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4. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201, 4102, and 4570]
5. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
6. Permittee shall pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers. [District Rules 2201 and 4570]
7. Permittee shall scrape feed lanes and walkways for mature cows with an automatic scraper (or equivalent) at least four times per day and scrape feed lanes and walkways for support stock (heifers) at least once per day. [District Rules 2201, 4102, and 4570]
8. Permittee shall maintain records sufficient to demonstrate that feed lanes and walkways are scraped at least four times per day for mature cows and at least once per day for support stock (heifers). [District Rules 2201, 4102, and 4570]
9. Freestall barns and loafing barns shall not have exercise pens, corrals, or drylots at any time. [District Rules 2201 and 4570]
10. Permittee shall maintain records, such as design specifications, or provide other verification that freestall barns and loafing barns have no exercise pens, corrals, or drylots. [District Rules 2201 and 4570]
11. Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rules 2201 and 4570]
12. Permittee shall maintain records demonstrating that water pipes and troughs are inspected and leaks are repaired at least once every seven (7) days. [District Rules 2201 and 4570]
13. Permittee shall implement at least one of the following exercise pen/corral mitigation measures: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 square feet or less and shall slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 square feet per animal; 2) maintain corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface except during periods of rainy weather. [District Rules 2201 and 4570]
14. Permittee shall either 1) maintain sufficient records to demonstrate that pens/corrals are maintained to ensure proper drainage preventing water from standing for more than forty-eight hours or 2) maintain records of dates pens/corrals are groomed (i.e., harrowed, raked, or scraped, etc.). [District Rules 2201 and 4570]
15. All open corrals shall be equipped with shade structures. [District Rules 2201 and 4102]
16. Shade structures shall be installed in any of the following ways: 1) constructed with a light permeable roofing material; 2) uphill of any slope in the corral; 3) installed so that the structure has a North/South orientation. OR Permittee shall clean manure from under corral shades at least once every fourteen (14) days, when weather permits access into the corral. [District Rules 2201 and 4570]
17. If permittee has selected to comply using shades constructed with a light permeable roofing material, then permittee shall maintain records, such as design specifications, demonstrating that the shade structures are equipped with such roofing material or if permittee has selected to comply by cleaning the manure from under the corral shades, then permittee shall maintain records demonstrating that manure is cleaned from under the shades at least once every fourteen (14) days, as long as weather permits access to corrals. [District Rules 2201 and 4570]
18. Calves housed in corrals and heifers shall be fed near (within one hour of) dusk. [District Rule 2201]
19. Permittee shall maintain sufficient records to demonstrate that calves housed in corrals and heifers were fed within one hour of dusk. [District Rule 2201]
20. Permittee shall scrape exercise pen/corral surfaces every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions. [District Rule 2201, 4102 and and 4570]

CONDITIONS CONTINUE ON NEXT PAGE

21. Permittee shall maintain sufficient records to demonstrate that exercise pen/corral surfaces are scraped every two weeks using a pull-type scraper during morning hours, except when prevented by wet conditions. [District Rules 2201 and 4570]

22. 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]

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

24. Permittee shall apply water to exercise pens and corrals using sprinklers or other method approved by the District such that one of the following benchmarks is met: (1) at least 25% of the corral surface is wet or (2) the average surface moisture content of the area is equal to or greater than 16% (wet basis). [District Rules 2201 and 4102]

25. Permittee shall keep records demonstrating that the pen/corral sprinkling benchmarks have been met. [District Rules 2201 and 4102]

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

27. 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]

28. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: S-6032-3-1

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: BARCELLOS FARMS
MAILING ADDRESS: PO BOX 142
TIPTON, CA 93272

LOCATION: 14851 ROAD 168
PORTERVILLE, CA 93257

EQUIPMENT DESCRIPTION:
MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF ONE STORAGE POND: INSTALL 4 WEEPING WALLS AND DESIGNATE EXISTING STORAGE POND AS AN ANAEROBIC TREATMENT LAGOON; ALLOW FOR LAND APPLICATION OF LIQUID MANURE; AND ALLOW AN INCREASE IN THROUGHPUT DUE TO HERD EXPANSION AUTHORIZED BY ATC S-6032-2-1

CONDITIONS

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

CONDITIONS CONTINUE ON NEXT PAGE

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

Seyed Sadredin, Executive Director / APCO

Arnaud Marjollet, Director of Permit Services

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5. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
6. Permittee shall use an anaerobic treatment lagoon designed according to NRCS Guideline No. 359. [District Rules 2201 and 4570]
7. Permittee shall maintain records, such as design specifications, calculations, including Minimum Treatment Volume (MTV), Hydraulic Retention Time (HRT) demonstrating that the anaerobic treatment lagoon meets the requirements listed in the NRCS Field Office Technical Guide Code 359. [District Rules 2201 and 4570]
8. Permittee shall test any other parameters determined necessary by the APCO, ARB, and EPA to demonstrate compliance with rule requirements as frequently as determined necessary by the APCO, ARB, and EPA. [District Rules 2201 and 4570]
9. Permittee shall remove solids with a solid separator system, prior to the manure entering the lagoon. [District Rules 2201, 4102, and 4570]
10. If liquid manure is used to irrigate crops, the liquid manure shall be taken from an uncovered anaerobic treatment lagoon designed to meet Natural Resources Conservation Service (NRCS) standards. A minimum liquid manure depth of 18 feet shall be retained in the lagoon at all times. [District Rules 2201 and 4570]
11. Permittee shall maintain records that only liquid manure treated with an anaerobic treatment lagoon is applied to fields. [District Rules 2201 and 4570]
12. Permittee shall not allow liquid/slurry manure to stand in the fields for more than twenty-four (24) hours after irrigation. [District Rules 2201 and 4570]
13. Permittee shall maintain records to demonstrate liquid manure did not stand in the fields for more than twenty-four (24) hours after irrigation. [District Rules 2201 and 4570]
14. 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]
15. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-6032-4-1

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: BARCELLOS FARMS
MAILING ADDRESS: PO BOX 142
TIPTON, CA 93272

LOCATION: 14851 ROAD 168
PORTERVILLE, CA 93257

EQUIPMENT DESCRIPTION:
MODIFICATION OF SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; SOLID MANURE HAULED OFFSITE: ALLOW LAND APPLICATION THROUGH SOLIDS SPREADING AND ALLOW FOR AN INCREASE IN THROUGHPUT DUE TO HERD EXPANSION AUTHORIZED BY ATC S-6032-2-1

CONDITIONS

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

CONDITIONS CONTINUE ON NEXT PAGE

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

Seyed Sadredin, Executive Director / APCO

DRAFT

Arnaud Marjollet, Director of Permit Services

S-6032-4-1 Nov 7 2016 11:39AM -- LOWELES Joint Inspection NOT Required

5. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
6. Within seventy two (72) hours of removal of solid manure from housing, permittee shall either 1) remove dry manure from the facility, or 2) cover dry manure outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed twenty-four (24) hours per event. [District Rules 2201 and 4570]
7. Permittee shall keep records of dates when manure is removed from the facility or permittee shall maintain records to demonstrate that dry manure piles outside the pens are covered with a weatherproof covering from October through May. [District Rules 2201 and 4570]
8. If weatherproof coverings are used, permittee shall maintain records, such as manufacturer warranties or other documentation, demonstrating that the weatherproof covering over dry manure are installed, used, and maintained in accordance with manufacturer recommendations and applicable standards listed in NRCS Field Office Technical Guide Code 313 or 367, or any other applicable standard approved by the APCO, ARB, and EPA. [District Rules 2201 and 4570]
9. Permittee shall incorporate all solid manure within two (2) hours of land application. [District Rules 2201 and 4570]
10. Permittee shall maintain records to demonstrate that all solid manure has been incorporated within two (2) hours of land application. [District Rules 2201 and 4570]
11. 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]
12. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: S-6032-5-1 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: BARCELLOS FARMS
MAILING ADDRESS: PO BOX 142
TIPTON, CA 93272

LOCATION: 14851 ROAD 168
PORTERVILLE, CA 93257

EQUIPMENT DESCRIPTION:
MODIFICATION OF FEED STORAGE AND HANDLING CONSISTING OF COMMODITY BARNS AND SILAGE PILES: ALLOW FOR INCREASE IN TMR DUE TO HERD EXPANSION AUTHORIZED BY ATC S-6032-2-1

CONDITIONS

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

CONDITIONS CONTINUE ON NEXT PAGE

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

Seyed Sadredin, Executive Director / APCO

Arnaud Marjollet, Director of Permit Services

Southern Regional Office • 34946 Flyover Court • Bakersfield, CA 93308 • (661) 392-5500 • Fax (661) 392-5585

6. 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]
7. 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]
8. Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
9. 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]
10. Permittee shall store grain in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]
11. 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]
12. Permittee shall remove uneaten wet feed from feed bunks within twenty-four (24) hours after the end of a rain event. [District Rules 2201 and 4570]
13. Permittee shall maintain records demonstrating that uneaten wet feed was removed from feed bunks within twenty-four (24) hours after the end of a rain event. [District Rules 2201 and 4570]
14. For bagged silage/feedstuff, permittee shall utilize a sealed feed storage system (e.g., ag bag). [District Rules 2201 and 4570]
15. 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]
16. 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]
17. 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]
18. 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]
19. 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]
20. 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]

CONDITIONS CONTINUE ON NEXT PAGE

21. 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]

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

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

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

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 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]

26. 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]

27. 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]

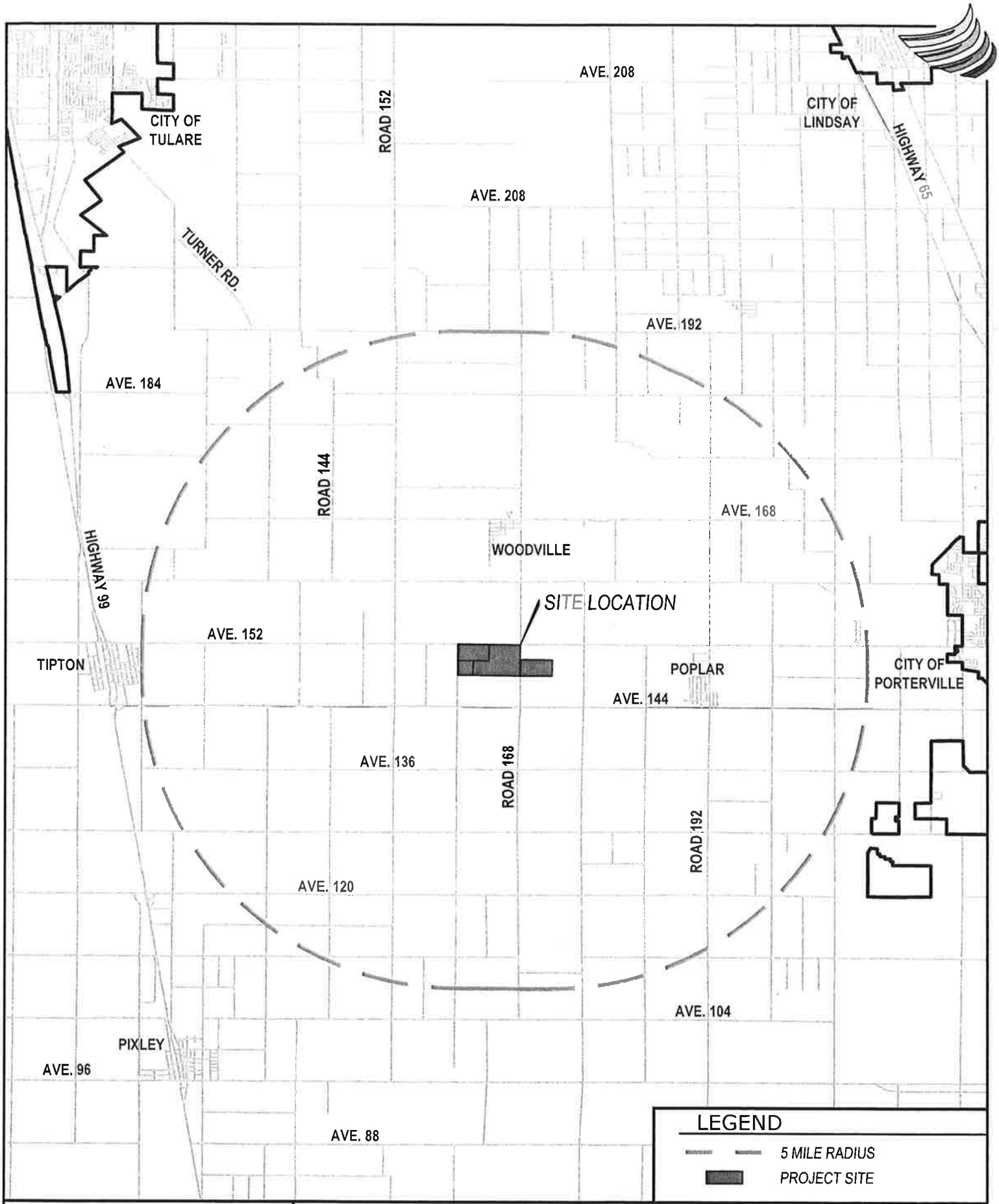
28. For each silage pile that Option 2 (Shaver/Facer or Smooth Face) is chosen as a mitigation measure for managing the pile, the permittee shall maintain records that a shaver/facer was used to remove silage from the pile or shall visually inspect the pile at least daily to verify that the working face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

29. 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]

30. 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]

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

APPENDIX C
Project Site Plans



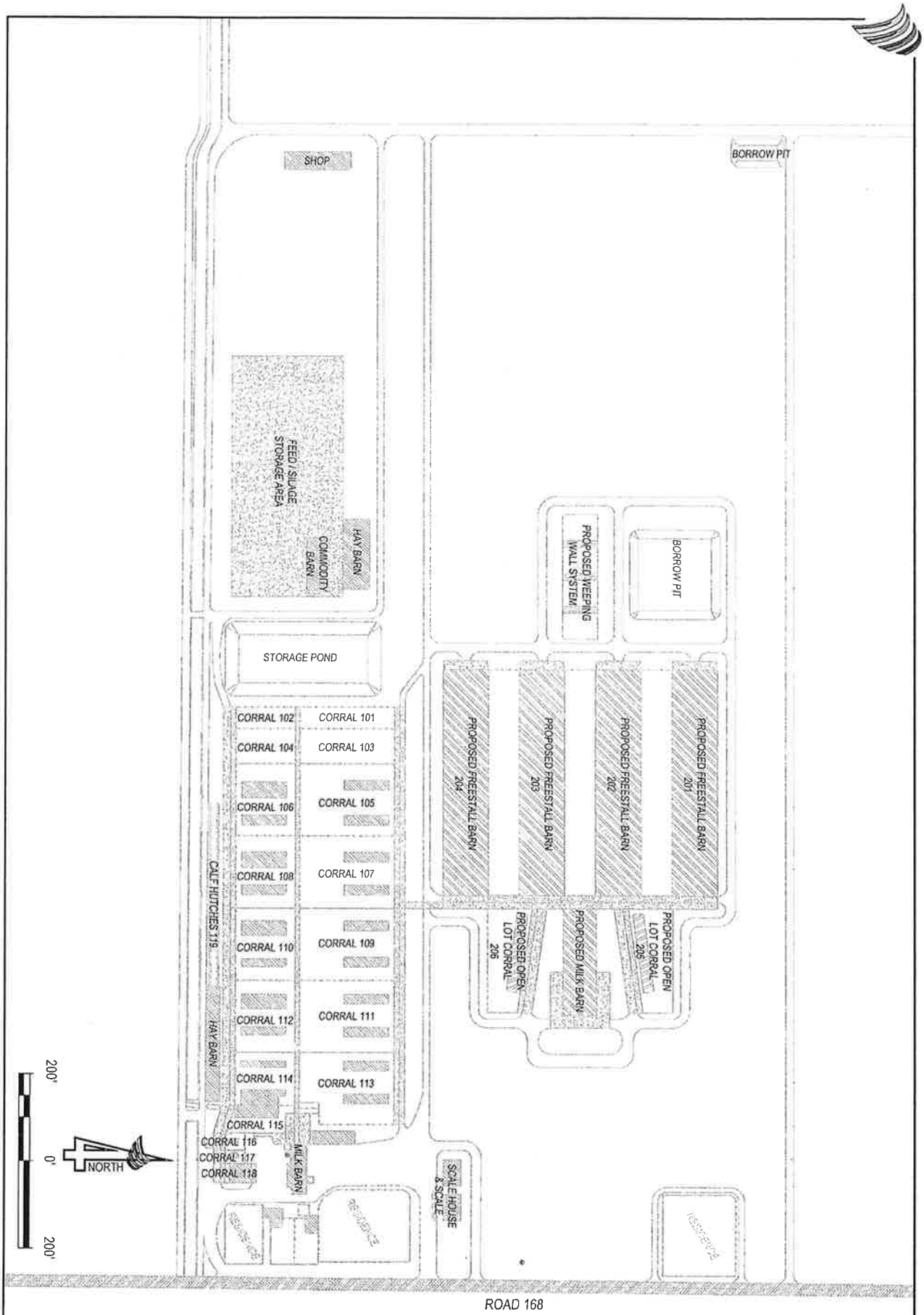
4CREEKS
324 S. SANTA FE, STE. A
VISALIA, CA 93292
(559) 802-3052

VICINITY MAP

T-BAR DAIRY
TULARE COUNTY, CA

NORTH

JOB NO.	15077
	VICINITY MAP
	8/8/2015
	1" = 2 MI.



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324 S. Santa Fe, Ste. A
Visalia, CA 93292
(559) 802-3052
www.4-creeks.com

DETAILED PROJECT SITE PLAN

BARCELLOS FARMS
TULARE COUNTY, CA

JOB NO. 15077
SITE PLAN
11/10/2015
1" = 200'

APPENDIX D
Dairy Emission Factors/Potential to Emit

Rev. November 16, 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? no
3. Does the facility land apply liquid manure? yes
   Answering "yes" assumes worst case.
4. Does the facility land apply solid manure? yes
   Answering "yes" assumes worst case.
5. Is any scraped manure sent to a lagoon? yes
   Answering "yes" assumes worst case.

Pre-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals
Milk Cows			1,045		1,045
Dry Cows			180		180
Support Stock (Heifers, Calves, and Bulls)			150		150
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	325						325

Total Herd Summary	
Total Milk Cows	1,045
Total Mature Cows	1,225
Support Stock (Heifers, Calves, and Bulls)	150
Total Calves	325
Total Dairy Head	1,700

Pre-Project Silage Information

Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	1	16	16
Alfalfa	1	12	12
Wheat	2	16	16

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? 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	1,600		144		1,744
Dry Cows			424		424
Support Stock (Heifers, Calves, and Bulls)				1,750	1,750
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	325					80	405

Total Herd Summary	
Total Milk Cows	1,744
Total Mature Cows	2,168
Support Stock (Heifers, Calves, and Bulls)	1,750
Total Calves	405
Total Dairy Head	4,323

Post-Project Silage Information

Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	1	16	16
Alfalfa	1	12	12
Wheat	2	16	16

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	10%	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%	0%
☑	☑	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.	5%	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	14.50%	14.50%
		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.	0%	0%
☐	☐	(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	10.00%	10.00%
		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.	0%	0%
☐	☑	(D) Have no animals in exercise pens or corrals at any time.	0%	10%
		Total Control Efficiency	10.00%	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	0%	40%
☐	☑	Remove solids from the waste system with a solid separator system, prior to the waste entering the lagoon. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF.	0%	0%
☐	☐	Maintain lagoon pH between 6.5 and 7.5	0%	0%
		Total Control Efficiency	10.00%	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	0%	40%
☑	☑	Allow liquid manure to stand in the fields for no more than 24 hours after irrigation. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF.	0%	0%
☐	☐	Apply liquid/slurry manure via injection with drag hose or similar apparatus	0%	0%
		Total Control Efficiency	10.00%	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%	10%
		Total Control Efficiency	10.00%	19.00%
		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.	39.0%	39.0%
		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.	0%	0%
☑	☑	Remove uneaten wet feed from feed bunks within 24 hrs after then end of a rain event.	10%	10%
☐	☐	**(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.	0%	0%
☑	☑	Feed according to NRC guidelines. Note: If selected for dairies, control efficiency already included in EF.	0%	0%
		Total Control Efficiency	19.00%	19.00%

Ammonia Mitigation Measures and Control Efficiencies

Milking Parlor				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	NH3 Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Milking Parlor Floor Mitigations		
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	28%	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.	50%	50%
		Total Control Efficiency	64%	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.	0.0%	0.0%
		Total Control Efficiency	28.00%	28.00%
		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.	0%	80%
		Total Control Efficiency	28.0%	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	0%	42%
		Total Control Efficiency	28.00%	58.24%

Solid Manure Handling				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	NH3 Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Solid Manure Land Application Mitigations		
☑	☑	Feed according to NRC guidelines	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%

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 All Housing Structure(s)	Maximum Design Capacity of Each Structure	# of Combined Housing Structures 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	open corral	large heifers	30	30	1	☐	☐	☐	FALSE	FALSE	☐	FALSE	☐	FALSE
2	2	open corral	large heifers	50	50	1	☐	☐	☐	☐	☐	☐	FALSE	☐	☐
3	3	open corral	milk cows	100	100	1	TRUE	☐	☐	☐	☐	☐	FALSE	☐	☐
4	4	open corral	milk cows	100	100	1	TRUE	☐	☐	☐	☐	☐	FALSE	☐	☐
5	5	open corral	milk cows	100	100	1	TRUE	☐	☐	☐	☐	☐	FALSE	☐	☐
6	6	open corral	milk cows	100	100	1	TRUE	☐	☐	☐	☐	☐	☐	☐	☐
7	7	open corral	milk cows	100	100	1	TRUE	☐	☐	☐	☐	☐	☐	☐	☐
8	8	open corral	dry cows	30	30	1	FALSE	☐	☐	☐	☐	☐	☐	☐	☐
9	9	open corral	dry cows	50	50	1	FALSE	☐	☐	☐	☐	☐	☐	☐	☐
10	10	open corral	milk cows	100	100	1	TRUE	☐	☐	☐	☐	☐	☐	☐	☐
11	11	open corral	milk cows	100	100	1	TRUE	☐	☐	☐	☐	☐	☐	☐	☐
12	12	open corral	milk cows	100	100	1	TRUE	☐	☐	☐	☐	☐	☐	☐	☐
13	13	open corral	milk cows	100	100	1	TRUE	☐	☐	☐	☐	☐	☐	☐	☐
14	14	open corral	dry cows	100	100	1	TRUE	☐	☐	☐	☐	☐	☐	☐	☐
15	15/hospital	open corral	milk cows	40	40	1	TRUE	☐	☐	☐	☐	☐	☐	☐	☐
16	16	open corral	medium heifers	40	40	1	TRUE	☐	☐	☐	☐	☐	☐	☐	☐
17	17	open corral	medium heifers	30	30	1	TRUE	☐	☐	☐	☐	☐	☐	☐	☐
18	18/maternity	open corral	milk cows	25	25	1	TRUE	☐	☐	☐	☐	☐	☐	☐	☐
19	19	open corral	milk cows	40	40	1	TRUE	☐	☐	☐	☐	☐	☐	☐	☐
20	20	open corral	milk cows	40	40	1	TRUE	☐	☐	☐	☐	☐	☐	☐	☐
21	calf hutches	aboveground flushed hutches	calves	325	325	1	FALSE	☐	☐	☐	☐	☐	☐	☐	☐
22							☐	☐	☐	☐	☐	☐	☐	☐	☐
23							☐	☐	☐	☐	☐	☐	☐	☐	☐
24							☐	☐	☐	☐	☐	☐	☐	☐	☐
25							☐	☐	☐	☐	☐	☐	☐	☐	☐
26							☐	☐	☐	☐	☐	☐	☐	☐	☐
27							☐	☐	☐	☐	☐	☐	☐	☐	☐
28							☐	☐	☐	☐	☐	☐	☐	☐	☐
29							☐	☐	☐	☐	☐	☐	☐	☐	☐
30							☐	☐	☐	☐	☐	☐	☐	☐	☐
31							☐	☐	☐	☐	☐	☐	☐	☐	☐
32							☐	☐	☐	☐	☐	☐	☐	☐	☐
33							☐	☐	☐	☐	☐	☐	☐	☐	☐
34							☐	☐	☐	☐	☐	☐	☐	☐	☐
35							☐	☐	☐	☐	☐	☐	☐	☐	☐
36							☐	☐	☐	☐	☐	☐	☐	☐	☐
37							☐	☐	☐	☐	☐	☐	☐	☐	☐
38							☐	☐	☐	☐	☐	☐	☐	☐	☐
39							☐	☐	☐	☐	☐	☐	☐	☐	☐
40							☐	☐	☐	☐	☐	☐	☐	☐	☐
			Pre-Project Total # of Cows	1,700											

Pre-Project PM10 Control Efficiencies and Emission Factors

	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows in All Housing Structure(s)	Maximum Design Capacity of Each 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	open corral	large heifers	30	30	8.010										8.01
2	2	open corral	large heifers	50	50	8.010										8.01
3	3	open corral	milk cows	100	100	5.460	16.7%									4.55
4	4	open corral	milk cows	100	100	5.460	16.7%									4.55
5	5	open corral	milk cows	100	100	5.460	16.7%									4.55
6	6	open corral	milk cows	100	100	5.460	16.7%									4.55
7	7	open corral	milk cows	100	100	5.460	16.7%									4.55
8	8	open corral	dry cows	30	30	5.460										5.46
9	9	open corral	dry cows	50	50	5.460										5.46
10	10	open corral	milk cows	100	100	5.460	16.7%									4.55
11	11	open corral	milk cows	100	100	5.460	16.7%									4.55
12	12	open corral	milk cows	100	100	5.460	16.7%									4.55
13	13	open corral	milk cows	100	100	5.460	16.7%									4.55
14	14	open corral	dry cows	100	100	5.460	16.7%									4.55
15	15/hospital	open corral	milk cows	40	40	5.460	16.7%									4.55
16	16	open corral	medium heifers	40	40	10.550	8.3%									9.67
17	17	open corral	medium heifers	30	30	10.550	8.3%									9.67
18	18/maternity	open corral	milk cows	25	25	5.460	16.7%									4.55
19	19	open corral	milk cows	40	40	5.460	16.7%									4.55
20	20	open corral	milk cows	40	40	5.460	16.7%									4.55
21	calf hutches	aboveground flushed hutches	calves	325	325	0.069										0.07
22																
23																
24																
25																
26																
27																
28																
29																
30																
31																
32																
33																
34																
35																
36																
37																
38																
39																
40																
			Pre-Project Total # of Cows	1,700												

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 All Housing Structure(s)	Maximum Design Capacity of Each Structure	# of Combined Housing Structures 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	open corral	large heifers	80	80	1	TRUE	☐	FALSE	☐	☐	☐	TRUE	TRUE	TRUE
2	2	open corral	large heifers	110	110	1	TRUE	☐	FALSE	☐	☐	☐	TRUE	TRUE	TRUE
3	3	open corral	large heifers	160	160	1	TRUE	☐	FALSE	☐	☐	☐	TRUE	TRUE	TRUE
4	4	open corral	large heifers	160	160	1	TRUE	☐	FALSE	☐	☐	☐	TRUE	TRUE	TRUE
5	5	open corral	large heifers	160	160	1	TRUE	☐	FALSE	☐	☐	☐	TRUE	TRUE	TRUE
6	6	open corral	dry cows	100	100	1	TRUE	☐	FALSE	☐	☐	☐	TRUE	TRUE	FALSE
7	7	open corral	dry cows	100	100	1	TRUE	☐	FALSE	☐	☐	☐	TRUE	TRUE	FALSE
8	8	open corral	large heifers	80	80	1	TRUE	☐	FALSE	☐	☐	☐	TRUE	TRUE	TRUE
9	9	open corral	medium heifers	110	110	1	TRUE	☐	FALSE	☐	☐	☐	TRUE	TRUE	TRUE
10	10	open corral	medium heifers	160	160	1	TRUE	☐	FALSE	☐	☐	☐	TRUE	TRUE	TRUE
11	11	open corral	medium heifers	160	160	1	TRUE	☐	FALSE	☐	☐	☐	TRUE	TRUE	TRUE
12	12	open corral	medium heifers	160	160	1	TRUE	☐	FALSE	☐	☐	☐	TRUE	TRUE	TRUE
13	13	open corral	medium heifers	160	160	1	TRUE	☐	FALSE	☐	☐	☐	TRUE	TRUE	TRUE
14	14	open corral	small heifers	110	110	1	TRUE	☐	FALSE	☐	☐	☐	TRUE	TRUE	TRUE
15	15/old hospital	open corral	small heifers	60	60	1	TRUE	☐	FALSE	☐	☐	☐	TRUE	TRUE	TRUE
16	16	open corral	small heifers	40	40	1	TRUE	☐	FALSE	☐	☐	FALSE	TRUE	TRUE	TRUE
17	17	open corral	small heifers	40	40	1	TRUE	☐	FALSE	☐	☐	☐	TRUE	TRUE	TRUE
18	18/old maternity	open corral	calves	80	80	1	TRUE	☐	FALSE	☐	☐	☐	TRUE	TRUE	TRUE
19	19	open corral	dry cows	40	40	1	TRUE	☐	FALSE	☐	☐	☐	TRUE	TRUE	FALSE
20	20	open corral	dry cows	40	40	1	TRUE	☐	FALSE	☐	☐	☐	TRUE	TRUE	FALSE
21	calf hutches	aboveground flushed hutches	calves	325	325	1	TRUE	☐	FALSE	☐	☐	☐	☐	☐	FALSE
22							☐	☐	☐	☐	☐	☐	☐	☐	☐
23							☐	☐	☐	FALSE	☐	☐	☐	☐	☐
24							☐	☐	☐	☐	☐	☐	☐	☐	☐
25							☐	☐	☐	FALSE	☐	☐	☐	☐	☐
26							☐	☐	☐	☐	☐	☐	☐	☐	☐
27							☐	☐	☐	☐	☐	☐	☐	☐	☐
28							☐	☐	☐	☐	☐	☐	☐	☐	☐
29							☐	☐	☐	☐	☐	☐	☐	☐	☐
30							☐	☐	☐	FALSE	☐	☐	☐	☐	☐
31							☐	☐	☐	☐	☐	☐	☐	☐	☐
32							☐	☐	☐	☐	☐	☐	☐	☐	☐
33							☐	☐	☐	FALSE	☐	☐	☐	☐	☐
34							☐	☐	☐	☐	☐	☐	☐	☐	☐
35							☐	☐	☐	☐	☐	☐	☐	☐	☐
36							☐	☐	☐	FALSE	☐	☐	☐	☐	☐
37							☐	☐	☐	☐	☐	☐	☐	☐	☐
38							☐	☐	☐	FALSE	☐	☐	☐	☐	☐
39							☐	☐	☐	☐	☐	☐	☐	☐	☐
40							☐	☐	☐	☐	☐	☐	☐	☐	☐

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 All Housing Structure(s)	Maximum Design Capacity of Each Structure	# of Combined Housing Structures 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	freestall1	freestall	milk cows	400	400	1	FALSE	☐	☐	FALSE	TRUE	☐	FALSE	FALSE	☐
2	freestall2	freestall	milk cows	400	400	1	FALSE	☐	☐	FALSE	TRUE	☐	FALSE	FALSE	☐
3	freestall3	freestall	milk cows	400	400	1	FALSE	☐	☐	FALSE	TRUE	☐	FALSE	FALSE	☐
4	freestall4	freestall	milk cows	400	400	1	☐	☐	☐	FALSE	TRUE	☐	FALSE	FALSE	FALSE
5	new maternity	loafing barn	dry cows	144	144	1	FALSE	☐	☐	FALSE	☐	☐	TRUE	TRUE	FALSE
6	new hospital	loafing barn	milk cows	144	144	1	FALSE	☐	☐	FALSE	☐	☐	TRUE	TRUE	FALSE
7							☐	☐	☐	FALSE	☐	☐	☐	☐	☐
8							☐	☐	☐	FALSE	☐	☐	☐	☐	☐
9							☐	☐	☐	FALSE	☐	☐	☐	☐	☐
10							☐	☐	☐	FALSE	☐	☐	☐	☐	☐
11							☐	☐	☐	FALSE	☐	☐	☐	☐	☐
12							☐	☐	☐	FALSE	☐	☐	☐	☐	☐
13							☐	☐	☐	FALSE	☐	☐	☐	☐	☐
14							☐	☐	☐	FALSE	☐	☐	☐	☐	☐
		Post-Project Total # of Cows		4,323		(The post-project total includes		2,435	dairy cows already on-site and		1888	new cows from the expansion.)			

Post-Project PM10 Control Efficiencies and Emission Factors

	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows in All Housing Structure(s)	Maximum Design Capacity of Each 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	open corral	large heifers	80	80	8.010	8.3%						15%	50%	10%	2.81
2	2	open corral	large heifers	110	110	8.010	8.3%						15%	50%	10%	2.81
3	3	open corral	large heifers	160	160	8.010	8.3%						15%	50%	10%	2.81
4	4	open corral	large heifers	160	160	8.010	8.3%						15%	50%	10%	2.81
5	5	open corral	large heifers	160	160	8.010	8.3%						15%	50%	10%	2.81
6	6	open corral	dry cows	100	100	5.460	16.7%						15%	50%		1.93
7	7	open corral	dry cows	100	100	5.460	16.7%						15%	50%		1.93
8	8	open corral	large heifers	80	80	8.010	8.3%						15%	50%	10%	2.81
9	9	open corral	medium heifers	110	110	10.550	8.3%						15%	50%	10%	3.70
10	10	open corral	medium heifers	160	160	10.550	8.3%						15%	50%	10%	3.70
11	11	open corral	medium heifers	160	160	10.550	8.3%						15%	50%	10%	3.70
12	12	open corral	medium heifers	160	160	10.550	8.3%						15%	50%	10%	3.70
13	13	open corral	medium heifers	160	160	10.550	8.3%						15%	50%	10%	3.70
14	14	open corral	small heifers	110	110	10.550	8.3%						15%	50%	10%	3.70
15	15/old hospital	open corral	small heifers	60	60	10.550	8.3%						15%	50%	10%	3.70
16	16	open corral	small heifers	40	40	10.550	8.3%						15%	50%	10%	3.70
17	17	open corral	small heifers	40	40	10.550	8.3%						15%	50%	10%	3.70
18	18/old maternity	open corral	calves	80	80	1.370	8.3%						15%	50%	10%	0.48
19	19	open corral	dry cows	40	40	5.460	16.7%						15%	50%		1.93
20	20	open corral	dry cows	40	40	5.460	16.7%						15%	50%		1.93
21	calf hutches	aboveground flushed hutches	calves	325	325	0.069										0.07
22																
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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 All Housing Structure(s)	Maximum Design Capacity of Each 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	freestall1	freestall	milk cows	400	400	1.370					80%					0.27
2	freestall2	freestall	milk cows	400	400	1.370					80%					0.27
3	freestall3	freestall	milk cows	400	400	1.370					80%					0.27
4	freestall4	freestall	milk cows	400	400	1.370					80%					0.27
5	new maternity	loafing barn	dry cows	144	144	2.730							15%	50%		1.16
6	new hospital	loafing barn	milk cows	144	144	2.730							15%	50%		1.16
7																
8																
9																
10																
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Dairy Emission Factors

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	5.64	5.64	5.40	3.59	3.07	3.07	4.20	2.76	2.36	2.36	2.85	1.88	1.61	1.61	1.50	1.04	0.89	0.89	0.75	0.50	0.43	0.43	2.55	1.67	1.43	1.43
		Bedding	1.05	1.00	0.90	0.90	0.57	0.54	0.49	0.49	0.44	0.42	0.38	0.38	0.30	0.26	0.26	0.26	0.17	0.16	0.14	0.14	0.08	0.08	0.07	0.07	0.27	0.25	0.23	0.23
		Lanes	0.84	0.80	0.72	0.65	0.45	0.44	0.39	0.35	0.35	0.33	0.30	0.27	0.24	0.23	0.21	0.18	0.13	0.13	0.11	0.10	0.06	0.06	0.05	0.05	0.21	0.20	0.18	0.16
		Total	**15.78**	**12.09**	**10.58**	**10.51**	**8.75**	**6.80**	**5.96**	**5.92**	**6.81**	**5.22**	**4.58**	**4.55**	**4.62**	**3.56**	**3.12**	**3.10**	**2.59**	**1.98**	**1.73**	**1.72**	**1.22**	**0.95**	**0.83**	**0.83**	**4.13**	**3.16**	**2.77**	**2.75**
	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	4.54	4.54	3.20	3.20	2.30	2.30	1.70	1.70	1.22	1.22	1.20	1.20	0.86	0.86	0.90	0.90	0.65	0.65	0.30	0.30	0.22	0.22	2.30	2.30	1.66	1.66
		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**	**23.29**	**23.29**	**27.00**	**27.00**	**11.81**	**11.81**	**14.00**	**14.00**	**6.12**	**6.12**	**10.10**	**10.10**	**4.43**	**4.43**	**7.60**	**7.60**	**3.31**	**3.31**	**2.30**	**2.30**	**1.01**	**1.01**	**19.50**	**19.50**	**8.53**	**8.53**
Liquid Manure Handling	VOC	Lagoons/Storage Ponds	1.52	1.30	1.17	0.70	0.82	0.71	0.64	0.38	0.64	0.54	0.49	0.29	0.43	0.37	0.33	0.20	0.24	0.21	0.19	0.11	0.11	0.10	0.09	0.05	0.40	0.33	0.30	0.18
		Liquid Manure Land Application	1.64	1.40	1.26	0.76	0.89	0.76	0.69	0.41	0.69	0.58	0.53	0.32	0.47	0.40	0.36	0.22	0.26	0.22	0.20	0.12	0.12	0.11	0.10	0.06	0.42	0.35	0.32	0.19
		Total	**3.16**	**2.70**	**2.43**	**1.46**	**1.71**	**1.47**	**1.33**	**0.79**	**1.33**	**1.13**	**1.02**	**0.61**	**0.90**	**0.77**	**0.69**	**0.42**	**0.51**	**0.43**	**0.38**	**0.23**	**0.24**	**0.21**	**0.18**	**0.11**	**0.82**	**0.68**	**0.61**	**0.37**
	NH3	Lagoons/Storage Ponds	8.20	8.20	5.90	1.18	4.20	4.20	3.02	0.60	2.20	2.20	1.58	0.32	1.50	1.50	1.08	0.22	1.20	1.20	0.86	0.17	0.35	0.35	0.25	0.05	3.00	3.00	2.16	0.43
		Liquid Manure Land Application	8.90	8.90	6.41	3.72	4.50	4.50	3.24	1.88	2.30	2.30	1.66	0.96	1.70	1.70	1.22	0.71	1.30	1.30	0.94	0.54	0.37	0.37	0.27	0.15	3.23	3.23	2.33	1.35
		Total	**17.10**	**17.10**	**12.31**	**4.90**	**8.70**	**8.70**	**6.26**	**2.48**	**4.50**	**4.50**	**3.24**	**1.28**	**3.20**	**3.20**	**2.30**	**0.93**	**2.50**	**2.50**	**1.80**	**0.72**	**0.72**	**0.72**	**0.52**	**0.20**	**6.23**	**6.23**	**4.49**	**1.78**
Solid Manure Handling	VOC	Solid Manure Storage	0.16	0.15	0.14	0.12	0.09	0.08	0.07	0.07	0.07	0.06	0.06	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.04	0.04	0.04	0.03
		Separated Solids Piles	0.06	0.06	0.05	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**	**0.47**	**0.33**	**0.29**	**0.26**	**0.26**	**0.26**	**0.23**	**0.20**	**0.20**	**0.17**	**0.15**	**0.14**	**0.13**	**0.10**	**0.09**	**0.08**	**0.07**	**0.05**	**0.04**	**0.04**	**0.04**	**0.16**	**0.14**	**0.13**	**0.12**
	NH3	Solid Manure Storage	0.95	0.95	0.95	0.95	0.48	0.48	0.48	0.48	0.25	0.25	0.25	0.25	0.18	0.18	0.18	0.18	0.13	0.13	0.13	0.13	0.04	0.04	0.04	0.04	0.35	0.35	0.35	0.35
		Separated Solids Piles	0.38	0.38	0.38	0.38	0.19	0.19	0.19	0.19	0.10	0.10	0.10	0.10	0.07	0.07	0.07	0.07	0.05	0.05	0.05	0.05	0.02	0.02	0.02	0.02	0.14	0.14	0.14	0.14
		Solid Manure Land Application	2.09	2.09	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	10,575	10,575

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

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

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

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

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	large heifers	30	4.58	6.12	8.01	0.4	137	0.5	184	0.7	240
2	2	large heifers	50	4.58	6.12	8.01	0.6	229	0.8	306	1.1	401
3	3	milk cows	100	10.58	23.29	4.55	2.9	1,058	6.4	2,329	1.2	455
4	4	milk cows	100	10.58	23.29	4.55	2.9	1,058	6.4	2,329	1.2	455
5	5	milk cows	100	10.58	23.29	4.55	2.9	1,058	6.4	2,329	1.2	455
6	6	milk cows	100	10.58	23.29	4.55	2.9	1,058	6.4	2,329	1.2	455
7	7	milk cows	100	10.58	23.29	4.55	2.9	1,058	6.4	2,329	1.2	455
8	8	dry cows	30	5.96	11.81	5.46	0.5	179	1.0	354	0.4	164
9	9	dry cows	50	5.96	11.81	5.46	0.8	298	1.6	590	0.7	273
10	10	milk cows	100	10.58	23.29	4.55	2.9	1,058	6.4	2,329	1.2	455
11	11	milk cows	100	10.58	23.29	4.55	2.9	1,058	6.4	2,329	1.2	455
12	12	milk cows	100	10.58	23.29	4.55	2.9	1,058	6.4	2,329	1.2	455
13	13	milk cows	100	10.58	23.29	4.55	2.9	1,058	6.4	2,329	1.2	455
14	14	dry cows	100	5.96	11.81	4.55	1.6	596	3.2	1,181	1.2	455
15	15/hospital	milk cows	40	10.58	23.29	4.55	1.2	423	2.6	932	0.5	182
16	16	medium heifers	40	3.12	4.43	9.67	0.3	125	0.5	177	1.1	387
17	17	medium heifers	30	3.12	4.43	9.67	0.3	94	0.4	133	0.8	290
18	18/maternity	milk cows	25	10.58	23.29	4.55	0.7	265	1.6	582	0.3	114
19	19	milk cows	40	10.58	23.29	4.55	1.2	423	2.6	932	0.5	182
20	20	milk cows	40	10.58	23.29	4.55	1.2	423	2.6	932	0.5	182
21	calf hutches	calves	325	0.83	1.01	0.07	0.7	270	0.9	328	0.1	22
22												
23												
24												
25												
26												
27												
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39												
40												
	Pre-Project Total # of Cows		1,700				35.6	12,984	75.9	27,592	18.7	6,987

Pre-Project Totals						
Total # of Cows	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
1,700	35.6	12,984	75.9	27,592	18.7	6,987

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	large heifers	80	4.55	6.12	2.81	1.0	364	1.3	490	0.6	225
2	2	large heifers	110	4.55	6.12	2.81	1.4	501	1.8	673	0.8	309
3	3	large heifers	160	4.55	6.12	2.81	2.0	728	2.7	979	1.2	450
4	4	large heifers	160	4.55	6.12	2.81	2.0	728	2.7	979	1.2	450
5	5	large heifers	160	4.55	6.12	2.81	2.0	728	2.7	979	1.2	450
6	6	dry cows	100	5.92	11.81	1.93	1.6	592	3.2	1,181	0.5	193
7	7	dry cows	100	5.92	11.81	1.93	1.6	592	3.2	1,181	0.5	193
8	8	large heifers	80	4.55	6.12	2.81	1.0	364	1.3	490	0.6	225
9	9	medium heifers	110	3.1	4.43	3.70	0.9	341	1.3	487	1.1	407
10	10	medium heifers	160	3.1	4.43	3.70	1.4	496	1.9	708	1.6	592
11	11	medium heifers	160	3.1	4.43	3.70	1.4	496	1.9	708	1.6	592
12	12	medium heifers	160	3.1	4.43	3.70	1.4	496	1.9	708	1.6	592
13	13	medium heifers	160	3.1	4.43	3.70	1.4	496	1.9	708	1.6	592
14	14	small heifers	110	1.72	3.31	3.70	0.5	189	1.0	364	1.1	407
15	15/old hospital	small heifers	60	1.72	3.31	3.70	0.3	103	0.5	199	0.6	222
16	16	small heifers	40	1.72	3.31	3.70	0.2	69	0.4	132	0.4	148
17	17	small heifers	40	1.72	3.31	3.70	0.2	69	0.4	132	0.4	148
18	18/old maternity	calves	80	0.83	1.01	0.48	0.2	66	0.2	81	0.1	38
19	19	dry cows	40	5.92	11.81	1.93	0.6	237	1.3	472	0.2	77
20	20	dry cows	40	5.92	11.81	1.93	0.6	237	1.3	472	0.2	77
21	calf hutches	calves	325	0.83	1.01	0.07	0.7	270	0.9	328	0.1	22
22												
23												
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	Post-Project # of Cows (non-expansion)		2,435				22.4	8,162	33.8	12,451	17.2	6,409

	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	freestall1	milk cows	400	10.51	23.29	0.27	11.5	4,204	25.5	9,317	0.3	110
2	freestall2	milk cows	400	10.51	23.29	0.27	11.5	4,204	25.5	9,317	0.3	110
3	freestall3	milk cows	400	10.51	23.29	0.27	11.5	4,204	25.5	9,317	0.3	110
4	freestall4	milk cows	400	10.51	23.29	0.27	11.5	4,204	25.5	9,317	0.3	110
5	new maternity	dry cows	144	5.92	11.81	1.16	2.3	852	4.7	1,700	0.5	167
6	new hospital	milk cows	144	10.51	23.29	1.16	4.1	1,513	9.2	3,354	0.5	167
7												
8												
9												
10												
11												
12												
13												
14												
	Total # of Cows From Expansion		1,888				52.4	19,181	115.9	42,322	2.2	774

Post-Project Totals						
Total # of Cows	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
4,323	74.8	27,343	149.7	54,773	19.4	7,183

Calculations:

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

Pre-Project Potential to Emit (PE1)

Pre-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals
Milk Cows	0	0	1,045	0	1,045
Dry Cows	0	0	180	0	180
Support Stock (Heifers, Calves and Bulls)	0	0	150	0	150
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	325	0	0	0	0	0	325

Silage Information

Feed Type	Maximum # Open Piles	Maximum Height (ft)	Maximum Width (ft)	Open Face Area (ft^2)
Corn	1	16	16	228
Alfalfa	1	12	12	128
Wheat	2	16	16	456

Milking Parlor

Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	1.1	418	0.4	143

Cow Housing

Cow	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Total	35.6	12,984	75.9	27,592	18.7	6,987

Liquid Manure Handling

Cow	VOC		NH3		H2S*	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	7.0	2,539	35.2	12,864	0.6	206
Dry Cows	0.7	239	3.1	1,127	0.1	26
Support Stock (Heifers, Calves and Bulls)	0.4	153	1.3	486	0.2	55
Large Heifers	0.0	0	0.0	0	0	0
Medium Heifers	0.0	0	0.0	0	0	0
Small Heifers	0.0	0	0.0	0	0	0
Calves	0.2	59	0.5	169	0	2
Bulls	0.0	0	0.0	0	0	0
Total	8.3	2,990	40.1	14,646	0.9	289

Solid Manure Handling

Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	1.4	512	8.1	2,957
Dry Cows	0.1	47	0.7	257
Support Stock (Heifers, Calves and Bulls)	0.1	30	0.3	113
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	13	0.1	39
Bulls	0.0	0	0.0	0
Total	1.6	602	9.2	3,366

Feed Handling and Storage

	Daily PE (lb-VOC/day)	Annual PE (lb-VOC/yr)
Corn Emissions	1.4	519
Alfalfa Emissions	0.2	73
Wheat Emissions	3.6	1,311
TMR	30.3	11,064
Total	35.5	12,967

Calculations for milking parlor:

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

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

Calculations for cow housing:

See detailed calculations under Cow Housing Calculations worksheet.

Calculations for liquid manure and solid manure handling:

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

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

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

Calculations for silage emissions:

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

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

Calculation for TMR emissions:

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

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

Calves are not included in TMR calculation.

Notes

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

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

Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0.0	0.0	0.0	0.0	1.1	0.4	0.0
Cow Housing	0.0	0.0	18.7	0.0	35.6	75.9	0.0
Liquid Manure	0.0	0.0	0.0	0.0	8.3	40.1	0.9
Solid Manure	0.0	0.0	0.0	0.0	1.6	9.2	0.0
Feed Handling	0.0	0.0	0.0	0.0	35.5	0.0	0.0
Total	0.0	0.0	18.7	0.0	82.1	125.6	0.9

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	1,440
Solid Manure	0	0	0	0	0
Feed Handling	0	0	0	0	0
Total	0	0	0	0	1,440

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

Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	418	143	0
Cow Housing	0	0	6,987	0	12,984	27,592	0
Liquid Manure	0	0	0	0	2,990	14,646	289
Solid Manure	0	0	0	0	602	3,366	0
Feed Handling	0	0	0	0	12,967	0	0
Total	0	0	6,987	0	29,961	45,747	289

Post-Project Potential to Emit (PE2)

Post-Project Herd Size							
Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals		
Milk Cows	1,600	0	144	0	1,744		
Dry Cows	0	0	424	0	424		
Support Stock (Heifers, Calves, and Bulls)	0	0	0	1,750	1,750		
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	325	0	0	0	0	80	405

Silage Information				
Feed Type	Maximum # Open Piles	Maximum Height (ft)	Maximum Width (ft)	Open Face Area (ft^2)
Corn	1	16	16	228
Alfalfa	1	12	12	128
Wheat	2	16	16	456

Milking Parlor				
Cow	VOC		NH3	
Milk Cows	lb/day	lb/yr	lb/day	lb/yr
Total	1.9	698	0.7	239

Cow Housing						
	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Total	74.8	27,343	149.7	54,773	19.4	7,183

Liquid Manure Handling						
Cow	VOC		NH3		H2S	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	7.0	2,546	23.4	8,546	0.6	206
Dry Cows	0.9	335	2.9	1,052	0.1	26
Support Stock (Heifers, Calves, and Bulls)	2.9	1,068	6.1	2,240	0.2	55
Large Heifers	0.0	0	0.0	0	0	0
Medium Heifers	0.0	0	0.0	0	0	0
Small Heifers	0.0	0	0.0	0	0	0
Calves	0.1	45	0.2	81	0	2
Bulls	0.0	0	0.0	0	0	0
Total	10.9	3,993	32.6	11,918	0.9	289

Solid Manure Handling				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	2.2	820	13.5	4,936
Dry Cows	0.3	110	1.7	606
Support Stock (Heifers, Calves, and Bulls)	1.0	350	3.6	1,313
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	16	0.1	49
Bulls	0.0	0	0.0	0
Total	3.5	1,296	18.9	6,903

Feed Handling and Storage		
	Daily PE (lb-VOC/day)	Annual PE (lb-VOC/yr)
Corn Emissions	1.4	519
Alfalfa Emissions	0.2	73
Wheat Emissions	3.6	1,311
TMR	86.4	31,526
Total	91.6	33,429

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 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 (EF2) x (0.658 m^2) x (525,600 min/yr) x (2.20E-9 lb/µg)

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

Calves are not included in TMR calculation.

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	1.9	0.7	0.0
Cow Housing	0.0	0.0	19.4	0.0	74.8	149.7	0.0
Liquid Manure	0.0	0.0	0.0	0.0	10.9	32.6	0.9
Solid Manure	0.0	0.0	0.0	0.0	3.5	18.9	0.0
Feed Handling	0.0	0.0	0.0	0.0	91.6	0.0	0.0
Total	0.0	0.0	19.4	0.0	182.7	201.9	0.9

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	1,911
Solid Manure	0	0	0	0	0
Feed Handling	0	0	0	0	0
Total	0	0	0	0	1,911

Total Annual Post-Project Potential to Emit (lb/yr)							
Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	698	239	0
Cow Housing	0	0	7,183	0	27,343	54,773	0
Liquid Manure	0	0	0	0	3,993	11,918	289
Solid Manure	0	0	0	0	1,296	6,903	0
Feed Handling	0	0	0	0	33,429	0	0
Total	0	0	7,183	0	66,759	73,833	289

APPENDIX E
Lagoon Check Calculations

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	350	ft
Width	170	ft
Depth	33	ft
Slope	1	ft

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

Primary Lagoon Volume	**1,445,136 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	1,744	x	17	x	71%	x	68%	=	**6,841**
Dry Cow	424	x	9.2	x	71%	x	68%	=	**900**
Heifer (15 to 24 months)	1,750	x	7.1	x	48%	x	68%	=	**1,938**
Heifer (7 to 14 months)	0	x	4.9	x	48%	x	68%	=	**0**
Heifer (3 to 6 months)	0	x	2.7	x	48%	x	68%	=	**0**
Calf (under 3 months)	405	x	1.0	x	100%	x	68%	=	**132**
Bulls	0	x	9.2	x	48%	x	68%	=	**0**
Total for Dairy									**9,811**

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

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

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

Lagoon Design Check in Accordance with NRCS Guideline #359

Minimum Treatment Volume Calculation

MTV = TVS/VSLR

Where:

MTV = Minimum Treatment Volume (ft^3)

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

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

Minimum Treatment Volume in Primary Lagoon					
Breed: Holstein **Type of Cow**	**Net VS Loading (lb/day)**		**VSLR** (lb/ft3-day)[1]		**MTV (ft^3)**
Milk Cows	6,841	÷	0.011	=	**621,934**
Dry Cow	900	÷	0.011	=	**81,828**
Heifer (15 to 24 months)	1,938	÷	0.011	=	**176,209**
Heifer (7 to 14 months)	0	÷	0.011	=	**0**
Heifer (3 to 6 months)	0	÷	0.011	=	**0**
Calf (under 3 months)	132	÷	0.011	=	**11,966**
Bulls	0	÷	0.011	=	**0**
Total for Dairy					**891,937**

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

Lagoon Design Check in Accordance with NRCS Guideline #359

Sludge Accumulation Volume

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

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

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

SAV = VPL - MTV

Where:

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

SAV =	**VPL**	**-**	**MTV**	
SAV =	**1,445,136**		**891,937 =**	**553,199 (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	1,744	x	2.40	ft^3	=	4,186	ft^3/day
Dry Cows	424	x	1.30	ft^3	=	551	ft^3/day
Heifers (15-24 mo)	1,750	x	0.78	ft^3	=	1,365	ft^3/day
Heifers (7-14 mo)	0	x	0.78	ft^3	=	-	ft^3/day
Heifers (3-6 mo)	0	x	0.30	ft^3	=	-	ft^3/day
Calves	405	x	0.15	ft^3	=	61	ft^3/day
Bulls	0	x	1.30	ft^3	=	-	ft^3/day
Total	4,323					**6,163**	**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	1744 milk cows	x	ft3	+	6,163	ft3		
milk cow * day			7.48 gal			day		
				=	17,820.3	ft3/day		

Formula:

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

HRT:

⇨

891,937 ft3	day	=		=	50.0517458	days
	17,820.3 ft3					

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	350	ft
Width	170	ft
Depth	18	ft
Slope	1	ft

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

Primary Lagoon Volume	**910,296 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

Minimum Treatment Volume Calculation

MTV = TVS/VSLR

Where:

MTV = Minimum Treatment Volume (ft^3)

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

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

Minimum Treatment Volume in Primary Lagoon					
Breed: Holstein **Type of Cow**	**Net VS Loading (lb/day)**		**VSLR** (lb/ft3-day)[1]		**MTV (ft^3)**
Milk Cows	6,841	÷	0.011	=	**621,934**
Dry Cow	900	÷	0.011	=	**81,828**
Heifer (15 to 24 months)	1,938	÷	0.011	=	**176,209**
Heifer (7 to 14 months)	0	÷	0.011	=	**0**
Heifer (3 to 6 months)	0	÷	0.011	=	**0**
Calf (under 3 months)	132	÷	0.011	=	**11,966**
Bulls	0	÷	0.011	=	**0**
Total for Dairy					**891,937**

[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

APPENDIX F
AIPE/BACT Calculations

BACT Applicability

Milking Parlor					
VOC Emissions					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	1.9	1.1	0.40	0.40	0.8
				Total	0.8
NH3 Emissions					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	0.7	0.4	0.14	0.14	0.3
				Total	0.3

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	3.3	3.3	0.70	1.17	1.3
Dry Cows	0.4	0.3	0.38	0.64	0.2
Support Stock (Heifers, Calves, and Bulls)	1.4	0.2	0.29	0.49	1.3
Large Heifers	0.0	0.0	0.29	0.49	0.0
Medium Heifers	0.0	0.0	0.20	0.33	0.0
Small Heifers	0.0	0.0	0.11	0.19	0.0
Calves	0.1	0.1	0.05	0.09	0.0
Bulls	0.0	0.0	0.18	0.30	0.0
BACT triggered for VOC for Lagoon/Storage Ponds				Total	2.9
VOC Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	3.6	3.6	0.76	1.26	1.4
Dry Cows	0.5	0.3	0.41	0.69	0.3
Support Stock (Heifers, Calves, and Bulls)	1.5	0.2	0.32	0.53	1.4
Large Heifers	0.0	0.0	0.32	0.53	0.0
Medium Heifers	0.0	0.0	0.22	0.36	0.0
Small Heifers	0.0	0.0	0.12	0.20	0.0
Calves	0.1	0.1	0.06	0.10	0.0
Bulls	0.0	0.0	0.19	0.32	0.0
BACT triggered for VOC for Liquid Manure Land Application				Total	3.2
NH3 Emissions - Lagoon/Storage Pond(s)					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	5.6	16.9	1.18	5.90	2.2
Dry Cows	0.7	1.5	0.60	3.02	0.4
Support Stock (Heifers, Calves, and Bulls)	1.5	0.7	0.32	1.58	1.4
Large Heifers	0.0	0.0	0.32	1.58	0.0
Medium Heifers	0.0	0.0	0.22	1.08	0.0
Small Heifers	0.0	0.0	0.17	0.86	0.0
Calves	0.1	0.2	0.05	0.25	0.1
Bulls	0.0	0.0	0.43	2.16	0.0
BACT triggered for NH3 for Lagoon/Storage Ponds				Total	4.0
NH3 Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	17.8	18.3	3.72	6.41	7.2
Dry Cows	2.2	1.6	1.88	3.24	1.3
Support Stock (Heifers, Calves, and Bulls)	4.6	0.7	0.96	1.66	4.2
Large Heifers	0.0	0.0	0.96	1.66	0.0
Medium Heifers	0.0	0.0	0.71	1.22	0.0
Small Heifers	0.0	0.0	0.54	0.94	0.0
Calves	0.2	0.2	0.15	0.27	0.1
Bulls	0.0	0.0	1.35	2.33	0.0
BACT triggered for NH3 for Liquid Manure Land Application				Total	12.7
H2S Emissions - Lagoon/Storage Pond(s)					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	0.6	0.6	0.12	0.59	0.5
Dry Cows	0.1	0.1	0.06	0.30	0.1
Support Stock (Heifers, Calves, and Bulls)	0.2	0.2	0.03	0.16	0.2
Large Heifers	0.0	0.0	0.03	0.16	0.0
Medium Heifers	0.0	0.0	0.02	0.11	0.0
Small Heifers	0.0	0.0	0.02	0.09	0.0
Calves	0.0	0.0	0.01	0.03	0.0
Bulls	0.0	0.0	0.04	0.22	0.0
				Total	0.7

Solid Manure Handling					
VOC Emissions - Solid Manure Storage/Separated Solids Piles					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	0.8	0.5	0.18	0.19	0.3
Dry Cows	0.1	0.1	0.10	0.10	0.0
Support Stock (Heifers, Calves, and Bulls)	0.4	0.0	0.10	0.08	0.4
Large Heifers	0.0	0.0	0.07	0.08	0.0
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	0.7
VOC Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	1.4	0.9	0.30	0.30	0.5
Dry Cows	0.2	0.1	0.16	0.16	0.1
Support Stock (Heifers, Calves, and Bulls)	0.6	0.1	0.12	0.12	0.5
Large Heifers	0.0	0.0	0.12	0.12	0.0
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	1.1
NH3 Emissions - Solid Manure Storage/Separated Solids Piles					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	6.4	3.8	1.33	1.33	2.6
Dry Cows	0.8	0.3	0.67	0.67	0.5
Support Stock (Heifers, Calves, and Bulls)	1.7	0.1	0.35	0.35	1.6
Large Heifers	0.0	0.0	0.35	0.35	0.0
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	0.1	0.06	0.06	0.0
Bulls	0.0	0.0	0.49	0.49	0.0
BACT triggered for NH3 for Solid Manure Storage				Total	4.7
NH3 Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	7.2	4.3	1.50	1.50	2.9
Dry Cows	0.9	0.4	0.76	0.76	0.5
Support Stock (Heifers, Calves, and Bulls)	1.9	0.2	0.40	0.40	1.7
Large Heifers	0.0	0.0	0.40	0.40	0.0
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	0.1	0.06	0.06	0.0
Bulls	0.0	0.0	0.55	0.55	0.0
BACT triggered for NH3 for Solid Manure Land Application				Total	5.1

Feed Storage and Handling					
VOC Emissions - Silage					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Corn Silage	1.4	1.4	21,155	21,155	0.0
Alfalfa Silage	0.2	0.2	10,649	10,649	0.0
Wheat Silage	3.6	3.6	26,745	26,745	0.0
				Total	0.0
VOC Emissions - TMR					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
TMR	86.4	30.3	10,575	10,575	56.1
BACT triggered for VOC for TMR				Total	56.1

Cow Housing - VOC Emissions

	Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)	BACT Triggered?
1	1	1.0	0.4	4.55	4.58	0.6	No
2	2	1.4	0.6	4.55	4.58	0.8	No
3	3	2.0	2.9	4.55	10.58	0.8	No
4	4	2.0	2.9	4.55	10.58	0.8	No
5	5	2.0	2.9	4.55	10.58	0.8	No
6	6	1.6	2.9	5.92	10.58	0.0	No
7	7	1.6	2.9	5.92	10.58	0.0	No
8	8	1.0	0.5	4.55	5.96	0.6	No
9	9	0.9	0.8	3.10	5.96	0.5	No
10	10	1.4	2.9	3.10	10.58	0.6	No
11	11	1.4	2.9	3.10	10.58	0.6	No
12	12	1.4	2.9	3.10	10.58	0.6	No
13	13	1.4	2.9	3.10	10.58	0.6	No
14	14	0.5	1.6	1.72	5.96	0.0	No
15	15/old hospital	0.3	1.2	1.72	10.58	0.1	No
16	16	0.2	0.3	1.72	3.12	0.0	No
17	17	0.2	0.3	1.72	3.12	0.0	No
18	18/old maternity	0.2	0.7	0.83	10.58	0.1	No
19	19	0.6	1.2	5.92	10.58	-0.1	No
20	20	0.6	1.2	5.92	10.58	-0.1	No
21	calf hutches	0.7	0.7	0.83	0.83	0.0	No
22							
23							
24							
25							
26							
27							
28							
29							
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37							
38							
39							
40							

New Units from Expansion

	Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)	BACT Triggered?
1	freestall1	11.5	0.0	10.51	0.00	11.5	Yes
2	freestall2	11.5	0.0	10.51	0.00	11.5	Yes
3	freestall3	11.5	0.0	10.51	0.00	11.5	Yes
4	freestall4	11.5	0.0	10.51	0.00	11.5	Yes
5	new maternity	2.3	0.0	5.92	0.00	2.3	Yes
6	new hospital	4.1	0.0	10.51	0.00	4.1	Yes
7							
8							
9							
10							
11							
12							
13							
14							

Cow Housing - NH3 Emissions

Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)	BACT Triggered?
1	1.3	0.5	6.12	6.12	0.8	No
2	1.8	0.8	6.12	6.12	1.0	No
3	2.7	6.4	6.12	23.29	1.0	No
4	2.7	6.4	6.12	23.29	1.0	No
5	2.7	6.4	6.12	23.29	1.0	No
6	3.2	6.4	11.81	23.29	0.0	No
7	3.2	6.4	11.81	23.29	0.0	No
8	1.3	1.0	6.12	11.81	0.8	No
9	1.3	1.6	4.43	11.81	0.7	No
10	1.9	6.4	4.43	23.29	0.7	No
11	1.9	6.4	4.43	23.29	0.7	No
12	1.9	6.4	4.43	23.29	0.7	No
13	1.9	6.4	4.43	23.29	0.7	No
14	1.0	3.2	3.31	11.81	0.1	No
15/old hospital	0.5	2.6	3.31	23.29	0.1	No
16	0.4	0.5	3.31	4.43	0.0	No
17	0.4	0.4	3.31	4.43	0.1	No
18/old maternity	0.2	1.6	1.01	23.29	0.1	No
19	1.3	2.6	11.81	23.29	0.0	No
20	1.3	2.6	11.81	23.29	0.0	No
calf hutches	0.9	0.9	1.01	1.01	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?
freestall1	25.5	0.0	23.29	0.00	25.5	Yes
freestall2	25.5	0.0	23.29	0.00	25.5	Yes
freestall3	25.5	0.0	23.29	0.00	25.5	Yes
freestall4	25.5	0.0	23.29	0.00	25.5	Yes
new maternity	4.7	0.0	11.81	0.00	4.7	Yes
new hospital	9.2	0.0	23.29	0.00	9.2	Yes

*Multiple 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	0.6	0.7	2.81	8.01	0.4	No
2	2	0.8	1.1	2.81	8.01	0.4	No
3	3	1.2	1.2	2.81	4.55	0.5	No
4	4	1.2	1.2	2.81	4.55	0.5	No
5	5	1.2	1.2	2.81	4.55	0.5	No
6	6	0.5	1.2	1.93	4.55	0.0	No
7	7	0.5	1.2	1.93	4.55	0.0	No
8	8	0.6	0.4	2.81	5.46	0.4	No
9	9	1.1	0.7	3.70	5.46	0.6	No
10	10	1.6	1.2	3.70	4.55	0.6	No
11	11	1.6	1.2	3.70	4.55	0.6	No
12	12	1.6	1.2	3.70	4.55	0.6	No
13	13	1.6	1.2	3.70	4.55	0.6	No
14	14	1.1	1.2	3.70	4.55	0.1	No
15	15/old hospital	0.6	0.5	3.70	4.55	0.2	No
16	16	0.4	1.1	3.70	9.67	0.0	No
17	17	0.4	0.8	3.70	9.67	0.1	No
18	18/old maternity	0.1	0.3	0.48	4.55	0.1	No
19	19	0.2	0.5	1.93	4.55	0.0	No
20	20	0.2	0.5	1.93	4.55	0.0	No
21	calf hutches	0.1	0.1	0.07	0.07	0.0	No
22						#VALUE!	
23						#VALUE!	
24						#VALUE!	
25						#VALUE!	
26						#VALUE!	
27						#VALUE!	
28						#VALUE!	
29						#VALUE!	
30						#VALUE!	
31						#VALUE!	
32						#VALUE!	
33						#VALUE!	
34						#VALUE!	
35						#VALUE!	
36						#VALUE!	
37						#VALUE!	
38						#VALUE!	
39						#VALUE!	
40						#VALUE!	

New Units from Expansion

	Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)	BACT Triggered?
1	freestall1	0.3	0.0	0.27	0.00	0.3	No
2	freestall2	0.3	0.0	0.27	0.00	0.3	No
3	freestall3	0.3	0.0	0.27	0.00	0.3	No
4	freestall4	0.3	0.0	0.27	0.00	0.3	No
5	new maternity	0.5	0.0	1.16	0.00	0.5	No
6	new hospital	0.5	0.0	1.16	0.00	0.5	No
7							
8							
9							
10							
11							
12							
13							
14							

*Multiple 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.

Increase in Emissions

SSIPE (lb/yr)							
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	280	96	0
Cow Housing	0	0	196	0	14,359	27,181	0
Liquid Manure	0	0	0	0	1,003	-2,728	0
Solid Manure	0	0	0	0	694	3,537	0
Feed Handling	0	0	0	0	20,462	0	0
Total	**0**	**0**	**196**	**0**	**36,798**	**28,086**	**0**

Total Daily Change in Emissions (lb/day)							
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0.0	0.0	0.0	0.0	0.8	0.3	0.0
Cow Housing	0.0	0.0	0.7	0.0	39.2	73.8	0.0
Liquid Manure	0.0	0.0	0.0	0.0	2.6	-7.5	0.0
Solid Manure	0.0	0.0	0.0	0.0	1.9	9.7	0.0
Feed Handling	0.0	0.0	0.0	0.0	56.1	0.0	0.0
Total	**0.0**	**0.0**	**0.7**	**0.0**	**100.6**	**76.3**	**0.0**

Total Annual Change in Non-Fugitive Emissions (Major Source Emissions) (lb/yr)							
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	0	0	0
Cow Housing	0	0	0	0	0	0	0
Liquid Manure	0	0	0	0	471	0	0
Solid Manure	0	0	0	0	0	0	0
Feed Handling	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**471**	**0**	**0**

APPENDIX G
CO2e/GHG Calculations

Uncontrolled GHG Emission Factors (lbs/hd-yr)						
Animal Type	CH4 (Anaerobic Treatment Lagoon)	CH4 (Lagoon)	CH4 (Manure Spreading)	CH4 (Solid Manure Storage)	CH4 (Enteric)	CO2 Equivalent Multiplier for CH4
Milk Cows	513	307.8	3.5	27.7	271.5	21
Dry Cows	513	307.8	3.5	27.7	271.5	21
Support Stock*	110.4	110.4	1.6	--	151.6	21
Large Heifers	110.4	110.4	1.6	--	151.6	21
Medium Heifers	110.4	110.4	1.6	--	100.5	21
Small Heifers	110.4	110.4	1.6	--	100.5	21
Calves	--	--	--	--	--	--
Bulls*	110.4	110.4	1.6	--	151.6	21

Uncontrolled GHG Emission Factors (lbs/hd-yr)					
Animal Type	N2O (Anaerobic Treatment Lagoon)	N2O (Manure Spreading)	N2O (Solid Manure Storage)	N2O (Enteric)	CO2 Equivalent Multiplier for N2O
Milk Cows	1.5	0	2.6	0	310
Dry Cows	1.5	0	2.6	0	310
Support Stock*	1.4	0	--	0	310
Large Heifers	1.4	0	--	0	310
Medium Heifers	1.4	0	--	0	310
Small Heifers	1.4	0	--	0	310
Calves	--	0	--	0	--
Bulls*	1.4	0	--	0	310

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

1 short ton = 0.9072 metric ton

CO2e from CH4 = [CH4 (anaerobic treatment) lagoon + CH4 manure spreading + CH4 solid manure storage + CH4 enteric] x 21 x 0.9072 metric tons/short tons ÷ 2000 lb/ton

CO2e from N2O= [N2O anearobic treatment lagoon + N2O manure spreading + N2O solid manure storage + N2O enteric] x 310 x 0.9072 metric tons/short tons ÷ 2000 lb/ton

Pre-Project CO2e Emissions

Pre-Project Lagoon CO2e Emissions from CH4 (metric tons/yr)				
Animal Type	Number of Cows	CH4 Lagoons (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (metric tons/yr)
Milk Cows	1,045	307.8	21.0	3,064
Dry Cows	180	307.8	21.0	526
Support Stock	150	110.4	21.0	158
Large Heifers	0	110.4	21.0	0
Medium Heifers	0	110.4	21.0	0
Small Heifers	0	110.4	21.0	0
Calves	325	--	--	0
Bulls	0	110.4	21.0	0

Pre-Project Non-Lagoons CO2e Emissions from CH4 (metric tons/yr)						
Animal Type	Number of Cows	CH4 Manure Spreading (lbs/hd-yr)	CH4 Solid Manure Storage (lbs/hd-yr)	CH4 Enteric (lbs/hd-yr)	Multiplier	CO2e Non-Lagoons (metric tons/yr)
Milk Cows	1,045	3.5	27.7	271.5	21.0	3,013
Dry Cows	180	3.5	27.7	271.5	21.0	519
Support Stock	150	1.6	--	151.6	21.0	219
Large Heifers	0	1.6	--	151.6	21.0	0
Medium Heifers	0	1.6	--	100.5	21.0	0
Small Heifers	0	1.6	--	100.5	21.0	0
Calves	325	--	--	--	--	0
Bulls	0	1.6	--	151.6	21.0	0

Pre-Project Lagoon CO2e Emissions from N2O (metric tons/yr)				
Animal Type	Number of Cows	N2O Lagoons (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (metric tons/yr)
Milk Cows	1,045	0.0	310.0	0
Dry Cows	180	0.0	310.0	0
Support Stock	150	0.0	310.0	0
Large Heifers	0	0.0	310.0	0
Medium Heifers	0	0.0	310.0	0
Small Heifers	0	0.0	310.0	0
Calves	325	0.0	--	0
Bulls	0	0.0	310.0	0

Pre-Project Non-Lagoons CO2e Emissions from N2O (metric tons/yr)						
Animal Type	Number of Cows	N2O Manure Spreading (lbs/hd-yr)	N2O Solid Manure Storage (lbs/hd-yr)	N2O Enteric (lbs/hd-yr)	Multiplier	CO2e Non-Lagoons (metric tons/yr)
Milk Cows	1,045	0.0	2.6	0.0	310.0	382
Dry Cows	180	0.0	2.6	0.0	310.0	66
Support Stock	150	0.0	--	0.0	310.0	0
Large Heifers	0	0.0	--	0.0	310.0	0
Medium Heifers	0	0.0	--	0.0	310.0	0
Small Heifers	0	0.0	--	0.0	310.0	0
Calves	325	0.0	--	0.0	--	0
Bulls	0	0.0	--	0.0	310.0	0

Total Pre-Project CO2e Emissions (metric tons/yr)			
Animal Type	CO2e from CH4	CO2e from N2O	Total
Milk Cows	6,077	382	6,459
Dry Cows	1,047	66	1,113
Support Stock	377	0	377
Large Heifers	0	0	0
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	7,949

Post-Project CO2e Emissions

Post-Project Lagoon CO2e Emissions from CH4 (metric tons/yr)				
Animal Type	Number of Cows	CH4 Lagoons (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (metric tons/yr)
Milk Cows	1,744	513.0	21.0	8,522
Dry Cows	424	513.0	21.0	2,072
Support Stock	1,750	110.4	21.0	1,840
Large Heifers	0	110.4	21.0	0
Medium Heifers	0	110.4	21.0	0
Small Heifers	0	110.4	21.0	0
Calves	405	--	--	0
Bulls	0	110.4	21.0	0

Post-Project Non-Lagoons CO2e Emissions from CH4 (metric tons/yr)						
Animal Type	Number of Cows	CH4 Manure Spreading (lbs/hd-yr)	CH4 Solid Manure Storage (lbs/hd-yr)	CH4 Enteric (lbs/hd-yr)	Multiplier	CO2e Non-Lagoons (metric tons/yr)
Milk Cows	1,744	3.5	27.7	271.5	21.0	5,029
Dry Cows	424	3.5	27.7	271.5	21.0	1,223
Support Stock	1,750	1.6	--	151.6	21.0	2,554
Large Heifers	0	1.6	--	151.6	21.0	0
Medium Heifers	0	1.6	--	100.5	21.0	0
Small Heifers	0	1.6	--	100.5	21.0	0
Calves	405	--	--	--	--	0
Bulls	0	1.6	--	151.6	21.0	0

Post-Project Lagoon CO2e Emissions from N2O (metric tons/yr)				
Animal Type	Number of Cows	N2O Lagoons (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (metric tons/yr)
Milk Cows	1,744	1.5	310.0	368
Dry Cows	424	1.5	310.0	89
Support Stock	1,750	1.4	310.0	345
Large Heifers	0	1.4	310.0	0
Medium Heifers	0	1.4	310.0	0
Small Heifers	0	1.4	310.0	0
Calves	405	--	--	0
Bulls	0	1.4	310.0	0

Post-Project Non-Lagoons CO2e Emissions from N2O (metric tons/yr)						
Animal Type	Number of Cows	N2O Manure Spreading (lbs/hd-yr)	N2O Solid Manure Storage (lbs/hd-yr)	N2O Enteric (lbs/hd-yr)	Multiplier	CO2e Non-Lagoons (metric tons/yr)
Milk Cows	1,744	0.0	2.6	0.0	310.0	638
Dry Cows	424	0.0	2.6	0.0	310.0	155
Support Stock	1,750	0.0	--	0.0	310.0	0
Large Heifers	0	0.0	--	0.0	310.0	0
Medium Heifers	0	0.0	--	0.0	310.0	0
Small Heifers	0	0.0	--	0.0	310.0	0
Calves	405	0.0	--	0.0	--	0
Bulls	0	0.0	--	0.0	310.0	0

Total Post-Project CO2e Emissions (metric tons/yr)			
Animal Type	CO2e from CH4	CO2e from N2O	Total
Milk Cows	13,551	1,005	14,556
Dry Cows	3,294	244	3,539
Support Stock	4,394	345	4,739
Large Heifers	0	0	0
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	22,834

Change in CO2e Emissions

Change in Project GHG Emissions			
Animal Type	Pre-Project CO2e (metric tons/yr)	Post-Project CO2e (metric tons/yr)	Change (metric tons/yr)
Milk Cows	6,459	14,556	8,097
Dry Cows	1,113	3,539	2,426
Support Stock	377	4,739	4,362
Large Heifers	0	0	0
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	14,886

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

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

Notes:

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

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

Calculations:

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

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

Pre-Project CO2e Emissions

Pre-Project Lagoon CO2e Emissions from CH4 (short tons/yr)				
Animal Type	Number of Cows with Manure Flushed to Lagoon	EF CH4 Lagoons (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (short tons/yr)
Milk Cows	1045	307.8	21	3,377
Dry Cows	180	307.8	21	582
Support Stock	150	110.4	21	174
Large Heifers	0	110.4	21	0
Medium Heifers	0	110.4	21	0
Small Heifers	0	110.4	21	0
Calves	325	--	--	0
Bulls	0	110.4	21	0

Pre-Project Non-Lagoons CO2e Emissions from CH4 (short tons/yr)						
Animal Type	Number of Cows	EF CH4 Manure Spreading (lb/hd-yr)	EF CH4 Solid Manure Storage (lb/hd-yr)	EF CH4 Enteric (lb/hd-yr)	CO2e Multiplier	CO2e Non-Lagoons (short tons/yr)
Milk Cows	1,045	0.0	0.0	0.0	21	0
Dry Cows	180	0.0	0.0	0.0	21	0
Support Stock	150	0.0	--	0.0	21	0
Large Heifers	0	0.0	--	0.0	21	0
Medium Heifers	0	0.0	--	0.0	21	0
Small Heifers	0	0.0	--	0.0	21	0
Calves	325	--	--	--	--	0
Bulls	0	0.0	--	0.0	21	0

Pre-Project Lagoon CO2e Emissions from N2O (short tons/yr)				
Animal Type	Number of Cows	EF N2O Anaerobic Treatment Lagoon (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (short tons/yr)
Milk Cows	1045	0.0	310	0
Dry Cows	180	0.0	310	0
Support Stock	150	0.0	310	0
Large Heifers	0	0.0	310	0
Medium Heifers	0	0.0	310	0
Small Heifers	0	0.0	310	0
Calves	325	0.0	--	0
Bulls	0	0.0	310	0

Pre-Project Non-Lagoons CO2e Emissions from N2O (short tons/yr)						
Animal Type	Number of Cows	EF N2O Manure Spreading (lb/hd-yr)	EF N2O Solid Manure Storage (lb/hd-yr)	N2O Enteric (lb/hd-yr)	CO2e Multiplier	CO2e Non-Lagoons (short tons/yr)
Milk Cows	1,045	0.0	0.0	0.0	310	0
Dry Cows	180	0.0	0.0	0.0	310	0
Support Stock	150	0.0	--	0.0	310	0
Large Heifers	0	0.0	--	0.0	310	0
Medium Heifers	0	0.0	--	0.0	310	0
Small Heifers	0	0.0	--	0.0	310	0
Calves	325	0.0	--	0.0	--	0
Bulls	0	0.0	--	0.0	310	0

Total Pre-Project CO2e Emissions (short tons/yr)			
Animal Type	CO2e from CH4	CO2e from N2O	Total
Milk Cows	3,377	0	3,377
Dry Cows	582	0	582
Support Stock	174	0	174
Large Heifers	0	0	0
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	4,133

Post-Project CO2e Emissions

Post-Project Lagoon CO2e Emissions from CH4 (short tons/yr)				
Animal Type	Number of Cows with Manure Flushed to Lagoon	EF CH4 Anaerobic Treatment Lagoon (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (short tons/yr)
Milk Cows	1744	513.0	21	9,394
Dry Cows	424	513.0	21	2,284
Support Stock	1750	110.4	21	2,029
Large Heifers	0	110.4	21	0
Medium Heifers	0	110.4	21	0
Small Heifers	0	110.4	21	0
Calves	405	--	--	0
Bulls	0	110.4	21	0

Post-Project Non-Lagoons CO2e Emissions from CH4 (short tons/yr)						
Animal Type	Number of Cows	EF CH4 Manure Spreading (lb/hd-yr)	EF CH4 Solid Manure Storage (lb/hd-yr)	EF CH4 Enteric (lb/hd-yr)	CO2e Multiplier	CO2e Non-Lagoons (short tons/yr)
Milk Cows	1,744	0.0	0.0	0.0	21	0
Dry Cows	424	0.0	0.0	0.0	21	0
Support Stock	1,750	0.0	--	0.0	21	0
Large Heifers	0	0.0	--	0.0	21	0
Medium Heifers	0	0.0	--	0.0	21	0
Small Heifers	0	0.0	--	0.0	21	0
Calves	405	--	--	--	--	0
Bulls	0	0.0	--	0.0	21	0

Post-Project Lagoon CO2e Emissions from N2O (metric tons/yr)				
Animal Type	Number of Cows	EF N2O Anaerobic Treatment Lagoon (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (metric tons/yr)
Milk Cows	1744	1.5	310	405
Dry Cows	424	1.5	310	99
Support Stock	1750	1.4	310	380
Large Heifers	0	1.4	310	0
Medium Heifers	0	1.4	310	0
Small Heifers	0	1.4	310	0
Calves	405	--	--	0
Bulls	0	1.4	310	0

Post-Project Non-Lagoons CO2e Emissions from N2O (short tons/yr)						
Animal Type	Number of Cows	EF N2O Manure Spreading (lb/hd-yr)	EF N2O Solid Manure Storage (lb/hd-yr)	EF N2O Enteric (lb/hd-yr)	CO2e Multiplier	CO2e Non-Lagoons (short tons/yr)
Milk Cows	1,744	0.0	0.0	0.0	310	0
Dry Cows	424	0.0	0.0	0.0	310	0
Support Stock	1,750	0.0	--	0.0	310	0
Large Heifers	0	0.0	--	0.0	310	0
Medium Heifers	0	0.0	--	0.0	310	0
Small Heifers	0	0.0	--	0.0	310	0
Calves	405	0.0	--	0.0	--	0
Bulls	0	0.0	--	0.0	310	0

Total Post-Project CO2e Emissions (short tons/yr)			
Animal Type	CO2e from CH4	CO2e from N2O	Total
Milk Cows	9,394	405	9,800
Dry Cows	2,284	99	2,382
Support Stock	2,029	380	2,408
Large Heifers	0	0	0
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	14,590

Change in CO2e Emissions

Change in Project GHG Emissions			
Animal Type	Pre-Project CO2e (short tons/yr)	Post-Project CO2e (short tons/yr)	Change (short tons/yr)
Milk Cows	3,377	9,800	6,422
Dry Cows	582	2,382	1,801
Support Stock	174	2,408	2,234
Large Heifers	0	0	0
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	10,457

APPENDIX H
BACT Guidelines

San Joaquin Valley Unified Air Pollution Control District

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

Last Update: December 18, 2013

Cow Housing – Freestall Barns	
Pollutant	**Control Technology/Mitigation Technique**
VOC	- Concrete feed lanes and walkways; - Flushing the feed lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing feed lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, Scraping feed lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning feed 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 - District Rule 4570 Mitigation Measures **(all required)**
PM_{10}	- Concrete feed lanes and walkways; - Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions **(all required)**
NH_3	- Concrete feed lanes and walkways; - Flushing the feed lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing feed lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, Scraping feed lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning feed 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 **(all required)**

Cow Housing – Open Corrals

Pollutant	Control Technology/Mitigation Technique
VOC	- Concrete feed lanes and walkways; - Flushing the feed lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing feed lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, Scraping feed lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning feed 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 - District Rule 4570 Mitigation Measures **(all required)**
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 within 1 hour of dusk; and - Windbreaks controlling dust from corrals (when feasible and there is adequate space at existing facilities); *Windbreaks/shelterbelts must meet the USDA National Research Conservation Services (NRCS) Conservation Practice Standard: Windbreaks/Shelterbelt Establishment -Code 380* **(all required)**
NH_3	- Concrete feed lanes and walkways; - Flushing the feed lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing feed lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, Scraping feed lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning feed 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 **(all required)**

Liquid Manure Management

Pollutant	Control Technology/Mitigation Technique
VOC	Anaerobic treatment lagoon designed according to Natural Resources Conservation Service (NRCS) guideline, and solids removal/separation system (mechanical separator(s) or settling basin(s)/weeping wall(s)) **(required)**
	Aerobic treatment lagoon or mechanically aerated lagoon *(technologically feasible)*
	Covered lagoon digester vented to a control device with minimum 95% control *(technologically feasible)*
NH_3	All animals fed in accordance with NRCS or other District-approved guidelines **(required)**
H_2S	All animals fed in accordance with NRCS or other District-approved guidelines, and solids removal/separation system (mechanical separator(s) or settling basin(s)/weeping wall(s)) **(required)**

Land Application of Liquid/Slurry Manure

Pollutant	Control Technology/Mitigation Technique
VOC	Irrigation of crops using liquid/slurry manure from a secondary lagoon/ holding/storage pond where preceded by an uncovered anaerobic treatment lagoon designed to meet Natural Resources Conservation Service (NRCS) standards **(required)**
	Irrigation of crops using liquid manure from an aerobic treatment lagoon or mechanically aerated lagoon *(technologically feasible)*
	Irrigation of crops using liquid manure from a holding/storage pond after being treated in a covered lagoon/digester *(technologically feasible)*
NH_3	All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines **(required)**

Solid Manure Management

Pollutant	Control Technology/Mitigation Technique
NH_3	All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines **(required)**

Land Application of Solid Manure	
Pollutant	**Control Technology/Mitigation Technique**
VOC	Solid manure incorporated into the soil within two hours of land application **(required)**
	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 *(technologically feasible)*
	Land Application of Solid Manure Processed by In-Vessel/Enclosed Negatively-Aerated Static Piles vented to biofilter ≥ 80% destruction efficiency *(technologically feasible)*
	Land Application of Solid Manure Processed by Open Negatively-Aerated Static Piles vented to biofilter ≥ 80% destruction efficiency *(technologically feasible)*
	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 *(technologically feasible)*
NH_3	Solid manure incorporated into the soil within two hours of land application, and all animals fed in accordance with National Research Council (NRC) or other District-approved guidelines **(required)**

Feed Storage and Handling – Feed/TMR	
Pollutant	**Control Technology/Mitigation Technique**
VOC	Implement District Rule 4570 management practices for feed **(required)**

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 I
Top-Down BACT Analysis

Top Down BACT Analysis for Freestalls

1. BACT Analysis for VOC Emissions from New Freestalls 1, 2, 3, and 4

Step 1 - Identify all control technologies

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

Feed and Manure Management Practices

- Concrete feed lanes and walkways
- Scraping feed lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and scraping feed lanes and walkways for support stock (heifers) at least once per day;
- All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines
- Properly sloping corrals (i.e. exercise pens) (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 exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions; and
- VOC mitigation measures required by District Rule 4570

Concrete feed lanes and walkways

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

Frequent cleaning of feed lanes and walkways

Many dairy operations use a flush system to remove manure from the freestall barn feed lanes and walkways, however the facility is proposing to use an automated scraping system for the freestalls. The lanes for milk and dry cows will be scraped four times per day.

In addition to cleaning the feed lanes and walkways, the automated scraping system also serves as an emission control for reducing VOC emissions. The manure deposited in the lanes, which is a source of VOC emissions, is removed

from the cow housing area by the scraper and deposited in the weeping wall separator. VOCs are then drained into the lagoon for treatment.

It must be noted that the system for cleaning the lanes and walkways will only control the VOCs emitted from the manure; it will have little or no effect on enteric emissions produced from the cows' digestive processes. As stated above, the feed lanes and walkways in the cow housing areas are typically cleaned four times per day. Cleaning the lanes four times per day as opposed to one or two times increases the frequency that manure is removed from the cow housing permit unit. Although the control efficiency for VOCs 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 until better data becomes available.

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

Nutritional management of dairy feed is routinely practiced to improve milk production and herd health. The potential for VOC emissions can be reduced by reducing the quantity of undigested nutrients in the manure. Many of the VOCs emitted from Confined Animal Facilities, including dairies, originate from the decomposition of undigested protein in animal waste.[9] This undigested protein also produces ammonia and hydrogen sulfide 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 VOCs, ammonia, and hydrogen sulfide.

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

Based on very limited data (Klaunser, 1998, *J Prod Agric),* diet manipulation decreased nitrogen excretion by 34% while improving milk production. Up to 70% of excess nitrogen is lost off of the farm through volatilization, denitrification and leaching. Because of limited research, feeding dairy animals in accordance with National Research Council (NRC) or other District-approved guidelines will be assumed to have a conservative control efficiency of only 5-10% for both enteric VOC emissions from dairy animals and VOC emissions from manure.

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

Properly sloping exercise pens/corrals

Accumulation of water on exercise pen/corral surfaces, due to rain or on-farm activities, could result in anaerobic conditions and thereby increase emissions. Keeping exercise pen/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.

Scraping of exercise pens/corrals with a pull-type scraper

Frequent scraping the freestall exercise pens/corrals will reduce the amount of manure on the pen/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 pen/corral surface, which will reduce gaseous pollutants from this area.

Step 2 - Eliminate technologically infeasible options

There are no technologically infeasible options to eliminate.

Step 3 - Rank remaining options by control effectiveness

Feed and Manure Management Practices

- Concrete feed lanes and walkways
- Scraping feed lanes and walkways for mature cows at least four times per day and scraping feed lanes and walkways for support stock at least once per day;
- All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines
- Properly sloping corrals (i.e. exercise pens) (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 exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions; and
- VOC mitigation measures required by District Rule 4570

Step 4 - Cost Effectiveness Analysis

The applicant has proposed the feed and manure management practices listed in Step 3; therefore a cost effectiveness analysis is not required.

Step 5 - Select BACT

BACT for VOC emissions from the new freestalls is the following feed and manure management practices:

1) Concrete feed lanes and walkways;
2) Scraping feed lanes and walkways for mature cows at least four times per day and scraping feed lanes and walkways for support stock at least once per day;
3) All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines;
4) Properly sloping corrals (i.e. exercise pens) (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;
5) Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions; and
6) VOC mitigation measures required by District Rule 4570

The facility proposes to implement the above measures; therefore BACT is satisfied.

2. BACT Analysis for PM_{10} Emissions from New Freestalls 1, 2, 3, and 4:

Step 1 - Identify all control technologies

The following options were identified as possible controls for PM10 emissions from freestalls:

Feed and Manure Management Practices

- Concrete feed lanes and walkways
- Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions

Concrete feed lanes and walkways

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

Scraping of exercise pens/corrals with a pull-type scraper

Frequent scraping the freestall exercise pens/corrals will reduce the amount of manure on the pen/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 pen/corral surface, which will reduce gaseous pollutants from this area.

Step 2 - Eliminate technologically infeasible options

There are no technologically infeasible options to eliminate.

Step 3 - Rank remaining options by control effectiveness

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

Feed and Manure Management Practices

- Concrete feed lanes and walkways
- Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions

Step 4 - Cost Effectiveness Analysis

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

Step 5 - Select BACT

BACT for PM_{10} emissions from the proposed new freestall barns is the following feed and manure management practices:

1) Concrete feed lanes and walkways; and
2) Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions

The facility proposes to implement the above measures; therefore BACT is satisfied.

3. BACT Analysis for NH_3 Emissions from New Freestalls 1, 2, 3, and 4

Step 1 - Identify all control technologies

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

The following management practices have been identified as possible control options for the NH_3 emissions from freestalls:

Feed and Manure Management Practices

- Concrete feed lanes and walkways
- Scraping feed lanes and walkways for mature cows at least four times per day and scraping feed lanes and walkways for support stock at least once per day;
- All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines
- Properly sloping corrals (i.e. exercise pens) (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 exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions

Concrete feed lanes and walkways

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

Frequent cleaning of feed lanes and walkways

The facility is proposing to remove manure from the freestall barn feed lanes and walkways using an automated scraping system. The lanes for milk and dry cows are typically scraped four times per day.

In addition to cleaning the feed lanes and walkways, the automated scraping system also serves as an emission control for reducing NH_3 emissions. The manure deposited in the lanes, which is a source of NH_3 emissions, is removed from the cow housing area by the scraper and deposited in the weeping wall separator. Ammonia is then drained into the lagoon for treatment.

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.

Properly sloping exercise pens/corrals

Accumulation of water on exercise pen/corral surfaces, due to rain or on-farm activities, could result in anaerobic conditions and thereby increase emissions. Keeping exercise pen/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.

Scraping of exercise pens/corrals with a pull-type scraper

Frequent scraping the freestall exercise pens/corrals will reduce the amount of manure on the pen/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 pen/corral surface, which will reduce gaseous pollutants from this area.

Step 2 - Eliminate technologically infeasible options

There are no technologically infeasible options to eliminate.

Step 3 - Rank remaining options by control effectiveness

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

Feed and Manure Management Practices

- Concrete feed lanes and walkways
- Flushing feed lanes and walkways for mature cows at least four times per day and flushing feed lanes and walkways for support stock at least once per day;
- All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines
- Properly sloping corrals (i.e. exercise pens) (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 exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions

Step 4 - Cost Effectiveness Analysis

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

Step 5 – Select BACT

BACT for NH_3 from the new freestalls is the following feed and manure management practices:

1) Concrete feed lanes and walkways;
2) Flushing feed lanes and walkways for mature cows at least four times per day and flushing feed lanes and walkways for support stock at least once per day;
3) All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines;
4) Properly sloping corrals (i.e. exercise pens) (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
5) Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions

The facility proposes to implement the above measures; therefore BACT is satisfied.

Top Down BACT Analysis for Open Corrals

1. BACT Analysis for VOC Emissions from New Maternity Corral and New Hospital Corral

Step 1 - Identify all control technologies

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

Feed and Manure Management Practices

- Concrete feed lanes and walkways;
- Scraping feed lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and scraping feed 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
- District Rule 4570 Mitigation Measures

The descriptions and control mechanisms for these feed and manure mitigation measures were discussed under the top-down BACT analysis for freestalls.

Step 2 – Eliminate technologically infeasible options

There are no technologically infeasible options to eliminate.

Step 3 – Rank remaining options by control effectiveness

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

Feed and Manure Management Practices

- Concrete feed lanes and walkways;
- Scraping feed lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning feed 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
- District Rule 4570 Mitigation Measures

Step 4 – Cost Effectiveness Analysis

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

Step 5 – Select BACT

BACT for VOC emissions from the proposed new corrals is the following feed and manure management practices:

1) Concrete feed lanes and walkways;
2) Scraping feed lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and scraping feed lanes and walkways for support stock (heifers) 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 per animal) or managing corrals to maintain a dry surface;
5) Scraping corrals and exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions; and
6) District Rule 4570 Mitigation Measures

The facility proposes to implement the above measures; therefore BACT is satisfied.

2. BACT Analysis for PM_{10} Emissions from New Maternity Corral and New Hospital Corral (T-BACT only)

Step 1 - Identify all control technologies

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

<u>Feed and Manure Management Practices</u>

- 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 within 1 hour of dusk; and
- Windbreaks controlling dust from corrals (when feasible and there is adequate space at existing facilities); Windbreaks/shelterbelts must meet the USDA National Research Conservation Services (NRCS) Conservation Practice Standard: Windbreaks/*Shelterbelt Establishment -Code 380*

Frequent scraping of corrals

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

Concrete feedlanes

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

Shade Structures in corrals

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

Feeding heifers near (within 1 hour of) dusk

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

Shelterbelts/Windbreaks

A windbreak, or shelterbelt is composed of one or more rows of trees or shrubs, which are planted in a manner that breaks up the wind and reduces its force downwind of the windbreak. Windbreaks can be used to prevent soil erosion,

improve air quality by intercepting dust, chemicals, and odors, to protect crops, and to provide habitat for wildlife. The NRCS requires that a 3-row shelterbelt be installed, the first row consisting of shrubs, second row consisting of a medium size tree and the last row consisting of an evergreen (larger tree). NRCS also requires that an irrigation system be maintained so that there is greater survivability and rapid growth of the trees and shrubs. A windbreak/shelterbelt will reduce the amount of particulate matter entrained into the atmosphere.

Application of Water in Heifer Corrals

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

Step 2 - Eliminate technologically infeasible options

At this dairy, the calf hutches are currently located on the south border of the dairy and after the herd expansion, the calf hutches will remain along the south fence line. With the calf hutches so close to the property line, there is no room for a windbread/shelterbelt that meets NRCS Conservation Practice Standard 380; therefore, this mitigation measure is technologically infeasible for this dairy.

Step 3 - Rank remaining options by control effectiveness

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

Feed and Manure Management Practices

- 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; and
- Feeding heifers in corrals within 1 hour of dusk.

The descriptions and control mechanisms for these feed and manure mitigation measures were discussed under the top-down BACT analysis for freestalls.

Step 4 – Cost Effectiveness Analysis

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

Step 5 – Select BACT

BACT for PM_{10} emissions from the proposed new corrals is the following feed and manure management practices:

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

The facility proposes to implement the above measures; therefore BACT is satisfied.

3. BACT Analysis for NH_3 Emissions from the New Maternity Corral and the New Hospital Corral

Step 1 - Identify all control technologies

The following options were identified as possible controls for NH_3 emissions from corrals:

1) Feed and Manure Management Practices

- Concrete feed lanes and walkways;
- Scraping feed lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning feed 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

Step 2 - Eliminate technologically infeasible options

There are no technologically infeasible options to eliminate.

Step 3 - Rank remaining options by control effectiveness

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

Feed and Manure Management Practices

- Concrete feed lanes and walkways;
- Scraping feed lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning feed 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.

Step 4 – Cost Effectiveness Analysis

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

Step 5 – Select BACT

BACT for NH_3 emissions from the proposed new open corrals is the following feed and manure management practices:

1) Concrete feed lanes and walkways;
2) Scraping feed lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning feed lanes and walkways for support stock (heifers) 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 per animal) or managing corrals to maintain a dry surface; and
5) Scraping corrals and exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions.

The facility proposes to implement the above measures; therefore BACT is satisfied.

Top Down BACT Analysis for the Liquid Manure Handling

1. BACT Analysis for VOC Emissions from Liquid Manure Handling

Step 1 - Identify all control technologies

The following options are identified as controls for VOC emissions:

- Anaerobic treatment lagoon designed according to Natural Resources Conservation Service (NRCS) guideline, and solids removal/separation system (mechanical separator(s) or settling basin(s)/weeping wall(s)) (required)
- Aerobic treatment lagoon or mechanically aerated lagoon (technologically feasible)
- Covered lagoon digester vented to a control device with a minimum 95% control (technologically feasible)

Anaerobic Treatment Lagoon Designed to Meet Natural Resources Conservation Service (NRCS) Standards

An anaerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of manure by microbes in the absence of oxygen. The process of anaerobic decomposition results in the preferential conversion of organic compounds in the wastewater into methane (CH_4), carbon dioxide (CO_2), and water rather than intermediate metabolites (VOCs). The National Resource Conservation Service (NRCS) California Field Office Technical Guide Code 359 - Waste Treatment Lagoon specifies 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 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 18 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. The applicant has proposed a single lagoon for this herd expansion.

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). The process of aerobic digestion is sometimes referred to as nitrification (especially when discussing NH_3 transformation). Complete aerobic digestion (100% aeration) removes nearly all malodors and also virtually eliminates VOCs, H_2S, and NH_3 emissions from liquid waste.

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 the depth of naturally aerobic lagoons 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 will therefore have lower control efficiencies.

Covered Lagoon Digester Vented to a Control Device

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

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

Solids Removal/Separation

The purpose of solids is to remove the fibrous materials prior to the liquid manure entering the lagoon. By removing the most fibrous material from the liquid stream prior to entering the pond, it is anticipated that the amount of intermediate metabolites released during digestion in the pond may be reduced. Removal of the fibrous material allows for more complete digestion in the pond and lower emissions.

The facility is proposing a set of four weeping walls to remove solids. With weeping walls, the effluent is allowed to weep through the slots between boards or screens while the solids are retained. Liquid manure enters the structure and slowly drains through the solids in the structure to dewater at a face. Solids from the structure can be hauled directly out of the structure if farming practices permit or they can be further dried for future use. Weeping wall systems can remove 60% of the solids in manure.

The emissions control efficiency of weeping walls is not known at this time. Separation systems in general have the potential of reducing emissions from the lagoon system by allowing for more complete digestion to take place through the removal of indigestible solids.

Step 2 - Eliminate technologically infeasible options

There are no technologically infeasible options to eliminate.

Step 3 - Rank remaining options by control effectiveness

1) Aerobic Treatment Lagoon or Mechanically Aerated Lagoon (95% VOC control efficiency)
2) Covered Lagoon Digester Vented to a Control Device (80% VOC control efficiency)
3) Anaerobic Treatment Lagoon Designed to Meet Natural Resources Conservation Service (NRCS) Standards (40% VOC control efficiency)
4) Solids Removal/Separation

Step 4 - Cost Effectiveness Analysis

1) Aerobic Treatment Lagoon or Mechanically Aerated Lagoon

The following analysis is based on the treatment of manure from 1,744 milk cows in naturally aerobic lagoons and mechanically aerated lagoons.

(a) Naturally Aerobic Treatment Lagoon

Space Requirement

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 BOD5 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 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 1,600 milk cows in the San Joaquin Valley can be calculated as follows:

BOD_5 loading (lb/day) = 1,744 milk cows x 2.9 lb-BOD_5/cow-day x 0.80
= 4,046 lb-BOD_5/day

Minimum Surface Area (acres) in areas of the San Joaquin Valley with a maximum loading rate of 55 lb-BOD_5/acre-day
= 4,046 lb-BOD_5/day ÷ 55 lb-BOD_5/acre-day = 73.6 acres

Minimum Surface Area (acres) in areas of the San Joaquin Valley with a maximum loading rate of 45 lb-BOD_5/acre-day
= 4,046 lb-BOD_5/day ÷ 45 lb-BOD_5/acre-day = 89.9 acres

As shown above the minimum surface area required for a naturally aerobic lagoon treating manure from 1,744 milk cows in the San Joaquin Valley would range from approximately 73.6 to 89.9 acres. This does not include the additional surface area that would be required to treat manure from support stock onsite. Based on the space requirements alone it is clear that this option cannot reasonably be required and no further analysis is needed.

(b) 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 excreted by animals that must be treated; thus, this cost will be directly proportional to the number of animals at a site. The following analysis will determine the cost of emission reductions that can be achieved from a mechanically aerated lagoon treating manure from 1,744 milk cows.

Biological Oxygen Demand (BOD_5)

In order to effectively calculate the costs 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 lbs (1.1 kg) of oxygen (O_2) per cow must be provided each day for removal of BOD and an additional 3 lbs (1.4 kg) 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 1,744 milk cows will have a loading rate of approximately 4,046 lb-BOD_5/day (1,839 kg-BOD_5/day).

Energy Requirements

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 mechanically aerated lagoon treating flushed manure from 1,744 milk cows is calculated as follows:

High Efficiency Aerator

P = 1,839 kg-BOD_5/day x (365 day/year) ÷ (0.68 kg-O_2/kW-hr)
= 987,110 kW-hr/year

Low Efficiency Aerator

P = 1,839 kg-BOD_5/day x (365 day/year) ÷ (0.10 kg-O_2/kW-hr)
= 6,712,350 kW-hr/year

Cost of Electricity

Average cost of electricity to commercial users in California[10]:

2015 Average = $0.1579/kW-hr

The electricity costs for complete aeration are calculated as follows:

Low Cost Estimate (High Efficiency Aerator)

Electrical Cost = 987,110 kW-hr/year x $0.1579/kW-hr
= $155,865/year

High Cost Estimate (Low Efficiency Aerator)

Electrical Cost = 6,712,350 kW-hr/year x $0.1579/kW-hr
= $1,059,880/year

VOC Emission 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; therefore, the actual control from providing 1 lb of oxygen for every 1 lb of BOD_5 loading is probably closer to 50%.

The annual VOC Emission Reductions for mechanically aerated lagoon treating the manure from 1,744 milk cows are calculated as follows and shown in the table on the next page:

[10] Energy Information Administration/Electric Power; Average Retail Price of Electricity to Ultimate Customers by End-Use Sector, by State, 2015
http://www.eia.gov/electricity/data/browser/#/topic/7?agg=0,1&geo=000000000004&endsec=vg&freq=A&start=2001&end=2015&ctype=linechart&ltype=pin&rtype=s&maptype=0&rse=0&pin=

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

VOC Reductions for a Mechanically Aerated Lagoon							
Type of Animal	**# of cows**	**x**	**Lagoon EF (lb/cow-yr)**	**x**	**Control (%)**	**=**	**lb-VOC/yr**
Milk Cow (freestall)	1,744	x	1.3	x	90%	=	**2,040**

Cost Effectiveness of Mechanically Aerated Lagoon

Low Estimate = ($285,371/year)/[(2,040 lb-VOC/year)(1 ton/2000 lb)]
= $279,775/ton of VOC reduced

High Estimate = ($1,059,880/year)/[(2,040 lb-VOC/year)(1 ton/2000 lb)]
= $1,039,098/ton of VOC reduced

As shown above, the electricity cost alone for a mechanically aerated lagoon would cause the cost of the VOC reductions to be greater than $17,500/ton. This cost does not include the additional electricity cost for nitrification that would naturally occur as the lagoons were aerated or equipment costs. Even without these costs, this control technology would not be cost effective.

2) Covered Lagoon Digester Vented to a Control Device

The costs associated with treating the manure excreted by milk cows in a covered lagoon digester vented to a control device are analyzed below. Because it may be possible to generate power from the system to offset some of the costs associated with installation, this potential benefit is included in the analysis below. The following analysis is based on the treatment of manure from 1,744 milk cows in a covered lagoon anaerobic digester with power generation.

Capital Cost

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)[11] and the California Energy Commission (CEC) Public Interest Energy Research (PIER) Program Dairy Methane Digester System Program Evaluation Report (Feb 2009)[12]. The formula in the AgSTAR publication results in a capitol cost of

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

[12] "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

$1,032 per cow for a covered lagoon anaerobic digester treating manure from 1,000 cows. 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). Therefore, for purposes of this analysis the capital cost for installation of a covered lagoon digester system for 1,744 cows will be assumed to be between $585/cow and $1,032/cow. The capital cost estimates of a covered lagoon digester treating the manure of 1,744 milk cows is calculated as follows:

Low capital cost estimate: $585/cow x 1,744 cows = $1,020,240
High capital cost estimate: $1,032/cow x 1,744 cows = $1,799,808

The annualized capital cost estimates will be calculated below. The capital cost for the installation of the covered lagoon digester will be spread over the expected life of the system using the capital recovery equation. The expected life of the entire system will be estimated at 10 years though the cover may require replacement during this period. A 10% interest rate is assumed in the equation and the assumption will be made that the equipment has no salvage value at the end of the ten-year cycle.

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

$$\text{Low Annual Capital Cost Estimate} = \$1,020,240 \times 0.1(1.1)^{10}]/[(1.1)^{10}-1] = \$165,993/\text{year}$$

$$\text{High Annual Capital Cost Estimate} = [\$1,799,808 \times 0.1(1.1)^{10}]/[(1.1)^{10}-1] = \$292,829/\text{year}$$

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 production of electricity from a

covered lagoon digester treating manure from 1,744 milk cows is calculated as follows:

Electrical Production = 670.3 kW-hr/(milk cow-yr) x 1,744 milk cows
= 1,169,003 kW-hr/yr

Based on the reference given above, the value of electricity used for this analysis will be = $0.1579/kW-hr

The potential annual cost savings from electricity generation from a covered lagoon digester treating manure from 1,744 milk cows is calculated as follows:

Potential Annual Cost Savings from Electrical Production:
= 1,169,003 kW-hr/yr x $0.1579/kW-hr = $184,586/yr

Net Annualized Capital Cost

Annual Capital Cost Estimate minus Savings from Potential Generation
= $292,829/yr - $184,586/yr = $108,243/year

VOC Emission Reductions

The annual VOC Emission Reductions for covered lagoon anaerobic digester treating the manure from 1,744 milk cows are calculated as follows and shown in the table below:

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

VOC Reductions for a Covered Lagoon Vented to Control Device							
Type of Cow	**# of cows**	**x**	**Lagoon EF (lb/cow-yr)**	**x**	**Control (%)**	**=**	**lb-VOC/yr**
Milk Cow (freestall)	1,744	x	1.3	x	80%	=	**1,814**

Cost Effectiveness of Covered Lagoon Digester

Cost Effectiveness = ($184,586/year)/[(1,814 lb-VOC/year)(1 ton/2000 lb)]
= $203,513/ton of VOC reduced

As shown above, the capital cost alone for a covered lagoon digester for a dairy would cause the cost of the VOC reductions to be greater than $17,500/ton. This cost includes the potential revenue generated by electrical production but does not include the additional maintenance required for the system. Additionally, this analysis did not consider the additional pollution that would be generated by any combustion equipment that would utilize the gas, which may

offset any reductions in VOCs. Therefore, this control technology would not be cost effective.

3) **Anaerobic Treatment Lagoon Designed to Meet Natural Resources Conservation Service (NRCS) Standards**

The technology/practice is currently used at multiple dairies located throughout the valley, therefore a cost effective analysis is not required.

4) **Solids Removal/Separation**

The technology/practice is currently used at multiple dairies located throughout the valley, therefore a cost effective analysis is not required.

Step 5 - Select BACT

BACT for VOC emissios from liquid manure handling is an anaerobic treatment lagoon designed to meet Natural Resources Conservation Service (NRCS) standards. Additionally, solids removal/separation using mechanical separation, settling basins, or weeping walls is determined to be BACT.

The facility is proposing these operations, therefore, BACT is satisfied.

2. Top Down BACT Analysis for NH_3 Emissions from the Liquid Manure Handling

Step 1 - Identify all control technologies

A cost effectiveness threshold has not been established for ammonia (NH_3). Therefore, although there is ongoing research for multiple ammonia control technologies, only options that meet the District's definition of Achieved-in-Practice controls will be considered for ammonia at this time.

The following practice has been identified as a possible control option for NH_3 emissions from the lagoon and storage pond(s).

- All animals fed in accordance with NRCS or other District-approved guidelines

No other control technologies that meet the definition of Achieved-in-Practice have been identified for the lagoon.

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.

Step 2 - Eliminate technologically infeasible options

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

Step 3 - Rank remaining options by control effectiveness

All options are ranked according to their control efficiency.

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

Step 4 - Cost Effectiveness Analysis

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

Step 5 - Select BACT

BACT for NH_3 emissions from liquid manure handling is to feed all animals in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations. The facility has proposed to implement this mitigation measure, therefore, BACT is satisfied.

Top Down BACT Analysis for Liquid/Slurry Manure Land Application

1. Top Down BACT Analysis for VOC Emissions from Liquid/Slurry Manure Land Application

Step 1 - Identify all control technologies

The following options are identified as controls for VOC emissions:

- 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 (achieved in practice);
- Irrigation of crops using liquid manure from an aerobic treatment lagoon or mechanically aerated lagoon (95% VOC control efficiency), or
- Irrigation of crops using liquid manure from a holding/storage pond after being treated in a covered lagoon/digester (80% VOC control efficiency) (technologically feasible).

Irrigation of crops using liquid/slurry manure from an 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). The process of aerobic digestion is sometimes referred to as nitrification (especially when discussing NH_3 transformation). Complete aerobic digestion (100% aeration) removes nearly all malodors and also virtually eliminates VOCs, H_2S, and NH_3 emissions from liquid waste.

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 the depth of naturally aerobic lagoons 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 will therefore have lower control efficiencies.

Irrigation of crops using liquid/slurry manure from a holding/storage pond after being treated in a covered lagoon/digester

This practice would only allow the irrigation of liquid manure to cropland from the secondary lagoon after proper treatment has taken place in a covered lagoon/anaerobic 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 (CH4), carbon dioxide (CO2), and water rather than intermediate metabolites (VOCs). The gas generated by this process is known as biogas, waste gas or digester gas. In addition to methane and carbon dioxide, biogas also contains small amounts of Nitrogen (N2), Oxygen (O2), Hydrogen Sulfide (H2S), and Ammonia (NH3). Biogas will also include trace amounts of various Volatile Organic Compounds (VOCs) that remain from incomplete digestion of the volatile solids in the incoming wastewater. The small amounts of undigested solids that remain after digestion are removed from the digester as sludge.

Assumptions:

- 80% of the Volatile Solids (VS) can be removed from the covered anaerobic digestion process.
- 20% of the remaining VS will be assumed to be in the manure during land application. This will be considered worst-case because further digestion of the VS is likely to occur from the secondary lagoon.
- As a worst-case scenario, it will be assumed that all remaining VS will be emitted as VOCs during land application.

Since 80% of the VS is removed or digested in the covered lagoon and the remaining VS have been assumed to be emitted as VOCs, a control efficiency of 80% can be applied when applying liquid manure to land from a holding/storage pond after a covered lagoon.

Irrigation of crops using liquid/slurry manure from an uncovered anaerobic treatment lagoon designed to meet Natural Resources Conservation Service (NRCS) standards

This practice would only allow the irrigation of liquid manure to cropland from the secondary lagoon after going through a treatment phase in an anaerobic treatment lagoon, or the primary lagoon.

An anaerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of manure by microbes in the absence of oxygen. The process of anaerobic decomposition results in the preferential conversion of organic compounds in the wastewater into methane (CH_4), carbon dioxide (CO_2), and water rather than intermediate metabolites (VOCs).

The National Resource Conservation Service (NRCS) California Field Office Technical Guide Code 359 - Waste Treatment Lagoon specifies 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 18 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.

A properly designed anaerobic treatment lagoon will reduce the Volatile Solids (VS) by at least 67.5% and will reduce the biological oxygen demand (BOD), which will result in greater efficiency in degrading compounds that contain carbon into methane and carbon dioxide rather than VOCs. Since 67.5% of the Volatile Solids in the liquid manure will have been removed or digested in the lagoon, there will be less Volatile Solids remaining in the effluent to decompose into VOCs. Although, the Volatile Solids reduction will be at least 67.5%, to be conservative a 40% control will be applied to irrigation from an anaerobic treatment lagoon.

Step 2 - Eliminate technologically infeasible options

There are no technologically infeasible options.

Step 3 - Rank remaining options by control effectiveness

All options are ranked according to their control efficiency.

- Irrigation of crops using liquid/slurry manure from an aerobic treatment lagoon or mechanically aerated lagoon (95% VOC control efficiency)
- Irrigation of crops using liquid/slurry manure from a holding/storage pond after being treated in a covered lagoon/digester (80% VOC control efficiency)
- Irrigation of crops using liquid/slurry manure from the secondary lagoon/holding/storage pond where preceded by an uncovered anaerobic treatment lagoon designed to meet Natural Resources Conservation Service (NRCS) standards (40% VOC control efficiency)
- Irrigation of crops using liquid/slurry manure from the primary lagoon and/or secondary lagoon

Step 4 - Cost Effectiveness Analysis

1) **Irrigation of crops using liquid/slurry manure from an aerobic treatment lagoon or mechanically aerated lagoon**

   Because the liquid/slurry manure applied to land will come from an aerobic treatment lagoon or mechanically aerated lagoon, it will be assumed the reduction in VOC emissions from the lagoon will result in similar VOC reductions to land application.

   As shown in the top-down BACT discussion for VOCs from liquid manure handling, the cost effectiveness of a (naturally) aerobic treatment lagoon or a mechanically aerated lagoon is above the VOC threshold of $17,500 per ton VOC removed; therefore, this option is not cost effective.

2) **Irrigation of crops using liquid/slurry manure from a holding/storage pond after being treated in a covered lagoon/digester**

As shown in the top-down BACT discussion for VOCs from liquid manure handling, the cost effectiveness of a covered lagoon/digester is above the VOC threshold of $17,500 per ton VOC removed; therefore, this option is not cost effective.

3) **Irrigation of crops using liquid/slurry manure from the secondary lagoon/holding/storage pond where preceded by an uncovered anaerobic treatment lagoon designed to meet Natural Resources Conservation Service (NRCS) standards**

The technology/practice is currently used at multiple dairies located throughout the valley, therefore a cost effective analysis is not required.

Step 5 - Select BACT

BACT for VOC emissions from this operation is the irrigation of crops using liquid manure from the uncovered anaerobic treatment lagoon designed to meet Natural Resources Conservation Service (NRCS) standards and allowing the applied liquid to stand in the field for no more than 24 hours. The facility has proposed this measure; therefore BACT is satisfied.

2. Top Down BACT Analysis for NH_3 Emissions from Liquid/Slurry Manure Land Application

Step 1 - Identify all control technologies

A cost effectiveness threshold has not been established for ammonia (NH_3). Therefore, although there is ongoing research for multiple ammonia control technologies, only options that meet the District's definition of Achieved-in-Practice controls will be considered for ammonia at this time.

The following practice has been identified as a possible control option for NH_3 emissions.

- All animals fed in accordance with NRCS or other District-approved guidelines

No other control technologies that meet the definition of Achieved-in-Practice have been identified for the lagoon.

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 VOCs and NH_3.

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.

Step 2 - Eliminate technologically infeasible options

There are no technologically infeasible options.

Step 3 - Rank remaining options by control effectiveness

All options are ranked according to their control efficiency.

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

Step 4 - Cost Effectiveness Analysis

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

Step 5 - Select BACT

BACT for NH_3 emissions from land application of liquid manure is to feed all animals in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations. The facility has proposed to implement this mitigation measure, therefore, BACT is satisfied.

Top Down BACT Analysis for the Solid Manure Handling System

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

1. BACT Analysis for NH_3 Emissions from Solid Manure Handling

Step 1 - Identify all control technologies

A cost effectiveness threshold has not been established for ammonia (NH_3). Therefore, although there is ongoing research for multiple ammonia control technologies, only options that meet the District's definition of Achieved-in-Practice controls will be considered for ammonia at this time.

The following practice has been identified as a possible control option for NH_3 emissions from solid manure handling.

- All animals fed in accordance with NRCS or other District-approved guidelines

No other control technologies that meet the definition of Achieved-in-Practice have been identified for solid manure handling.

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 VOCs and NH_3.

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 applied to cropland.

Step 2 - Eliminate technologically infeasible options

There are no technologically infeasible options.

Step 3 - Rank remaining options by control effectiveness

All options are ranked according to their control efficiency.

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

Step 4 - Cost Effectiveness Analysis

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

Step 5 - Select BACT

BACT for NH_3 emissions from solid manure handling is to feed all animals in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations. The facility has proposed to implement this mitigation measure, therefore, BACT is satisfied.

Top Down BACT Analysis for the Solid Manure Land Application

1. BACT Analysis for NH_3 Emissions from Solid Manure Land Application

Step 1 - Identify all control technologies

A cost effectiveness threshold has not been established for ammonia (NH_3). Therefore, although there is ongoing research for multiple ammonia control technologies, only options that meet the District's definition of Achieved-in-Practice controls will be considered for ammonia at this time.

The following practice has been identified as a possible control option for NH_3 emissions from land application of solid manure.

- Incorporation of solid manure into cropland within 2 hours of application

  Incorporation of solid manure into the soil promptly after land application will reduce emissions by minimizing the amount of time that the solid waste is exposed to the atmosphere. Limiting the exposure of the solid manure to the atmosphere will reduce the rate of volatilization of ammonia, thereby reducing overall emissions. Once the solid manure has been incorporated into the soil, ammonia will remain predominantly in the nonvolatile ammonium ion (NH_4^+) phase, thus increasing chances for uptake by crops.

Step 2 - Eliminate technologically infeasible options

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

Step 3 - Rank remaining options by control effectiveness

All options are ranked according to their control efficiency.

- Incorporation of solid manure into cropland within 2 hours of application

Step 4 - Cost Effectiveness Analysis

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

Step 5 - Select BACT

BACT for NH_3 emissions from solid manure land application is to incorporate solid manure into soil within 2 hours after land application. The facility has proposed to implement this mitigation measure, therefore, BACT is satisfied.

Top-Down BACT Analysis for Total Mixed Rations (TMR)

1. BACT Analysis for VOC Emissions from TMR

Step 1 - Identify all control technologies

Since specific VOC emissions control efficiencies have not been identified in the literature for dairy TMR, the control efficiencies will be estimated based on the control efficiencies of similar processes and engineering judgment.

The following options were identified as possible controls for VOC emissions from the Total Mixed Ration (TMR) (Feed Handling and Storage permit)

- Rule 4570 Management Practices for TMR

  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; removal of uneaten wet feed from feeding areas; and preparing TMR with a minimum moisture content, which reduces VOCs since most of the compounds emitted are higly soluable in water. More details about these management practices are included in the District document Final Staff Report – Revised Proposed Amendments to Rule 4570 (Confined Animal Facilities), dated October 21, 2010.

Step 2 - Eliminate technologically infeasible options

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

Step 3 - Rank remaining options by control effectiveness

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

1) Rule 4570 Management Practices for TMR

Step 4 - Cost Effectiveness Analysis

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

Step 5 - Select BACT

BACT for VOC emissions from TMR is to implement the management practices required by District Rule 4570 to reduce VOC emissions from the TMR. The facility has proposed to implement these practices, therefore, BACT is satisfied.

APPENDIX J
HRA Summary/Risk Management Review and AAQA

San Joaquin Valley Air Pollution Control District
Risk Management Review
REVISED

To:	Sandra Lowe-Leseth – Permit Services
From:	Cheryl Lawler – Technical Services
Date:	December 12, 2016
Facility Name:	Barcellos Farms
Location:	14851 Road 168, Porterville, CA
Application #(s):	S-6032-1-1 through 5-1
Project #:	S-1153665

A. RMR SUMMARY

RMR Summary						
Categories	**Milk Parlor (Unit 1-1)**	**Cow Housing (Unit 2-1)**	**Liquid Manure Handling (Unit 3-1)**	**Solid Manure Storage (Unit 4-1)**	**Project Totals**	**Facility Totals**
Prioritization Score	0.63	46.8	64.2	0.15	>1.0	>1.0
Acute Hazard Index	0.001	0.39	0.018	0.009	0.418	0.418
Chronic Hazard Index	0.000	0.163	0.006	0.002	0.170	0.170
Maximum Individual Cancer Risk	2.20E-07	9.38E-06	4.55E-06	0.00E-00	1.42E-05	1.42E-05
T-BACT Required?	**No**	**Yes**[1]	**Yes**	**No**		
Special Permit Requirements?	**No**	**No**	**No**	**No**		

[1]TBACT is determined by each individual cow housing area. TBACT will be addressed in the Conclusions Section of this report.

Proposed Permit Requirements

To ensure that human health risks will not exceed District allowable levels; the following shall be included as requirements for:

Unit 2-1 (Freestall Barns 1, 2, 3 & 4, and New Hospital):

T-BACT is required for this unit because of emissions of VOCs and PM_{10}.

Unit 3-1 (Lagoon)

T-BACT is required for this unit because of emissions of VOCs.

B. RMR REPORT

I. Project Description

Technical Services received a request on November 22, 2016, to re-run a Risk Management Review (RMR) and Ambient Air Quality Analysis (AAQA) for a proposed dairy expansion project. The modification includes an increase in herd size to 1,744 milk cows, 2,168 dry cows, 1,750 heifers, and 405 calves (4,323 total head).

Unit 1-1 consists of the installation of a new 40-stall rotary milk barn and conversion of the existing 16-stall flat milking barn to a special needs milking barn. Unit 2-2 consists of the modification of cow housing, including remodeled cow housing to accommodate more animals and the installation of four freestall barns. Unit 3-1 consists of modifications to liquid manure handling, Unit 4-1 consists of modifications to solid manure handling, and Unit 5-1 includes the modification of feed storage and handling as a result of increased herd size.

The project is being re-run because the applicant has requested a change to the mitigation measure for the new freestall barns, which changed the PM10 and NH3 emissions for these units.

II. Analysis

Toxic emissions for the Cow Housing and the Milk Parlor 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 and from emissions provided by the project engineer. Toxic emissions from the Lagoon proposed unit were calculated using District approved emission factors derived from a 2007 VOC profile "Dairies-Flushing Lanes" in EPA's speciation program. Emissions were then 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 proposed unit's toxic emissions were prioritized using the procedure in the 1990 CAPCOA Facility Prioritization Guidelines. The prioritization score for the facility is greater than 1.0 (see RMR Summary Table). Therefore, a refined health risk assessment was required. The AERMOD model was used, with the parameters outlined below and meteorological data for 2007-2011 from Tipton to determine the dispersion factors (i.e., the predicted concentration or X divided by the normalized source strength or Q) for a receptor grid. These dispersion factors were input into the SHARP Program, which then used the Air Dispersion Modeling and Risk Tool (ADMRT) of the Hot Spots Analysis and Reporting Program Version 2 (HARP 2) to calculate the chronic and acute hazard indices and the carcinogenic risk for the project.

The following parameters were used for the review:

Analysis Parameters Unit 1-1 (Milk Parlor)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	1625.8	**Release Height (m)**	1
VOC (lb/hr)	0.032	**Ammonia (lb/hr)**	0.011
VOC (lb/yr)	280	**Ammonia(lb/yr)**	96

Analysis Parameters Unit 2-1 (Cow Housing 1)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	952.3	**Release Height (m)**	1
# of Cows	50	**Ammonia (lb/hr)**	0.035
PM10 (lb/hr)	0	**Ammonia (lb/yr)**	306
PM10 (lb/yr)	0	**VOC (lb/hr)**	0.026
		VOC (lb/yr)	227

Analysis Parameters Unit 2-1 (Cow Housing 2)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	1,523.6	**Release Height (m)**	1
# of Cows	60	**Ammonia (lb/hr)**	0.042
PM10 (lb/hr)	0	**Ammonia (lb/yr)**	367
PM10 (lb/yr)	0	**VOC (lb/hr)**	0.01
		VOC (lb/yr)	272

Analysis Parameters Unit 2-1 (Cow Housing 8)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	789.7	**Release Height (m)**	1
# of Cows	50	**Ammonia (lb/hr)**	0.016
PM10 (lb/hr)	0.007	**Ammonia (lb/yr)**	136
PM10 (lb/yr)	61	**VOC (lb/hr)**	0.021
		VOC (lb/yr)	185

Analysis Parameters Unit 2-1 (Cow Housing 9)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	1,263.5	**Release Height (m)**	1
# of Cows	60	**Ammonia (lb/hr)**	0
PM10 (lb/hr)	0.015	**Ammonia (lb/yr)**	0
PM10 (lb/yr)	134	**VOC (lb/hr)**	0.005
		VOC (lb/yr)	43

Analysis Parameters Unit 2-1 (Cow Housing 10, 11, 12, & 13 (each))			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	2,605.9	**Release Height (m)**	1
# of Cows	60	**Ammonia (lb/hr)**	0
PM10 (lb/hr)	0.016	**Ammonia (lb/yr)**	0
PM10 (lb/yr)	137	**VOC (lb/hr)**	0
		VOC (lb/yr)	0

Analysis Parameters Unit 2-1 (Cow Housing 15/hospital)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	947.6	**Release Height (m)**	1
# of Cows	20	**Ammonia (lb/hr)**	0
PM10 (lb/hr)	0.005	**Ammonia (lb/yr)**	0
PM10 (lb/yr)	40	**VOC (lb/hr)**	0
		VOC (lb/yr)	0

Analysis Parameters Unit 2-2 (Freestall Barn 1, 2, 3, 4 (each))			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	4899.3	**Release Height (m)**	1
# of Cows	400	**Ammonia (lb/hr)**	1.06
PM10 (lb/hr)	0.013	**Ammonia (lb/yr)**	9,320
PM10 (lb/yr)	110	**VOC (lb/hr)**	0.480
		VOC (lb/yr)	4,204

Analysis Parameters Unit 2-2 (New Maternity)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	1897.0	**Release Height (m)**	1
# of Cows	144	**Ammonia (lb/hr)**	0.194
PM10 (lb/hr)	0.019	**Ammonia (lb/yr)**	1,700
PM10 (lb/yr)	167	**VOC (lb/hr)**	0.097
		VOC (lb/yr)	852

Analysis Parameters Unit 2-2 (New Hospital)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	1897.0	**Release Height (m)**	1
# of Cows	144	**Ammonia (lb/hr)**	0.383
PM10 (lb/hr)	0.019	**Ammonia (lb/yr)**	3,350
PM10 (lb/yr)	167	**VOC (lb/hr)**	0.173
		VOC (lb/yr)	1,513

Analysis Parameters Unit 3-1 (Lagoon)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	9058.0	**Release Height (m)**	0
Ammonia (lb/hr)	0.168	**Ammonia(lb/yr)**	1,470
# of Cows	2,623*		

*Used to calculate VOC TAC emissions

Analysis Parameters Unit 3-1 (Land Application)*			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	2,865,829	**Release Height (m)**	0
Ammonia (lb/hr)	0.743	**Ammonia (lb/yr)**	6,510

*Ammonia emissions for both liquid manure and dry manure application were evaluated based on farmland application area.

Analysis Parameters Unit 4-1 (Dry Manure)			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	2,400	**Release Height (m)**	0
Ammonia (lb/hr)	0.196	**Ammonia (lb/yr)**	1,720

AAQA. In addition to the RMR, Technical Services performed modeling for the criteria pollutant PM_{10} using AERMOD. The emission rate used was 688 lb PM_{10}/year. The results from the Criteria Pollutant Modeling are as follows:

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

Category	24 Hours	Annual
Net Value	9.21	1.70
Interim Significance Level	10.4[1]	2.08[1]
Result	Pass	Pass

[1]Per District 1925 the SIL threshold for fugitive dust sources is 10.4 µg/m3 for the 24-hour average concentration and 2.08 µg/m3 for the annual concentration.

III. Conclusion

Unit 2-1 (Freestall Barns 1, 2, 3 & 4, and New Hospital) & Unit 3-1:

The acute and chronic indices are below 1.0 and the cancer risk associated with these units is greater than 1.0 in a million, but less than 20 in a million. **In accordance with the District's Risk Management Policy, these units are approved with Toxic Best Available Control Technology (T-BACT)** for the addition of the Freestall Barns, and New Hospital and for the modification to liquid manure handling (Unit 3-1). T-BACT is required for the cow housing in Unit 2-1 and for Unit 3-1 (Lagoon) because of emissions of DBCP, Acrylonitrile, 1,3-Butadiene, CCl4, and Naphthalene which are VOCs. T-BACT is required for Unit 2-1 also due to emissions of Arsenic, which is a PM-10.

Unit 1-1, 2-1 (Cow Housing 1-20, calf hutches and New Maternity), and Unit 4-1:

The acute and chronic indices are below 1.0 and the cancer risk factor is less than 1.0 in a million. **In accordance with the District's Risk Management Policy, these units are approved without Toxic Best Available Control Technology (T-BACT)** for the milk parlor, all other cow housing units & new maternity, and solid manure storage.

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

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

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

IV. Attachments

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

APPENDIX K
Quarterly Net Emissions Change (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:

	Milking Parlor					
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	0	0	698	239
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	1.9	0.7
Quarterly Net Emissions Change (lb/qtr) 1:	0.0	0.0	0.0	0.0	69.9	23.9
2:	0.0	0.0	0.0	0.0	69.9	23.9
3:	0.0	0.0	0.0	0.0	69.9	23.9
4:	0.0	0.0	0.0	0.0	69.9	23.9

	Cow Housing					
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	7,183	0	27,343	54,773
Daily PE2 (lb/day)	0.0	0.0	19.4	0.0	74.8	149.7
Quarterly Net Emissions Change (lb/qtr) 1:	0.0	0.0	49.0	0.0	3,589.8	6,795.3
2:	0.0	0.0	49.0	0.0	3,589.8	6,795.3
3:	0.0	0.0	49.0	0.0	3,589.8	6,795.3
4:	0.0	0.0	49.0	0.0	3,589.8	6,795.3

	Liquid Manure Handling						
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Annual PE2 (lb/yr)	0	0	0	0	3,993	11,918	289
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	10.9	32.6	0.9
Quarterly Net Emissions Change (lb/qtr) 1:	0.0	0.0	0.0	0.0	250.8	-681.9	0.0
2:	0.0	0.0	0.0	0.0	250.8	-681.9	0.0
3:	0.0	0.0	0.0	0.0	250.8	-681.9	0.0
4:	0.0	0.0	0.0	0.0	250.8	-681.9	0.0

	Solid Manure Handling					
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	0	0	1,296	6,903
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	3.5	18.9
Quarterly Net Emissions Change (lb/qtr) 1:	0.0	0.0	0.0	0.0	173.6	884.2
2:	0.0	0.0	0.0	0.0	173.6	884.2
3:	0.0	0.0	0.0	0.0	173.6	884.2
4:	0.0	0.0	0.0	0.0	173.6	884.2

	Feed Storage and Handling					
	NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)	0	0	0	0	33,429	0
Daily PE2 (lb/day)	0.0	0.0	0.0	0.0	91.6	0.0
Quarterly Net Emissions Change (lb/qtr) 1:	0.0	0.0	0.0	0.0	5,115.5	0.0
2:	0.0	0.0	0.0	0.0	5,115.5	0.0
3:	0.0	0.0	0.0	0.0	5,115.5	0.0
4:	0.0	0.0	0.0	0.0	5,115.5	0.0