San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

July 16, 2020

Rocky DeJager
Red Rock Dairy
5914 S Hwy 59
Merced, CA 95340

Re: Notice of Preliminary Decision - Authority to Construct
Facility Number: N-7787
Project Number: N-1200547

Dear Mr. DeJager:

Enclosed for your review and comment is the District's analysis of Red Rock Dairy's application for an Authority to Construct for the modification to the exisiting dairy to construct one freestall barn to house 530 milk cows, and six open corrals to house 2,089 support stock, at 5020 S Hwy 59, Merced, CA.

The notice of preliminary decision for this project has been posted on the District's website (www.valleyair.org). After addressing all comments made during the 30-day public notice period, the District intends to issue the Authority to Construct. Please submit your written comments on this project within the 30-day public comment period, as specified in the enclosed public notice.

Thank you for your cooperation in this matter. If you have any questions regarding this matter, please contact Mr. Kamaljit Sran of Permit Services at (559) 230-5889.

Sincerely,

Arnaud Marjollet
Director of Permit Services

AM:ks

Enclosures

cc: Courtney Graham, CARB (w/ enclosure) via email

Samir Sheikh
Executive Director/Air Pollution Control Officer

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www.valleyair.org www.healthyairliving.com

San Joaquin Valley Air Pollution Control District
Authority to Construct (ATC) Application Review
Dairy Expansion

Facility Name:	Red Rock Dairy	Date:	July 13, 2020
Mailing Address:	5914 S Hwy 59 Merced, CA 95340	Engineer:	Kamaljit Sran
		Lead Engineer:	Derek Fukuda
Contact Person:	Alex Riordan		
Telephone:	(559) 313-3584		
E-Mail:	ariordan@fragservices.com		
Application #(s):	N-7787-1-2, -2-3, -3-3, -4-2, and -5-2		
Project #:	N-1140927		
Deemed Complete:	March 16, 2020		

I. Proposal

Red Rock Dairy has requested an Authorities to Construct (ATCs) permit for construction of one freestall barn to house 530 milk cows and six open corrals to house 2,089 support stock.

On September 8, 2008, Red Rock Dairy was issued ATC permits for the construction of a new dariy consisting of 2,650 milk cows and 350 dry cows in five and a half freestall barns and one loafing barn, and 2,636 support stock in seven open corrals. Red Rock Dairy built six and a half freestalls to house 3,000 milk cows and 400 dry cows but never built any open corrals. Red Rock Dairy has recently informed the Distirct that they will begin constructung the six open corrals (originally proposed in project N-1074014) to house 2,089 support stock. Additionally, the previously constructed sixth freestall barn used to house 530 milk cows will also be evaluated in this project. After the expansion all 3,400 mature cows will be housed in freestall barns and loafing barn, and all 2,089 support stock will be housed in open corrals.

ATC N-7787-3-2 was issued on February 5, 2020 under project N-1191760 for construction of a sand lane, conversion of the existing anaerobic treatment lagoon to a storage pond, and the construction of a new covered digester lagoon system (digester system) to capture methane/biogas. This ATC will be serve as base document for this project. As stated in engineering evaluation of project N-1191760, the use of an anaerobic treatment lagoon was required as Best Available Control Technology (BACT) during initial permitting project N-1074014. The existing anaerobic treatment lagoon will be converted to a storage pond. As a result of this change to the method of operation, the anaerobic treatment lagoon BACT requirements are no longer applicable and the corresponding conditions will not appear on the ATC. The covered digester lagoon will serve as the primary lagoon. It is assumed that all emissions are captured and sent offsite; therefore, BACT is not required. Should the facility discontinue use of the digester system or remove the cover, compliance with the anaerobic treatment lagoon BACT requirements will be necessary and would need to be evaluated under a future project.

The proposed expansion will result in an increase in PM_{10}, VOCs, and NH_3 emissions. Therefore proposed modifications consist of the existing cow milking parlor Permit to Operate (PTO) (N-7787-1-1), the existing cow housing PTO (N-7787-2-2), the liquid manure handling

operation ATC (N-7787-3-2), existing solid manure handling operation PTO (N-7787-4-1), and existing feed storage and handling PTO (N-7787-5-1) at the dairy.

A copy of the current PTOs are included in Appendix A of this application review.

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 (8/15/19)
Rule 2410: Prevention of Significant Deterioration (11/26/12)
Rule 2520: Federally Mandated Operating Permits (8/15/19)
Rule 2550: Federally Mandated Preconstruction Review for Major Sources of Air Toxics (6/18/1998)
Rule 4001: New Source Performance Standards (4/14/99)
Rule 4002: National Emissions Standards for Hazardous Air Pollutants (5/20/04)
Rule 4101: Visible Emissions (2/17/05)
Rule 4102: Nuisance (12/17/92)
Rule 4550: Conservation Management Practices (8/19/04)
Rule 4570: Confined Animal Facilities (CAF) (10/21/10)
California Health & Safety Code 41700: Health Risk Assessment
California Health & Safety Code 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

The dairy will continue to be operated at 5020 S Hwy 59 in Merced, CA. This dairy is not located within 1,000 feet of a K-12 School. Therefore, the public noticing requirement of California Health and Safety Code 42301.6 is not required for this project.

IV. Process Description

The primary function of this facility is the production of milk, which is used to make products for human consumption. Production of milk requires a herd of mature dairy cows that are lactating. In order to produce milk, the cows must be bred and give birth. The gestation period for a cow is nine months, and dairy cows are bred again four months after calving. Thus, a mature dairy cow produces a calf every 12 to 14 months. This dairy houses milk cows, dry cows, heifers, and bulls. All calves will be raised offsite.

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

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

Milking Parlor (N-7787-1-2)

The milking parlor is a separate building, apart from the lactating cow confinement. The milking parlor is designed to facilitate changing the groups of cows milked and to allow workers access to the cows during milking. A holding area confines the cows that are ready for milking. The holding area is covered with open sides and is part of the milking parlor, which in turn, is located in the immediate vicinity of the cow housing.

Red Rock Dairy is currently permitted for one 72 stall rotary milking parlor. The lactating cows will be milked up to three times per day in the milking parlors. The milking parlors will have concrete floors sloped to a drain. Manure that is deposited in the milking parlors will be sprayed or flushed into the drain using fresh water after each milking. The effluent from the milking parlors will be carried through pipes to the lagoon system.

Cow Housing (N-7787-2-3)

In the freestall barn, cows are grouped in large pens with free access to feed bunks, waterers, and stalls for resting. A standard freestall barn design has a feed alley in the center of the barn separating two feed bunks on each side. A variety of types of bedding materials are used for animal comfort and to prevent animal injury.

Loafing barns are similar in design to freestall barns, except that the loafing barn floors are not paved and are not divided into stalls. This type of housing structure provides coverage for a very large surface area providing protection from the heat and creating a cooler environment.

An open corral is a large open area where cows are confined, also with unlimited access to feed bunks, water, and possibly an open structure to provide shade.

Detailed pre-project and post-project housing arrangements are shown in Appendix E.

Liquid Manure Handling (N-7787-3-3)

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 liquid manure handling system will consist of solids separation including processing pits, mechanical separator(s), sand lane(s), a digester system including a covered digester lagoon and two storage ponds.

Storage Pond

The storage ponds are designed to have sufficient volume to hold all of the following: all manure and wastewater accumulated at the dairy for a period of 120 days; normal precipitation and any drainage to the lagoon system minus evaporation from the surface of lagoons; and precipitation during a 25 year, 24 hour storm event. The liquid manure from the storage ponds will be used to irrigate crops.

Mechanical Separator

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

Sand Lane

Sand lanes are small, shallow lanes used in systems where sand-laden manure is mixed with an appreciable amount of water with a flush transport system. The relatively large amount of water allows for rapid sand settling. Sand traps can be designed for up to 21 days of sand storage and can achieve 60-70% sand recovery. The drained sand is often moved and mixed several times to condition it for reuse as bedding. The liquid manure is then piped to the settling basins.

Land Application

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

Digester System:

A digester is a sealed basin or tank that is designed to accelerate and control the decomposition of organic matter by microorganisms in the absence of oxygen. Decomposition results in the conversion of organic compounds in the substrate into methane (CH_4), carbon dioxide (CO_2), and water rather than intermediate Volatile Organic Compounds (VOCs). The gas generated by this process is known as biogas, waste gas, or digester gas. In addition to methane and carbon dioxide, biogas may also contain small amounts of Nitrogen (N_2), Oxygen (O_2), Hydrogen Sulfide (H_2S), and Ammonia (NH_3). Biogas may also include trace amounts of various VOCs that remain from incomplete digestion of the volatile solids in the incoming substrate. 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 covered digester system will process the manure slurry (mixed manure solids and liquids) from the reception pits. The manure will be flushed from the milking parlor and the cow housing areas at the dairy and the manure will be routed via the existing underground piping system to reception pits where the waste stream will be adjusted to the proper solids content (9-15% solids) and then pumped into the new digester. The effluent from the digester will be pumped to a solid separation area where the fiber solids will be separated from the liquid digester effluent. After the fiber solids have been separated, the liquid digester effluent will be pumped back to the separated liquids pit to be used in the flush system. Excess liquid will flow to the settling basin(s) and storage pond to be used to fertilize adjacent cropland.

The biogas produced by the digester will then be piped to a gas chiller to remove moisture and pumped to a central processing location. The biogas produced by the digester will be composed of approximately 60-70% methane and 30-40% carbon dioxide.

Solid Manure Handling (N-7787-4-2)

Manure Stock Piles (Storage) and Land Application
The solid manure stockpiled at this dairy will include the separated solids from the mechanical separator. The separated solids will be immediately incorporated into cropland, be dried and used as fertilizer or as bedding in the freestall barns, or hauled offsite. The applicant proposes to cover the dry separated solids piles and animal waste piles with weatherproof coverings from October through May, so that the solids will remain dry until they are ready to be used.

Feed Storage and Handling (N-7787-5-2)

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

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

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

V. Equipment Listing

Pre-Project Equipment Description:

N-7787-1-1: 2,650 COW MILKING OPERATION WITH ONE 72 STALL ROTARY MILKING PARLOR

N-7787-2-2: COW HOUSING - 2,650 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 3,000 MATURE COWS (MILK AND DRY); AND FIVE AND HALF FREESTALL BARNS AND A LOAFING BARN WITH FLUSH/SCRAPE SYSTEM

N-7787-3-2: LIQUID MANURE HANDLING SYSTEM CONSISTING OF PROCESSING PIT(S); SAND LANE(S), MECHANICAL SEPARATOR(S); DIGESTER SYSTEM CONSISTING OF A COVERED DIGESTER LAGOON, WITH AN AIR INJECTION SYSTEM FOR CONTROL OF H2S, AND CARBON DRY H2S

SCRUBBER, AND TWO STORAGE PONDS, MANURE IS LAND APPLIED THROUGH FLOOD/FURROW IRRIGATION

N-7787-4-1: SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; SOLID MANURE APPLICATION TO LAND AND/OR HAULED OFFSITE

N-7787-5-1: FEED STORAGE AND HANDLING CONSISTING OF COMMODITY BARN, SILAGE PILES, AND TOTAL MIXED RATION FEEDING

ATC Equipment Description:

N-7787-1-2: MODIFICATION OF 2,650 COW MILKING OPERATION WITH ONE 72 STALL ROTARY MILKING PARLOR: INCREASE MILK COWS TO 3000

N-7787-2-3: MODIFICATION OF COW HOUSING - 2,650 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 3,000 MATURE COWS (MILK AND DRY); AND FIVE AND HALF FREESTALL BARNS AND A LOAFING BARN WITH FLUSH/SCRAPE SYSTEM: INCREASE MILK COWS TO 3000, DRY COWS TO 400, CONSTRUCT ONE FREESTALL TO HOUSE 530 MILK COWS AND ADD SIX OPEN CORRALS TO HOUSE 2,089 SUPPORT STOCK.

N-7787-3-3: MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF PROCESSING PIT(S); SAND LANE(S), MECHANICAL SEPARATOR(S); DIGESTER SYSTEM CONSISTING OF A COVERED DIGESTER LAGOON, WITH AN AIR INJECTION SYSTEM FOR CONTROL OF H2S, AND CARBON DRY H2S SCRUBBER, AND TWO STORAGE PONDS, MANURE IS LAND APPLIED THROUGH FLOOD/FURROW IRRIGATION: ALLOW INCREASE IN THROUGHPUT DUE TO HERD EXPANSION

N-7787-4-2: MODIFICATION OF SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; SOLID MANURE APPLICATION TO LAND AND/OR HAULED OFFSITE: ALLOW INCREASE IN THROUGHPUT DUE TO HERD EXPANSION

N-7787-5-2: MODIFICATION OF FEED STORAGE AND HANDLING CONSISTING OF COMMODITY BARN(S), SILAGE PILE(S), AND TOTAL MIXED RATION FEEDING: ALLOW INCREASE IN THROUGHPUT DUE TO HERD EXPANSION

Post-Project Equipment Description:

N-7787-1-2: 3,000 COW MILKING OPERATION WITH ONE 72 STALL ROTARY MILKING PARLOR

N-7787-2-3: COW HOUSING - 3,000 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 3,400 MATURE COWS (MILK AND DRY); 2,089 TOTAL SUPPORT STOCK (HEIFERS, CALVES AND BULLS); AND SIX AND HALF FREESTALL BARNS, A LOAFING BARN AND SIX OPEN CORRALS WITH FLUSH/SCRAPE SYSTEM

N-7787-3-3: LIQUID MANURE HANDLING SYSTEM CONSISTING OF PROCESSING PIT(S); SAND LANE(S); MECHANICAL SEPARATOR(S); DIGESTER SYSTEM CONSISTING OF A COVERED DIGESTER LAGOON WITH AN AIR INJECTION SYSTEM FOR CONTROL OF H_2S, AND CARBON DRY H_2S SCRUBBER; AND TWO STORAGE PONDS; MANURE IS LAND APPLIED THROUGH FLOOD/FURROW IRRIGATION

N-7787-4-2: SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; WINDROW/AERATED STATIC PILE COMPOSTING; SOLID MANURE APPLICATION TO LAND AND/OR HAULED OFFSITE

N-7787-5-2: FEED STORAGE AND HANDLING CONSISTING OF COMMODITY BARN, SILAGE PILES, AND TOTAL MIXED RATION FEEDING

VI. Emission Control Technology Evaluation

PM_{10}, VOC, H_2S and NH_3 are the major pollutants of concern from dairy operations. However, only VOC and NH_3 emissions are expected directly from the cow milking operation, while PM_{10}, VOC, and NH_3 emissions are expected from the cow housing operation, VOC, and NH_3 from manure handling operations, H_2S from liquid manure handling operation, and VOC emissions from the feed storage and handling operation.

Gaseous pollutant emissions at a dairy result from the ruminant digestive processes (enteric emissions), decomposition, and fermentation of feed and decomposition of organic material in the manure. VOCs are formed as intermediate metabolites when organic matter in manure degrades. Ammonia volatilization is the result of the microbial decomposition of nitrogenous compounds in manure. The quantity of enteric emissions depends directly on the number and types of cows. Hydrogen sulfide and other reduced sulfur compounds are produced as manure decomposes anaerobically. There are two primary sources of sulfur in animal manure. One is the sulfur amino acids contained in the feed. The other is inorganic sulfur compounds, such as copper sulfate and zinc sulfate, which are used as feed additives to supply trace minerals and serve as growth stimulants. A possible third source of sulfur in some locations is trace minerals in drinking water. 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.

The facility currently complies with all applicable Phase II mitigation measure requirements of District Rule 4570, as previously processed under District project N-1110984. All mitigation measures result in VOC emissions reductions; reductions in ammonia emissions are also expected.

Digester System

As previously discussed, a digester is a sealed basin or tank that is designed to accelerate and control the decomposition of organic matter by microorganisms in the absence of oxygen. Digestion results in greater conversion of organic compounds in the substrate into methane (CH_4), carbon dioxide (CO_2), and water rather than intermediate Volatile Organic Compounds (VOCs).

Excess moisture will be removed from the digester gas and it will be piped to a biogas upgrading plant. Since the digester system will be able to store the gas for extended periods, no flare is being proposed for this digester project at this time.

Fugitive Emissions

Previous analyses of digester gas have consistently demonstrated that the VOC content of digester gas is very low (less than 1% by weight). District Policy SSP 2015 – Procedures for Quantifying Fugitive VOC Emissions at Petroleum and SOCMI (Synthetic Organic Chemical Manufacturing Industry) Facilities specifies that fugitive VOC emissions are not assessed for piping and components handling fluid streams with a VOC content of 10% or less by weight. Therefore, because of the very low VOC content of the digester gas, fugitive VOC emissions from the digester system and associated equipment are assumed to be negligible, consistent with District Policy SSP 2015.

H_2S Removal

The covered digester lagoon will utilize injection of air for initial removal of H_2S from the digester gas. The continuous injection of controlled quantities of air under the lagoon cover will increase the amount of oxygen in the space under the digester cover and the surface layer of the liquid in the covered digester lagoon, which facilitates oxidation of sulfides in the digester gas and in the liquid surface to elemental sulfur and water. The sulfur in the liquid in the digester can be removed from the digester system by deposition and filtration. Injection of oxygen also promotes biological removal of H_2S from the digester gas by facilitating the establishment of sulfur oxidizing microorganisms, such as Thiobacillus species, which have the ability to grow under various environmental conditions and oxidize H_2S to elemental sulfur and sulfates that can be removed from the digester system.

The digester gas is then sent through an activated carbon H_2S scrubber or an equivalent dry media H_2S scrubber for the removal of H_2S prior to delivery to the offsite gas upgrading plant via a low pressure pipeline.

Specially treated activated carbon can be used to remove H_2S from gas streams. H_2S will be adsorbed as the gas flows through the activated carbon bed. Activated carbon has a large number of pores, which greatly increase the surface area for adsorption. Contaminants in the gas diffuse into these pores and are retained on the carbon surface due to both chemical and physical forces. Activated carbon used for the removal of H_2S is usually treated with chemical bases to increase the holding capacity for H_2S.

The scrubber consists of enclosed vessels filled with dry media for removal of H_2S. The digester gas flows through the scrubber and then to a dryer and chiller to remove moisture. For continuous operation, there will be a secondary unit that will be brought online at specified times or when monitoring indicates that the primary unit is nearing saturation. Valves can be arranged so either bed can operate while the other is serviced. The useful life of the vessels will vary depending on the inlet concentration of H_2S, the flow rate, and the mass in the vessels. Before a scrubber is completely spent, it must be regenerated or replaced. The spent scrubber vessels will be sent to a regeneration facility or to an appropriate disposal facility.

VII. General Calculations

A. Assumptions

- Pre-project potentials to emit for the dairy will be based on the current permitted capacity and types of cows at the dairy.
- Post-project potentials to emit for the dairy will be based on the proposed capacity and types of cows at the dairy.
- All PM_{10} emissions from the dairy will be allocated to the cow housing permit unit.
- For Major Source determination purposes, only emissions from the lagoon system (N-7787-3) will be used in determining if this facility will be a major source since the lagoon system is considered to be the only sources of non-fugitive emissions at this dairy, as will be discussed in Section VII.C.5 below.
- The PM_{10} emission factors for the dairy animals are based on a District document titled "Dairy and Feedlot PM_{10} Emissions Factors," which compiled data from studies performed by Texas A&M ASAE and a USDA/UC Davis report quantifying dairy and feedlot emissions.
- Because of the moisture content of the separated solids, PM_{10} emissions from solid manure handling are considered negligible.
- The NH_3 emission factors for milk cows are based on an internal document entitled "*Breakdown of Dairy VOC Emission Factor into Permit Units*." The NH_3 emission factors for the other cows were developed by taking the ratio of manure generated by the different types of cows to the milk cow and multiplying it by the milk cow emission factor. Jersey cows are 71% of emissions of Holstein cows.
- The VOC emission factors for the dairy animals are based on the District document entitled "Air Pollution Control Officer's Revision of the Dairy VOC Emissions Factor."
- The mitigation measures practiced at the dairy as well as the pre-project number, type, and size of silage piles are taken from the Rule 4570 Phase II application, processed under District project N-1110984.
- The dairy will continue to implement all Rule 4570 Phase II mitigation measures, except changes discussed in Rule 4570 compliance.
- All H_2S emissions from the dairy will be allocated to the lagoon/storage of the liquid manure handling permit unit, and will be assumed to be 10% of the post-project NH_3 emissions from the lagoon/storage pond.

B. Emission Factors (EF)

PM_{10}, VOC, NH_3, and H_2S:

The emissions calculations shown in Appendix B include the PM_{10}, VOC, NH_3, and H_2S emission factors from the animals and silage at this dairy. These emission factors will be used to calculate the pre-project and post-project PM_{10}, VOC, NH_3, and H_2S emissions from the dairy. However, only VOC and NH_3 emissions are expected directly from the cow milking operation, while PM_{10}, VOC, and NH_3 emissions are expected from the cow housing operation, VOC, and NH_3 from manure handling operations, H_2S from liquid manure handling operation and VOC emissions from the feed storage and handling operation.

C. Potential to Emit Calculations (PE)

All emission calculations for the dairy operation are included in Appendix B.

1. Pre-Project Potential to Emit (PE1)

A summary of the daily and annual pre-project emissions from the cow milking, cow housing, liquid manure handling operation, solid manure handling operation, and feed storage/handling permits are shown in the following tables.

Detailed potential to emit calculations for each emissions unit are shown in Appendix B.

Daily Pre-Project Potential to Emit (PE1) (lb/day)							
Permit Unit	NO_X	SO_X	PM_{10}	CO	VOC	NH_3	H_2S
N-7787-1-1	0.0	0.0	0.0	0.0	2.7	0.9	0.0
N-7787-2-2	0.0	0.0	9.3	0.0	74.7	280.9	0.0
N-7787-3-2	0.0	0.0	0.0	0.0	17.9	35.9	1.3
N-7787-4-1	0.0	0.0	0.0	0.0	3.5	16.1	0.0
N-7787-5-1	0.0	0.0	0.0	0.0	75.7	0.0	0.0
Annual Pre-Project Potential to Emit (PE1) (lb/yr)							
Permit Unit	NO_X	SO_X	PM_{10}	CO	VOC	NH_3	H_2S
N-7787-1-1	0	0	0	0	988	338	0
N-7787-2-2	0	0	3,440	0	27,306	102,563	0
N-7787-3-2	0	0	0	0	6,534	13,095	445
N-7787-4-1	0	0	0	0	1,290	5,878	0
N-7787-5-1	0	0	0	0	27,621	0	0

2. Post-Project Potential to Emit (PE2)

A summary of the daily and annual pre-project emissions from the cow milking, cow housing, liquid manure handling operation, solid manure handling operation, and feed storage/handling permits are shown in the following tables.

Detailed potential to emit calculations for each emissions unit are shown in Appendix B.

Daily Post-Project Potential to Emit (PE2) (lb/day)							
Permit Unit	NO_X	SO_X	PM_{10}	CO	VOC	NH_3	H_2S
N-7787-1-2	0.0	0.0	0.0	0.0	3.3	1.1	0.0
N-7787-2-3	0.0	0.0	50.9	0.0	114.6	394.2	0.0
N-7787-3-3	0.0	0.0	0.0	0.0	27.3	50.3	1.3
N-7787-4-2	0.0	0.0	0.0	0.0	5.3	22.6	0.0
N-7787-5-2	0.0	0.0	0.0	0.0	133.4	0.0	0.0
Annual Post-Project Potential to Emit (PE2) (lb/yr)							
Permit Unit	NO_X	SO_X	PM_{10}	CO	VOC	NH_3	H_2S
N-7787-1-2	0	0	0	0	1,200	410	0
N-7787-2-3	0	0	18,679	0	41,824	143,960	0

N-7787-3-3	0	0	0	0	9,953	18,366	445
N-7787-4-2	0	0	0	0	1,962	8,256	0
N-7787-5-2	0	0	0	0	48,694	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.

SSPE1 is summarized in the following table.

Pre-Project Stationary Source Potential to Emit [SSPE1] (lb/year)							
	NO_X	SO_X	PM_{10}	CO	VOC	NH_3	H_2S
N-7787-1-1	0	0	0	0	988	338	0
N-7787-2-2	0	0	3,440	0	27,306	102,563	0
N-7787-3-2	0	0	0	0	6,534	13,095	445
N-7787-4-1	0	0	0	0	1,290	5,878	0
N-7787-5-1	0	0	0	0	27,621	0	0
N-7787-6-0	585	1	3	58	30	0	0
Pre-Project SSPE [SSPE1]	**585**	**1**	**3,443**	**58**	**63,769**	**121,874**	**445**

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.

SSPE2 is summarized in the following table:

Post-Project Stationary Source Potential to Emit [SSPE2] (lb/year)							
	NO_X	SO_X	PM_{10}	CO	VOC	NH_3	H_2S
N-7787-1-2	0	0	0	0	1,200	410	0
N-7787-2-3	0	0	18,679	0	41,824	143,960	0
N-7787-3-3	0	0	0	0	9,953	18,366	445
N-7787-4-2	0	0	0	0	1,962	8,256	0
N-7787-5-2	0	0	0	0	48,694	0	0
N-7787-6-0	585	1	3	58	30	0	0
Post-Project SSPE [SSPE2]	**585**	**1**	**18,682**	**58**	**103,633**	**170,992**	**445**

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 below:

Milking Parlor:

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

Cow Housing:

Although there are smaller dairy farms that have enclosed housing barns, such barns are usually not fully enclosed and do not include any systems for the collection of emissions. In addition, the airflow requirements for dairy cows are extremely high, primarily for herd health reasons. Airflow requirements are expected to be even higher in places such as the San Joaquin Valley, where daytime temperatures can exceed 110 degrees for prolonged periods during the summer months. Given the high air flow

rates that will be involved, collection and control of the exhaust from housing barns is not only impractical but also cost prohibitive. The District therefore determines that emissions from housing barns cannot reasonably be captured, and are to be considered fugitive.

Manure Storage Areas:

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

Land Application:

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

Feed Handling and Storage:

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

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

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

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

As previously stated, emissions from liquid manure lagoons and storage ponds have

already been determined to be non-fugitive. The facility's non-fugitive stationary source potential emissions are summarized in the following tables:

Non-Fugitive SSPE1 (lb/year)						
Category	**NO_X**	**SO_X**	**PM_{10}**	**CO**	**VOC**	**H_2S**
N-7787-3-2 - Lagoons only	0	0	0	0	3,146[1]	445
N-7787-6-0 - Engine	585	1	3	58	30	0
Non-Fugitive SSPE1	**585**	**1**	**3**	**58**	**3,176**	**445**

Non-Fugitive SSPE2 (lb/year)						
Category	**NO_X**	**SO_X**	**PM_{10}**	**CO**	**VOC**	**H_2S**
N-7787-3-3 - Lagoons only	0	0	0	0	4,790[2]	445
N-7787-6-0 - Engine	585	1	3	58	30	0
Non-Fugitive SSPE2	**585**	**1**	**3**	**58**	**4,820**	**445**

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)	585	1	3	3	58	3,176
SSPE2 (lb/yr)	585	1	3	3	58	4,820
Major source threshold (lb/yr)	20,000	140,000	140,000	200,000	200,000	20,000
Major Source? (Y/N)	N	N	N	N	N	N

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

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

Rule 2410 Major Source Determination

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

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

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

The non-fugitive stationary source emissions from the preceding section have been

[1] From Appendix B - 'Pre-Project Potential to Emit (PE1)' sheet
[2] From Appendix B - 'Post-Project Potential to Emit (PE2)' sheet

converted into tons.[3] The PSD major source determination is summarized in the following table:

PSD Major Source Determination (tons/year)						
Permit Unit	NO_2	VOC	SO_2	CO	PM	PM_{10}
Estimated Facility PE before Project Increase	0.3	1.59	0	0.1	0	0
PSD Major Source Thresholds	250	250	250	250	250	250
PSD Major Source	No	No	No	No	No	No

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

6. Baseline Emissions

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.

As shown in Section VII.C.5 above, the facility is not a Major Source for any pollutant.

Therefore 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.

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

Since this facility is not a Major Source for any pollutants, this project does not constitute a Federal Major Modification. Additionally, since the facility is not a major source for PM_{10} (140,000 lb/year), it is not a major source for $PM_{2.5}$ (200,000 lb/year).

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 SJV and which are emitted in this project are (See 52.21 (b)(23) definition of significant):

- 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 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.

The facility or the equipment evaluated under this project is not listed as one of the categories specified in 40 CFR 52.21 (b)(1)(i). The PSD Major Source threshold is 250 tpy for any regulated NSR pollutant.

As previously stated, fugitive emissions at dairies are excluded in determining if a source is a major source for PSD. For this dairy, only emissions from the lagoon are non-fugitive emissions. However, all emissions from the milking parlor, housing, and feed storage/handling permits have been determined to be fugitive.

Project PSD Major Source Determination: Potential to Emit (tons/year)						
	NO_2	VOC	SO_2	CO	PM	PM_{10}
Total PE from New and Modified Units	0	2.41	0	0	0	0
PSD Major Source Thresholds	250	250	250	250	250	250
PSD Major Source	No	No	No	No	No	No

As shown in the table above, the potential to emit for the project, by itself, does not exceed any of the PSD major source thresholds. 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 D.

VIII. Compliance

Rule 1070 - Inspections

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

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

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

Rule 2010 - Permits Required

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

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

The facility has obtained all required Air District permits and is in compliance with the requirements of this rule.

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[4]:

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

[4] 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.

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.

a. New Emissions Units – PE > 2 lb/day

As discussed in Section I above, new forestall barn is a new emissions unit associated with this project. Based on the PE values in Appendix B, BACT is triggered for VOC and NH_3 emissions from new freestall barn and VOC, NH_3, and PM_{10} from six new corrals.

b. Relocation of Emissions Units – PE > 2 lb/day

There are no emissions units being relocated from one stationary source to another; therefore, BACT for relocated emission units is not triggered.

c. Modification of Emissions Units – AIPE > 2 lb/day

The milking parlor permit, cow housing permit, liquid manure handling, solid manure handling and feed storage and handling emission units are being modified. Therefore, the Adjusted Increase in Permitted Emissions (AIPE) must be calculated.

Based on the AIPE values in Appendix B, BACT is triggered for VOC emissions from the feed storage and handling permit for the total mixed ration (TMR).

N-7787-1-2
As shown in Appendix B, BACT is not triggered for VOC or NH_3 emissions for the existing milking parlor.

N-7787-2-3
As shown in Appendix F, BACT is not triggered for VOC, PM_{10}, or NH_3 emissions for any existing freestalls.

N-7787-3-3
The liquid manure handling emissions are estimated for the entire dairy. As shown in Appendix B, BACT is triggered for VOC and NH_3 emissions for the lagoon storage ponds; BACT is also triggered for VOC and NH_3 emissions for the liquid manure land application.

N-7787-4-2
The solid manure handling emissions are estimated for the entire dairy. As shown in Appendix B, BACT is triggered for NH_3 emissions for the solid manure storage/separated solids piles; BACT is also triggered for NH_3 emissions for the solid manure land application.

N-7787-5-2
The feed handling and storage emissions are estimated using type of feed commodity, number of stockpiles, size of stockpiles, and number of piles that stay open. As shown in Appendix F, BACT is triggered for VOC emissions from TMR.

d. SB 288/Federal Major Modification

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

2. BACT Guideline:

Draft BACT Guideline 5.8.2 applies to the dairy cow housing for freestall barns, 5.8.3 for open corral housing, 5.8.6 for lagoon/storage ponds, 5.8.7 for liquid manure land application, 5.8.8 for separated solid plies, and 5.8.9 for solid manure land applications, and 5.8.11 for dairy feed storage and handling system for total mixed ration (TMR) (Appendix F).

3. Top-Down BACT Analysis:

Per District Policy APR 1305, Section IX, "A top-down BACT analysis shall be performed as a part of the Application Review for each application subject to the BACT requirements pursuant to the District's NSR Rule."

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

Dairy Cow Housing – (N-7787-2-2):

Freestall Barn VOC & NH_3: Feed and Manure Management Practices.

- 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;
- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
- Properly sloping 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 exercise pens 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.

The Red Rock Dairy already employs these practices and therefore complies with BACT requirements.

Open Corrals

PM_{10}: Design and Management Practices

- Weekly scraping of open corrals using a pull-type scraper in the morning hours except when prevented by wet conditions.
- Concrete all feed lanes and walkways for all cows
- Shade structures in open corrals
- Feeding heifers dusk
- Windbreaks

VOC & NH_3: Feed and Manure Management Practices

- 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;
- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
- Properly sloping exercise pens (minimum of 3% slope where the available space for each animal is 400 square feet per animal 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 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.

The Red Rock Dairy has proposed these practices and therefore complies with BACT requirements.

The following conditions will be included on the proposed cow housing ATC to assure compliance with the BACT requirements of this rule:

- Open corrals and freestall exercise pens shall be scraped weekly using a pull-type scraper in the morning hours, except when this is prevented by wet conditions. [District Rule 2201]
- The feed lanes and feed walkways at this dairy shall be constructed of concrete. [District Rule 2201]
- Open corrals at this dairy shall be equipped with at least one shade structure. [District Rule 2201]
- At least one of the feedings of the heifers at this dairy shall be near (within one hour of) dusk. [District Rule 2201]
- Permittee shall establish windbreaks along 1,150 ft of the East boundary and 1,580 ft of the South boundary of the cow housing. South and East windbreaks shall consist of a first row (closest to the dairy) of Leland Cypress planted 10 feet apart and the final row shall consist of Aptos Blue Redwood tree planted 14 feet apart. Spacing between rows shall be sufficient to accommodate cultivation equipment. This spacing shall not exceed 20 feet. Any alternative windbreak proposal must be approved by the District. [District Rule 2201]

- Trees that are initially planted as part of the windbreak shall have a minimum container size of five gallons. [District Rule 2201]
- Windbreaks shall be irrigated and maintained for survivability and rapid growth. Dead trees and shrubs shall be replaced as necessary to maintain a windbreak density of 65%. [District Rule 2201]
- Density is the percentage of the background view that is obscured or hidden when viewing through the windbreak from 60 ft to 100 ft upwind of the rows. [District Rule 2201]
- The feed lanes and walkways for milk cows and dry cows at this dairy shall be flushed at least four times per day. The feed lanes and walkways in the corrals for the remaining animals at this dairy shall be flushed at least two times per day. [District Rule 2201]
- Permittee shall slope the surface of the pens at least 3% where the available space for each animal is 400 square feet or less and shall slope the surface of the pens at least 1.5% where the available space for each animal is more than 400 square feet per animal. [District Rules 2201 and 4570]
- Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570

Lagoon/Storage Ponds and Liquid Manure Land Application (N-7787-3-3)

Lagoon/Storage Ponds

As aforementioned, the existing anaerobic treatment lagoon will be converted to a storage pond. As a result of this change to the method of operation, the anaerobic treatment lagoon BACT requirements are no longer applicable and the corresponding conditions will not appear on the ATC. The covered digester lagoon will serve as the primary lagoon.

It is assumed that all emissions are captured and sent offsite; therefore, BACT is not required. Should the facility discontinue use of the digester system or remove the cover, compliance with the anaerobic treatment lagoon BACT requirements will be necessary and would need to be evaluated under a future project.

Land Application (VOC)

VOC: 1) Irrigation of crops using liquid/slurry manure from a secondary lagoon/holding/storage pond where preceded by an covered anaerobic treatment lagoon.

The following condition will be included on the proposed liquid manure handling ATC to assure compliance with the BACT requirements of this rule:

- Permittee shall only land apply liquid manure that has been treated in the lagoon, with the exception of periods of maintenance, repair, or cleaning. [District Rules 2201 and 4570]

Land Application (NH_3)

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

The following condition will be included on the proposed liquid manure handling ATC to assure compliance with the BACT requirements of this rule:

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

Solid Manure Land Application (N-7787-4-1)

Separated Solids NH_3: Animals fed in accordance with National Research Council (NRC) or other District-approved Guidelines.

Land application NH_3: rapid incorporation of solid manure into the soil after land application, and to feed all animals at the dairy in accordance with National Research Council (NRC) or other District-approved guidelines

The Red Rock Dairy already incorporate of solid manure into the soil soon after land application and feeds its herd in accordance with National Research Council (NRC) guidelines as per District Rule 4570 Mitigation Measures and therefore complies with BACT requirements.

Total Mixed Ration (TMR) (N-7787-5-1):

VOC: District Rule 4570 Measures.

The Red Rock Dairy already implements feed and TMR measure as per District Rule 4570 and therefore complies with BACT requirements.

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 table below.

Offset Determination (lb/year)					
	NO_X	**SO_X**	**PM_{10}**	**CO**	**VOC**
SSPE2	585	1	18,682	58	103,633
Offset Thresholds	20,000	54,750	29,200	200,000	20,000
Offsets triggered?	No	No	No	No	Yes

2. Quantity of Offsets Required

As seen above, the SSPE2 is greater than the offset thresholds for VOC. However, per Section 4.6.9 of Rule 2201, offsets are not required for agricultural operations that are not Major Sources. As indicated in Section VII.5 of this application review,

this agricultural operation is not a Major Source; therefore, offsets will not be required for any criteria pollutant.

C. Public Notification

1. Applicability

District Rule 2201, Section 5.4, requires a public notification for the affected pollutants from the following types of projects:

a. New Major Sources, SB-288 Major Modifications, and Federal Major Modifications.
b. New emission units with a PE > 100 lb/day of any one pollutant.
c. Any project which results in the offset thresholds being surpassed.
d. Any project with an SSIPE of greater than 20,000 lb/year for any pollutant.
e. Any project which results in a Title V significant permit modification.

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

Applications which include a new emissions unit with a Potential to Emit greater than 100 pounds during any one day for any pollutant will trigger public noticing requirements. New freestall barn associated with this project does not have PE > 100 lb/day for any pollutant; therefore public noticing is not required for this project for PE > 100 lb/day purposes.

c. Offset Threshold

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

Offset Threshold				
Pollutant	SSPE1 (lb/year)	SSPE2 (lb/year)	Offset Threshold	Public Notice Required?
NO_X	585	585	20,000 lb/year	No
SO_X	1	1	54,750 lb/year	No
PM_{10}	3,443	18,682	29,200 lb/year	No
CO	58	58	200,000 lb/year	No
VOC	63,769	103,633	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.

Stationary Source Increase in Permitted Emissions [SSIPE]					
Pollutant	SSPE2 (lb/year)	SSPE1 (lb/year)	SSIPE (lb/year)	SSIPE Public Notice Threshold	Public Notice Required?
NOx	585	585	0	20,000 lb/year	No
SOx	1	1	0	20,000 lb/year	No
PM_{10}	18,682	3,443	15,239	20,000 lb/year	No
CO	58	58	0	20,000 lb/year	No
VOC	103,633	63,769	39,864	20,000 lb/year	Yes
NH_3	170,992	121,874	49,118	20,000 lb/year	Yes
H_2S	445	445	0	20,000 lb/year	No

As demonstrated above, the SSIPEs for VOC and NH_3 was 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 VOC and NH_3 SSIPEs in excess of 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 District website prior to the issuance of the ATC for this equipment.

D. Daily Emissions Limits

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 DEL must be contained in the latest ATC and contained in or enforced by the latest PTO and enforceable, in a practicable manner, on a daily basis. DELs are also required to enforce the applicability of BACT.

For dairies, the DEL is satisfied based on the number and types of cows at the dairy, and any proposed mitigation measures. The number and types of cows are listed in the permit equipment description for the milking parlor and cow housing permits.

The following District Rule 2201 rule references will be added to the ATCs to ensure compliance with applicable BACT requirements and/or control efficiencies attributed to mitigation measures implemented at the facility. Some of the following conditions may reference District Rule 4570, as these are mitigation measures the facility has selected to comply with that rule.

N-7787-1-2 (Cow Milking)

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

N-7787-2-3 (Cow Housing)

- The total number of cattle housed at this dairy at any one time shall not exceed any of the following: 3,000 milk cows, 400 dry cows housed in freestall barns and loafing barn, and 2,089 support stock housed in open corrals. [District Rule 2201]
- Permittee shall establish windbreaks along 1,150 ft of the East boundary and 1,580 ft of the South boundary of the cow housing. South and East windbreaks shall consist of a first row (closest to the dairy) of Leland Cypress planted 10 feet apart and the final row shall consist of Aptos Blue Redwood tree planted 14 feet apart. Spacing between rows shall be sufficient to accommodate cultivation equipment. This spacing shall not exceed 20 feet. Any alternative windbreak proposal must be approved by the District. [District Rule 2201]
- Trees that are initially planted as part of the windbreak shall have a minimum container size of five gallons. [District Rule 2201]
- Windbreaks shall be irrigated and maintained for survivability and rapid growth. Dead trees and shrubs shall be replaced as necessary to maintain a windbreak density of 65%. [District Rule 2201]
- Density is the percentage of the background view that is obscured or hidden when viewing through the windbreak from 60 ft to 100 ft upwind of the rows. [District Rule 2201]
- The feed lanes and feed walkways at this dairy shall be constructed of concrete. [District Rule 2201]
- 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]
- The feed lanes and walkways for milk cows and dry cows at this dairy shall be flushed at least four times per day. The feed lanes and walkways in the corrals for the remaining animals at this dairy shall be flushed at least two times per day. [District Rule 2201]
- At least one of the feedings of the heifers at this dairy shall be near (within one hour of) dusk. [District Rule 2201]
- Open corrals and freestall exercise pens shall be scraped weekly using a pull-type scraper in the morning hours, except when this is prevented by wet conditions. [District Rule 2201]
- Permittee shall slope the surface of the pens at least 3% where the available space for each animal is 400 square feet or less and shall slope the surface of the pens at least 1.5% where the available space for each animal is more than 400 square feet per animal. [District Rules 2201 and 4570]
- Permittee shall flush, scrape or vacuum freestall lanes immediately prior to, immediately after or during each milking. [District Rules 2201 and 4570]

- Permittee shall remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every seven (7) days. [District 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]
- Permittee shall clean manure from corrals at least four (4) times per year with at least sixty (60) days between each cleaning, or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]
- Permittee shall clean concreted lanes such that the depth of manure does not exceed twelve (12) inches at any point or time. [District Rules 2201 and 4570]
- 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]
- 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]
- Open corrals at this dairy shall be equipped with at least one shade structure. [District Rule 2201]

N-7787-3-3 (Liquid Manure Handling)

- The VOC content of the digester gas produced by the digester system shall not exceed 10% by weight. [District Rule 2201] N
- The oxygen/air injection system shall be maintained and operated in accordance with the supplier's recommendations to minimize the concentration of hydrogen sulfide (H2S) in the digester gas. [District Rule 2201] N
- Permittee shall remove solids with a solid separator system, prior to the manure entering the lagoon. [District Rules 2201 and 4570] N
- Permittee shall only land apply liquid manure that has been treated in the lagoon, with the exception of periods of maintenance, repair, or cleaning. [District Rules 2201 and 4570] N

N-7787-4-2 (Solid Manure Handling)

- Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
- 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]
- Solid manure applied to fields shall be incorporated into the soil immediately (within two hours) after application. [District Rules 2201 and 4570]

N-7787-5-2 (Feed Storage and Handling)

- Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
- 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]
- Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
- Permittee shall store grain in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]
- Permittee shall feed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. [District Rules 2201 and 4570]
- For bagged silage/feedstuff, permittee shall utilize a sealed feed storage system (e.g., ag bag). [District Rules 2201 and 4570]
- 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]
- 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]
- 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]
- 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]

- 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]
- 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

The following measures shall be taken to ensure continued compliance with District Rules.

1. Source Testing

No source testing is currently required for dairy operations.

2. Monitoring

No monitoring is required to demonstrate compliance with Rule 2201.

3. Record Keeping

No recordkeeping is required for Rule 2201 compliance. However, the facility will need to maintain records for compliance with District Rule 4570. Recordkeeping requirements will be discussed under the Rule 4570 discussion section.

N-7787-1-2 (Cow Milking)

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

N-7787-2-3 (Cow Housing)

- 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]

- Permittee shall maintain records to demonstrate that the surface of the pens are sloped and maintained properly to ensure proper drainage. [District Rules 2201 and 4570]
- Permittee shall maintain records sufficient to demonstrate that freestall lanes are flushed, scraped or vacuumed immediately prior to, immediately after or during each milking. [District Rules 2201 and 4570]
- Permittee shall record the date that manure that is not dry is removed from individual cow freestall beds or freestall bedding is raked, harrowed, scraped, or graded at least once every seven (7) days. [District Rules 2201 and 4570]
- 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]
- Permittee shall demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning or demonstrate that corrals are cleaned at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]
- Permittee shall measure and document the depth of manure on the concrete lanes at least once every ninety (90) days. [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 maintain a record of the number of animals of each species and production group at the facility and shall maintain quarterly records of any changes to this information. [District Rules 2201 and 4570]
- Permittee shall maintain records of: (1) the number of times feed lanes are flushed per day and (2) the frequency of scraping and manure removal from open corrals. [District Rules 2201 and 4570]
- Permittee shall maintain a record of the number of animals of each production group at the Facility and shall maintain quarterly records of any changes to this information. Such records may include DHIA monthly records, milk production invoices, ration sheets or periodic inventory records. [District Rules 2201 and 4570]
- Permittee shall maintain records of the daily local evaporation rate/soil evaporation rate and the amount of water (inches or cm) applied to the corral surface. Records of sprinkler run time and flow rate may be used to satisfy this requirement. [District Rule 2201]
- All records shall be kept and maintained for a minimum of five (5) years and shall be made available to the APCO, ARB and EPA upon request. [District Rules 2201 and 4570]

<u>N-7787-3-3 (Liquid Manure Handling)</u>

- Permittee shall maintain records to demonstrate that only liquid manure treated in the lagoon is applied to fields. [District Rules 2201 and 4570] N
- 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] N

- 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] N
- 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]

N-7787-4-2 (Solid Manure Handling)

- 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]
- 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]
- 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]
- 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]
- All records shall be kept and maintained for a minimum of five (5) years and shall be made available to the APCO, ARB and EPA upon request. [District Rules 2201 and 4570]

N-7787-5-2 (Feed Storage and Handling)

- 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]
- 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]
- 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]
- 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]
- Permittee shall maintain records to demonstrate animals are fed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. Records such as feed company guaranteed analyses (feed

tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]

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

4. Reporting

No reporting is required to demonstrate compliance with Rule 2201.

F. Ambient Air Quality Analysis (AAQA)

An AAQA shall be conducted for the purpose of determining whether a new or modified Stationary Source will cause or make worse a violation of an air quality standard. The District's Technical Services Division conducted the required analysis. Refer to **Appendix H** of this document for the AAQA summary sheet.

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

The proposed location is in a non-attainment area for the state's PM_{10} as well as federal and state $PM_{2.5}$ thresholds. As shown by the AAQA summary sheet the proposed equipment will not cause a violation of an air quality standard for PM_{10} and $PM_{2.5}$.

Rule 2410 – Prevention of Significant Deterioration (PSD)

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 to emit does not exceed any major source thresholds of Rule 2201, this facility is not a major source, and Rule 2520 does not apply.

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

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

Under Rule 2550, newly constructed facilities or reconstructed units or sources[5] at existing facilities would be subject to preconstruction review requirements if they have the potential to emit hazardous air pollutants (air toxics) in "major" amounts (10 tons or more of an individual pollutant or 25 tons or more of a combination of pollutants) and the new units are not already subject to a standard promulgated under Section 112(d), 112(j), or 112(h) of the Clean Air Act." Facilities or sources subject to Rule 2550 would be subject to stringent air pollution control requirements, referred to Maximum Achievable Control Technology.

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

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

of controlled emissions levels. The following is a list of HAPs generated at dairies including the associated emission factor.

Hazardous Air Pollutant Emissions		
HAP	lbs-milk cow-yr	Source
Methanol	1.35	UC Davis - *VOC Emission from Dairy Cows and their Excreta,* 2005
Carbon disulfide	0.027	Dr. Schmidt - *Dairy Emissions using Flux Chambers (Phase I & II)*, 2005
Ethylbenzene	0.003	
o-Xylene	0.005	
1,2-Dibromo-3chloropropane	0.011	
1,2,4-Trichlorobenzene	0.025	
Napthalene	0.012	
Hexachlorobutadiene	0.012	
Formaldehyde	0.005	
Acetaldehyde	0.029	
Chloroform	0.017	California State University Fresno (CSUF) - *Monitoring and Modeling of ROG at California Dairies*, 2005
Styrene	0.01	
Vinyl acetate[6]	0.08	Dr. Schmidt - *Dairy Emissions using Flux Chambers (Phase I & II)* & California State University Fresno (CSUF) - *Monitoring and Modeling of ROG at California Dairies*, 2005
Toluene[7]	0.162	
Cadmium	0.009	Air Resources Board's Profile No. 423, Livestock Operations Dust
Hexavalent Chromium	0.004	
Nickel	0.026	
Arsenic	0.005	
Cobalt	0.003	
Lead	0.033	
Total	**1.828**	

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

HAP Emissions						
Type of Cow	**Number of cows**		**Emission Factor lbs/hd-yr[8]**		**lbs/yr**	**tons/yr**
Milking Cows	3,000	x	1.828	=	5,484	2.7
Dry Cows	400	x	1.123	=	449	0.3
Support Stock	2,089	x	1.123	=	2,346	1.2
Total				=	**8,279**	**4.2**

[6] 0.01 + 0.07 = 0.08 lbs/hd-yr
[7] 0.012 + 0.15 = 0.162 lbs/hd-yr
[8] The emission factor has been adjusted for each type of cow based on the ratio of amount of manure generated for each cow.

As shown above, each individual HAP is expected to be below 10 tons per year and total HAP emissions are expected to be below 25 tons per year. The largest individual HAP would be methanol, at 3.1 tons per year (4.2 tons/yr x (1.35 lbs-methanol/1.828 lbs-HAPs)). Therefore, this facility will not be a major air toxics source and the provisions of Rule 2550 do not apply.

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

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

Rule 4001 - New Source Performance Standards (NSPS)

This rule incorporates NSPS from Part 60, Chapter 1, Title 40, Code of Federal Regulations (CFR); and applies to all new sources of air pollution and modifications of existing sources of air pollution listed in 40 CFR Part 60. However, no subparts of 40 CFR Part 60 apply to dairies.

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

This rule incorporates NESHAPs from Part 61, Chapter I, Subchapter C, Title 40, CFR and the NESHAPs from Part 63, Chapter I, Subchapter C, Title 40, CFR; and applies to all sources of hazardous air pollution listed in 40 CFR Part 61 or 40 CFR Part 63. However, no subparts of 40 CFR Part 61 or 40 CFR Part 63 apply to dairies.

Rule 4101 - Visible Emissions

Rule 4101 states that no air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity.

Pursuant to section 4.12, emissions subject to or specifically exempt from Regulation VIII (Fugitive PM_{10} Prohibitions) are exempt from Rule 4101.

Pursuant to District Rule 8011, section 4.12, on-field agricultural sources are exempt from the requirements of Regulation VIII.

On-field agricultural sources are defined in Rule 8011, section 3.35 as the following:

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

Therefore, activities conducted solely for the purpose of raising fowl or animals are exempt from the requirements of Regulation VIII and Rule 4101.

Rule 4102 – Nuisance

Rule 4102 prohibits discharge of air contaminants which could cause injury, detriment, nuisance or annoyance to the public. Public nuisance conditions are not expected as a result of these operations, provided the equipment is well maintained. Therefore, compliance with this rule is expected.

California Health & Safety Code 41700 (Health Risk Analysis)

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

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

The RMR summery for this dairy is shown below in the following table:

Units	Prioritization Score	Acute Hazard Index	Chronic Hazard Index	Maximum Individual Cancer Risk	T-BACT Required	Special Permit Requirements
1-2	0.02	0.00	0.00	5.12E-09	No	No
2-3	2.00	0.08	0.07	1.87E-06	No	No
3-3	7.74	0.01	0.00	1.54E-06	No	No
4-2	0.00	0.00	0.00	0.00E+00	No	No
5-2	NA[1]	NA[1]	NA[1]	NA[1]	No	No
Project Totals	9.76	0.09	0.07	3.41E-06		
Facility Totals	>1	0.29	0.07	5.99E-06		

Notes:
1. There is no risk associated with Unit 5 as the District does not have an approved toxic speciation profile for dairy feed and storage handling operations.

The AAQA summery for this dairy is shown below in the following table:

Pollutant	Air Quality Standard (State/Federal)				
	1 Hour	3 Hours	8 Hours	24 Hours	Annual
PM_{10}				Pass[3]	Pass[3]
$PM_{2.5}$				Pass[4]	Pass[4]

Notes:
1. Results were taken from the attached AAQA Report.
2. The criteria pollutants are below EPA's level of significance as found in 40 CFR Part 51.165 (b)(2) unless otherwise noted below.
3. Modeled PM10 concentrations were below the District SIL for non-fugitive sources of 5 $\mu g/m^3$ for the 24-hour average concentration and 1 $\mu g/m^3$ for the annual concentration.
4. Modeled PM2.5 concentrations were below the District SIL for non-fugitive sources of 1.2 $\mu g/m^3$ for the 24-hour average concentration and 0.2 $\mu g/m^3$ for the annual concentration.

Discussion of T-BACT

BACT for toxic emission control (T-BACT) is required if the cancer risk exceeds one in one million. As demonstrated above, T-BACT is not required for this project because the HRA indicates that the risk is not above the District's thresholds for triggering T-BACT requirements; therefore, compliance with the District's Risk Management Policy is expected.

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

Rule 4550 - Conservation Management Practices

This rule applies to agricultural operation sites located within the San Joaquin Valley Air Basin. The purpose of 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 initial CMP plan on May 20, 2013. Continued compliance with the requirements of District Rule 4550 is expected.

Rule 4570 - Confined Animal Facilities (CAF)

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

PTOs incorporating Phase II mitigation measures of District Rule 4570, as evaluated under District project N-1110984 have already been issued to this dairy. Under this project, the

applicant has not proposed any changes to the mitigation measures currently practiced at both dairies; no further discussion is required.

For cow housing permit unit N-7787-2-3, the following mitigation measure is being changed as a result of the dairy now housing support stock into open corrals.

- 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]

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

- 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]

- 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]

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

- Permittee shall clean concreted lanes such that the depth of manure does not exceed twelve (12) inches at any point or time [District Rules 2201 and 4570]

- Permittee shall measure and document the depth of manure on the concrete lanes at least once every ninety (90) days. [District Rules 2201 and 4570]

- 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]

- 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]

- 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]

- 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 Rule 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]

No further requirements for Rule 4570 compliance will be added to the milking parlor, liquid manure handling, and feed storage and handling permits. The PTO condition will be carried over to the respective ATCs for these permit units.

California Health & Safety Code 42301.6 (School Notice)

California Health & Safety Code Section 42301.6 requires that the District prepare a school notice prior to approving an application for a permit to construct or modify a source that emits toxic air emissions which is located within 1,000 feet from the outer boundary of a K-12 school site. The District has verified that this facility is not located within 1,000 feet of any K-12 school. Therefore, a school notice is not required.

California Environmental Quality Act (CEQA)

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

- Inform governmental decision-makers and the public about the potential, significant environmental effects of proposed activities.
- Identify the ways that environmental damage can be avoided or significantly reduced.
- Prevent significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures when the governmental agency finds the changes to be feasible.
- Disclose to the public the reasons why a governmental agency approved the project in the manner the agency chose if significant environmental effects are involved.

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

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

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

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 criteria pollutant emissions and toxic air contaminant emissions associated with the proposed project are not significant, and there is minimal potential for public concern for this particular type of facility/operation. Therefore, an Indemnification Agreement and/or a Letter of Credit will not be required for this project in the absence of expressed public concern.

IX. Recommendation

Compliance with all applicable rules and regulations is expected. Pending a successful NSR Public Noticing period, issue ATC permits N-7787-1-2, N-7787-2-3, N-7787-3-3, N-7787-4-2, and N-7787-5-2 subject to the permit conditions on the attached draft ATC permits in Appendix I.

X. Billing Information

ATC Number	Fee Schedule	Fee Description
N-7787-1-2	3020-06	Cow Milking Parlor
N-7787-2-3	3020-06	Cow Housing
N-7787-3-3	3020-06	Liquid Manure Handling
N-7787-4-2	3020-06	Solid Manure Handling
N-7787-5-2	3020-06	Feed & Storage Handling

XI. Appendices

Appendix A: Current Permit to Operate N-7787-1-1, N-7787-2-2, N-7787-3-1, N-7787-4-1, and N-7787-5-1
Appendix B: Dairy Emissions Calculations
Appendix C: Major Source Determination
Appendix D: QNEC
Appendix E: Site Map
Appendix F: BACT Guidelines
Appendix G: Top-Down BACT Analysis
Appendix H: Risk Management Review & AAQA Summary
Appendix I: Draft Authority to Construct N-7787-1-2, N-7787-2-3, N-7787-3-3, N-7787-4-2, and N-7787-5-2

Appendix A

Current Permits to Operate N-7787-1-1, N-7787-2-2, N-7787-3-2, N-7787-4-1, and N-7787-5-1

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: N-7787-1-1 **EXPIRATION DATE:** 06/30/2022

EQUIPMENT DESCRIPTION:
2,650 COW MILKING OPERATION WITH ONE 72 STALL ROTARY 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. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]
4. If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
5. Permittee shall flush or hose milk parlor immediately prior to, immediately after, or during each milking. [District Rules 2201 and 4570]
6. Permittee shall provide verification that milk parlors are flushed or hosed prior to, immediately after, or during each milking. [District Rules 2201 and 4570]
7. 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]

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: N-7787-2-2 **EXPIRATION DATE:** 06/30/2022

EQUIPMENT DESCRIPTION:
COW HOUSING - 2,650 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 3,000 MATURE COWS (MILK AND DRY); AND FIVE AND HALF FREESTALL BARNS AND A LOAFING BARN WITH FLUSH/SCRAPE SYSTEM

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]
4. If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
5. The total number of cattle housed at this dairy at any one time shall not exceed any of the following: 2,650 milk cows and 350 dry cows housed in freestall barns with no exercise pens. [District Rule 2201]
6. Feed lanes and walkways for mature cows (milk and dry cows) shall be flushed four times per day. Feed lanes and walkways for the heifers shall be flushed at least twice per day. [District Rules 2201 and 4570]
7. Permittee shall maintain an operating plan that requires feed lanes and walkways for mature cows (milk and dry cows) are flushed four times per day and feed lanes and walkways for the heifers are flushed at least twice per day. [District Rules 2201 and 4570]
8. Permittee shall establish windbreaks along 1,150 ft of the East boundary and 1,580 ft of the South boundary of the cow housing. South and East windbreaks shall consist of a first row (closest to the dairy) of Leland Cypress planted 10 feet apart and the final row shall consist of Aptos Blue Redwood tree planted 14 feet apart. Spacing between rows shall be sufficient to accommodate cultivation equipment. This spacing shall not exceed 20 feet. Any alternative windbreak proposal must be approved by the District. [District Rule 2201]
9. Trees that are initially planted as part of the windbreak shall have a minimum container size of five gallons. [District Rule 2201]
10. Windbreaks shall be irrigated and maintained for survivability and rapid growth. Dead trees and shrubs shall be replaced as necessary to maintain a windbreak density of 65%. [District Rule 2201]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

11. Density is the percentage of the background view that is obscured or hidden when viewing through the windbreak from 60 ft to 100 ft upwind of the rows. [District Rule 2201]
12. All animals at this dairy shall be fed in accordance with the National Research Council (NRC) guidelines utilizing routine dairy nutritionist analyses of rations. [District Rule 2201]
13. 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]
14. Permittee shall remove manure that is not dry from individual cow freestall beds or shall rake, harrow, scrape, or grade freestall bedding at least once every seven (7) days. [District Rule 4570]
15. Permittee shall record either of the following: 1) the dates when manure that is not dry is removed from individual cow freestall beds or 2) the dates when the freestall bedding is raked, harrowed, scraped, or graded. [District Rule 4570]
16. Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rules 2201 and 4570]
17. 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]
18. 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]
19. 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]

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: N-7787-3-1 **EXPIRATION DATE:** 06/30/2022

EQUIPMENT DESCRIPTION:
LIQUID MANURE HANDLING SYSTEM CONSISTING OF MECHANICAL SEPARATOR(S); ONE ANAEROBIC TREATMENT LAGOON (922 'X 372' X 14'), AND ONE STORAGE POND; MANURE IS LAND APPLIED THROUGH FLOOD/FURROW IRRIGATION

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]
4. If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
5. Permittee shall only land apply liquid manure that has been treated in the lagoon, with the exception of periods of maintenance, repair, or cleaning. [District Rules 2201 and 4570]
6. Permittee shall maintain records to demonstrate that only liquid manure treated in the lagoon is applied to fields. [District Rules 2201 and 4570]
7. Permittee shall remove solids with a solid separator system, prior to the manure entering the lagoon. [District Rules 2201 and 4570]
8. Permittee shall use an anaerobic treatment lagoon designed according to NRCS Guideline No. 359. [District Rules 2201 and 4570]
9. Permittee shall maintain design specifications, calculations, including Minimum Treatment Volume (MTV), Hydraulic Retention Time (HRT) demonstrating that the anaerobic treatment lagoon meets the requirements listed in the NRCS Field Office Technical Guide Code 359. [District Rules 2201 and 4570]
10. 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]
11. 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]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

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

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: N-7787-4-1 **EXPIRATION DATE:** 06/30/2022

EQUIPMENT DESCRIPTION:
SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; SOLID MANURE APPLICATION TO LAND AND/OR 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. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]
4. If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
5. Within seventy two (72) hours of removal of separated solids from the drying process, permittee shall either 1) remove separated solids from the facility, or 2) 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 twenty-four (24) hours per event. [District Rules 2201 and 4570]
6. Permittee shall keep records of dates when separated solids are removed from the facility or permittee shall maintain records to demonstrate that separated solids piles outside the pens are covered with a weatherproof covering from October through May. [District Rules 2201 and 4570]
7. Permittee shall maintain records, such as manufacturer warranties or other documentation, demonstrating that the weatherproof covering over separated solids 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 201 and 4570]
8. Permittee shall incorporate all solid manure within seventy-two (72) hours of land application. [District Rules 2201 and 4570]
9. Permittee shall maintain records to demonstrate that all solid manure has been incorporated within seventy-two (72) hours of land application. [District Rules 2201 and 4570]
10. 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]

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: N-7787-5-1 **EXPIRATION DATE:** 06/30/2022

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

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]
4. If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
5. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
6. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
7. Permittee shall push feed so that it is within three feet of feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]
8. Permittee shall maintain an operating plan or record that requires feed to be pushed within three feet of feedlane fence within two hours of putting out the feed, or use of a feed trough or other structure designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]
9. Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
10. Permittee shall maintain an operating plan or record of when feeding of total mixed rations began within two hours of grinding and mixing rations. [District Rules 2201 and 4570]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

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

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

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

14. Permittee shall maintain records to demonstrate animals are fed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]

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

16. 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]

17. 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]

18. 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]

19. 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]

20. 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]

21. 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]

22. 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]

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

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

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

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 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]

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

27. 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]

28. 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]

29. 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]

30. 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]

31. 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]

Appendix B
Dairy Emissions Calculations

Rev. January 6, 2020

Pre-Project Facility Information

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

Pre-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals
Milk Cows	2,470				2,470
Dry Cows	130		270		400
Support Stock (Heifers, Calves, and Bulls)					0
Large Heifers					0
Medium Heifers					0
Small Heifers					0
Bulls					0

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

Total Herd Summary

Total Milk Cows	2,470
Total Mature Cows	2,870
Support Stock (Heifers, Calves, and Bulls)	0
Total Calves	0
Total Dairy Head	2,870

Pre-Project Silage Information

Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	1	15	100
Alfalfa	1	10	36
Wheat	1	12	75

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/storage pond? yes
   Answering "yes" assumes worst case.
6. Does this project result in an increase or relocation of uncovered surface area for any lagoon/storage pond? no

Post-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals
Milk Cows	3,000				3,000
Dry Cows	130		270		400
Support Stock (Heifers, Calves, and Bulls)				2,089	2,089
Large Heifers					0
Medium Heifers					0
Small Heifers					0
Bulls					0

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

Total Herd Summary

Total Milk Cows	3,000
Total Mature Cows	3,400
Support Stock (Heifers, Calves, and Bulls)	2,089
Total Calves	0
Total Dairy Head	5,489

Post-Project Silage Information

Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	1	15	100
Alfalfa	1	10	36
Wheat	1	12	75

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		
☑	☑	(D) Feed according to NRC guidelines	10%	10%
		Total Control Efficiency	10%	10%
		Milking Parlor Floor Mitigations		
☑	☑	(D) Feed according to NRC guidelines	10%	10%
☑	☑	(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).	10%	10%
☑	☑	Implement one of the following: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 sq ft or less and slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 sq ft; 2) maintain corrals to ensure proper drainage preventing water from standing more than 48 hrs; 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface. Note: If selected for dairies > 999 milk cows, CE already included in EF.	0%	0%
☐	☐	Install shade structures such that they are constructed with a light permeable roofing material. Note: If selected for dairies > 999 milk cows, the control efficiency will be 5% since the EF used includes a partial control for this measure.	0%	0%
☐	☐	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	19.00%	19.00%
		Bedding Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%

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

Liquid Manure Handling				
Measure Proposed?		**Mitigation Measure(s) per Emissions Point**	**VOC Control Efficiency (%)**	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Lagoons/Storage Ponds Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%
☐	☐	Use phototropic lagoon	0%	0%
☐	☐	Use an anaerobic treatment lagoon designed according to NRCS Guideline No. 359, or aerobic treatment lagoon, or mechanically aerated lagoon, or covered lagoon digester vented to a control device with minimum 95% control	0%	0%
☑	☑	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%	10.00%
		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%	0%
☑	☑	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%	10.00%

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%
☐	☐	**LARGE CAFO ONLY**: Within 72 hours of removal from housing, either a) remove dry manure from the facility, or b) cover dry manure outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed 24 hours per event.	0%	0%
		Total Control Efficiency	10.00%	10.00%
		Separated Solids Piles Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%
☑	☑	**LARGE CAFO ONLY**: 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.	10%	10%
		Total Control Efficiency	19.00%	19.00%
		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.	10%	10%
☐	☐	Remove uneaten wet feed from feed bunks within 24 hrs after then end of a rain event.	0%	0%
☐	☐	**(D)** For total mixed rations that contain at least 30% by weight of silage, feed animals total mixed rations that contain at least 45% moisture.	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		
☑	☑	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.	0%	0%
		Total Control Efficiency	28%	28%
		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.	80%	80%
		Total Control Efficiency	85.6%	85.6%
		Liquid Manure Land Application Mitigations		
☑	☑	Feed according to NRC guidelines	28%	28%
☑	☑	Only apply liquid manure that has been treated with an anaerobic treatment lagoon	42%	42%
		Total Control Efficiency	58.24%	58.24%

Solid Manure Handling				
Measure Proposed?		**Mitigation Measure(s) per Emissions Point**	**NH3 Control Efficiency (%)**	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Solid Manure Land Application Mitigations		
☑	☑	Feed according to NRC guidelines	28%	28%
☑	☑	Incorporate all solid manure within 72 hours of land application. **AND** Only apply solid manure that has been treated with an anaerobic treatment lagoon, aerobic lagoon or digester system. **AND** Apply no solid manure with a moisture content of more than 50%	42%	42%
		Total Control Efficiency	58.24%	58.24%

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	5.35	5.35	5.40	3.59	2.91	2.91	4.20	2.76	2.23	2.23	2.85	1.88	1.52	1.52	1.60	1.04	0.85	0.85	0.75	0.50	0.41	0.41	2.55	1.67	1.35	1.35
		Bedding	1.05	1.00	0.81	0.81	0.57	0.54	0.44	0.44	0.44	0.42	0.34	0.34	0.30	0.28	0.23	0.23	0.17	0.16	0.13	0.13	0.08	0.08	0.06	0.06	0.27	0.25	0.20	0.20
		Lanes	0.84	0.80	0.65	0.65	0.45	0.44	0.35	0.35	0.35	0.33	0.27	0.27	0.24	0.23	0.18	0.18	0.13	0.13	0.10	0.10	0.06	0.06	0.05	0.05	0.21	0.20	0.16	0.16
		Total	**15.78**	**12.09**	**10.13**	**10.13**	**8.75**	**6.80**	**5.71**	**5.71**	**6.81**	**5.22**	**4.38**	**4.38**	**4.62**	**3.56**	**2.99**	**2.99**	**2.59**	**1.98**	**1.66**	**1.66**	**1.22**	**0.95**	**0.80**	**0.80**	**4.13**	**3.16**	**2.65**	**2.65**
	NH3	Enteric Emissions in Cow Housing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Corrals/Pens	41.90	41.90	30.17	30.17	21.20	21.20	15.26	15.26	11.00	11.00	7.92	7.92	7.90	7.90	5.69	5.69	6.00	6.00	4.32	4.32	1.80	1.80	1.30	1.30	15.30	15.30	11.02	11.02
		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**	**38.38**	**38.38**	**27.00**	**27.00**	**19.44**	**19.44**	**14.00**	**14.00**	**10.08**	**10.08**	**10.10**	**10.10**	**7.27**	**7.27**	**7.60**	**7.60**	**5.47**	**5.47**	**2.30**	**2.30**	**1.66**	**1.66**	**19.50**	**19.50**	**14.04**	**14.04**
Liquid Manure Handling	**VOC**	Lagoons/Storage Ponds	1.52	1.30	1.17	1.17	0.82	0.71	0.64	0.64	0.64	0.54	0.49	0.49	0.43	0.37	0.33	0.33	0.24	0.21	0.19	0.19	0.11	0.10	0.09	0.09	0.40	0.33	0.30	0.30
		Liquid Manure Land Application	1.64	1.40	1.26	1.26	0.89	0.76	0.69	0.69	0.69	0.58	0.53	0.53	0.47	0.40	0.36	0.36	0.26	0.22	0.20	0.20	0.12	0.11	0.10	0.10	0.42	0.35	0.32	0.32
		Total	**3.16**	**2.70**	**2.43**	**2.43**	**1.71**	**1.47**	**1.33**	**1.33**	**1.33**	**1.13**	**1.02**	**1.02**	**0.90**	**0.77**	**0.69**	**0.69**	**0.51**	**0.43**	**0.38**	**0.38**	**0.24**	**0.21**	**0.18**	**0.18**	**0.82**	**0.68**	**0.61**	**0.61**
	NH3	Lagoons/Storage Ponds	8.20	8.20	1.18	1.18	4.20	4.20	0.60	0.60	2.20	2.20	0.32	0.32	1.50	1.50	0.22	0.22	1.20	1.20	0.17	0.17	0.35	0.35	0.05	0.05	3.00	3.00	0.43	0.43
		Liquid Manure Land Application	8.90	8.90	3.72	3.72	4.50	4.50	1.88	1.88	2.30	2.30	0.96	0.96	1.70	1.70	0.71	0.71	1.30	1.30	0.54	0.54	0.37	0.37	0.15	0.15	3.23	3.23	1.35	1.35
		Total	**17.10**	**17.10**	**4.90**	**4.90**	**8.70**	**8.70**	**2.48**	**2.48**	**4.50**	**4.50**	**1.28**	**1.28**	**3.20**	**3.20**	**0.93**	**0.93**	**2.50**	**2.50**	**0.72**	**0.72**	**0.72**	**0.72**	**0.20**	**0.20**	**6.23**	**6.23**	**1.78**	**1.78**
Solid Manure Handling	**VOC**	Solid Manure Storage	0.16	0.15	0.14	0.14	0.09	0.08	0.07	0.07	0.07	0.06	0.06	0.06	0.05	0.04	0.04	0.04	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.04	0.04	0.04	0.04
		Separated Solids Piles	0.06	0.06	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02
		Solid Manure Land Application	0.39	0.33	0.30	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**	**0.48**	**0.48**	**0.33**	**0.29**	**0.26**	**0.26**	**0.26**	**0.23**	**0.20**	**0.20**	**0.17**	**0.15**	**0.14**	**0.14**	**0.10**	**0.09**	**0.08**	**0.08**	**0.05**	**0.04**	**0.04**	**0.04**	**0.16**	**0.14**	**0.12**	**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	0.87	0.87	1.06	1.06	0.44	0.44	0.55	0.55	0.23	0.23	0.39	0.39	0.16	0.16	0.30	0.30	0.13	0.13	0.09	0.09	0.04	0.04	0.76	0.76	0.32	0.32
		Total	**3.42**	**3.42**	**2.20**	**2.20**	**1.73**	**1.73**	**1.11**	**1.11**	**0.90**	**0.90**	**0.58**	**0.58**	**0.64**	**0.64**	**0.41**	**0.41**	**0.48**	**0.48**	**0.31**	**0.31**	**0.15**	**0.15**	**0.10**	**0.10**	**1.25**	**1.25**	**0.81**	**0.81**

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 Loafing Barns	2.73	SJVAPCD
Heifers/Bulls in Loafing Barns	5.28	SJVAPCD
Calves in Loafing Barns	0.69	SJVAPCD
Milk/Dry in Corrals	5.46	Based on a Summer 2003 study by Texas A&M ASAE at a West Texas Dairy
Support Stock (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)
Large Heifers in Open Corrals	8.01	SJVAPCD
Calf (under 3 mo.) open corrals	1.37	SJVAPCD
Calf on-ground hutches	0.343	SJVAPCD
Calf above-ground flushed	0.069	SJVAPCD
Calf above-ground scraped	0.206	SJVAPCD

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

PM10 Mitigation Measures and Control Efficiencies

Control Measure	PM10 Control Efficiency
Shaded corrals (milk and dry cows)	16.7%
Shaded corrals (heifers and bulls)	8.3%
Downwind shelterbelts	12.5%
Upwind shelterbelts	10%
Freestall with no exercise pens and non-manure based bedding	90%
Freestall with no exercise pens and manure based bedding	80%
Fibrous layer in dusty areas (i.e. hay, etc.)	10%
Bi-weekly corral/exercise pen scraping and/or manure removal using a pull type manure harvesting equipment in morning hours when moisture in air except during periods of rainy weather	15%
Sprinkling of open corrals/exercise pens	12.5%
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 Each 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	FS1	freestall	milk cows	530	530	1	☐	☑	☐	☐	☐	☐	☐	☐	☐
2	FS2	freestall	milk cows	530	530	1	☐	☑	☐	☐	☐	☐	☐	☐	☐
3	FS3	freestall	milk cows	120	120	1	☐	☑	☐	☐	☐	☐	☐	☐	☐
4	FS3.5	freestall	dry cows	130	130	1	☐	☑	☐	☐	☐	☐	☐	☐	☐
5	FS4	freestall	milk cows	530	530	1	☐	☑	☐	☐	☐	☐	☐	☐	☐
6	FS5	freestall	milk cows	530	530	1	☐	☑	☐	☐	☐	☐	☐	☐	☐
7	FS6	freestall	milk cows	230	230	1	☐	☑	☐	☐	☐	☐	☐	☐	☐
8	LB	saudi style barn	dry cows	270	270	1	☐	☑	☐	☐	☐	☐	☐	☐	☐
40							☐	☐	☐	☐	☐	☐	☐	☐	☐
			Pre-Project Total # of Cows	2,870											

Pre-Project PM10 Control Efficiencies and Emission Factors

	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows in Each 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	FS1	freestall	milk cows	530	530	1.370		12.5%								1.20
2	FS2	freestall	milk cows	530	530	1.370		12.5%								1.20
3	FS3	freestall	milk cows	120	120	1.370		12.5%								1.20
4	FS3.5	freestall	dry cows	130	130	1.370		12.5%								1.20
5	FS4	freestall	milk cows	530	530	1.370		12.5%								1.20
6	FS5	freestall	milk cows	530	530	1.370		12.5%								1.20
7	FS6	freestall	milk cows	230	230	1.370		12.5%								1.20
8	LB	saudi style barn	dry cows	270	270	1.370		12.5%								1.20
40																
			Pre-Project Total # of Cows	2,870												

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 Each 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	FS1	freestall	milk cows	530	530	1	☐	☑	☐	☐	☐	☐	☐	☐	☐
2	FS2	freestall	milk cows	530	530	1	☐	☑	☐	☐	☐	☐	☐	☐	☐
3	FS3	freestall	milk cows	120	120	1	☐	☑	☐	☐	☐	☐	☐	☐	☐
4	FS3.5	freestall	dry cows	130	130	1	☐	☑	☐	☐	☐	☐	☐	☐	☐
5	FS4	freestall	milk cows	530	530	1	☐	☑	☐	☐	☐	☐	☐	☐	☐
6	FS5	freestall	milk cows	530	530	1	☐	☑	☐	☐	☐	☐	☐	☐	☐
7	FS6	freestall	milk cows	230	230	1	☐	☑	☐	☐	☐	☐	☐	☐	☐
8	LB	saudi style barn	dry cows	270	270	1	☐	☑	☐	☐	☐	☐	☐	☐	☐
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 Each 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	FS7	freestall	milk cows	530	530	1	☐	☑	☐	☑	☐	☐	☐	☐	☐
2	OC1	open corral	support stock	348	348	1	☑	☐	☑	☐	☐	☐	☑	☐	☑
3	OC2	open corral	support stock	348	348	1	☑	☐	☑	☐	☐	☐	☑	☐	☑
4	OC3	open corral	support stock	348	348	1	☑	☐	☑	☐	☐	☐	☑	☐	☑
5	OC4	open corral	support stock	348	348	1	☑	☐	☑	☐	☐	☐	☑	☐	☑
6	OC5	open corral	support stock	348	348	1	☑	☐	☑	☐	☐	☐	☑	☐	☑
7	OC7	open corral	support stock	349	349	1	☑	☐	☑	☐	☐	☐	☑	☐	☑
14							☐	☐	☐	☐	☐	☐	☐	☐	☐
		Post-Project Total # of Cows		5,489	(The post-project total includes				dairy cows already on-site and			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 Each 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	FS1	freestall	milk cows	530	530	1.370		12.5%								1.20
2	FS2	freestall	milk cows	530	530	1.370		12.5%								1.20
3	FS3	freestall	milk cows	120	120	1.370		12.5%								1.20
4	FS3.5	freestall	dry cows	130	130	1.370		12.5%								1.20
5	FS4	freestall	milk cows	530	530	1.370		12.5%								1.20
6	FS5	freestall	milk cows	530	530	1.370		12.5%								1.20
7	FS6	freestall	milk cows	230	230	1.370		12.5%								1.20
8	LB	saudi style barn	dry cows	270	270	1.370		12.5%								1.20
40																

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 Each 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	FS7	freestall	milk cows	530	530	1.370		12.5%		90%						0.12
2	OC1	open corral	support stock	348	348	10.550	8.3%		10%				15%		10%	6.66
3	OC2	open corral	support stock	348	348	10.550	8.3%		10%				15%		10%	6.66
4	OC3	open corral	support stock	348	348	10.550	8.3%		10%				15%		10%	6.66
5	OC4	open corral	support stock	348	348	10.550	8.3%		10%				15%		10%	6.66
6	OC5	open corral	support stock	348	348	10.550	8.3%		10%				15%		10%	6.66
7	OC7	open corral	support stock	349	349	10.550	8.3%		10%				15%		10%	6.66
14																

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	FS1	milk cows	530	10.13	38.38	1.20	14.7	5,369	55.7	20,339	1.7	635
2	FS2	milk cows	530	10.13	38.38	1.20	14.7	5,369	55.7	20,339	1.7	635
3	FS3	milk cows	120	10.13	38.38	1.20	3.3	1,216	12.6	4,605	0.4	144
4	FS3.5	dry cows	130	5.71	19.44	1.20	2.0	742	6.9	2,527	0.4	156
5	FS4	milk cows	530	10.13	38.38	1.20	14.7	5,369	55.7	20,339	1.7	635
6	FS5	milk cows	530	10.13	38.38	1.20	14.7	5,369	55.7	20,339	1.7	635
7	FS6	milk cows	230	10.13	38.38	1.20	6.4	2,330	24.2	8,826	0.8	276
8	LB	dry cows	270	5.71	19.44	1.20	4.2	1,542	14.4	5,249	0.9	324
40												
	Pre-Project Total # of Cows		**2,870**				**74.7**	**27,306**	**280.9**	**102,563**	**9.3**	**3,440**

*Multiple emissions units (freestalls, corrals, calf hutch areas, etc.) are combined in these rows.

Pre-Project Totals						
Total # of Cows	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
2,870	**74.7**	**27,306**	**280.9**	**102,563**	**9.3**	**3,440**

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	FS1	milk cows	530	10.13	38.38	1.20	14.7	5,369	55.7	20,339	1.7	635
2	FS2	milk cows	530	10.13	38.38	1.20	14.7	5,369	55.7	20,339	1.7	635
3	FS3	milk cows	120	10.13	38.38	1.20	3.3	1,216	12.6	4,605	0.4	144
4	FS3.5	dry cows	130	5.71	19.44	1.20	2.0	742	6.9	2,527	0.4	156
5	FS4	milk cows	530	10.13	38.38	1.20	14.7	5,369	55.7	20,339	1.7	635
6	FS5	milk cows	530	10.13	38.38	1.20	14.7	5,369	55.7	20,339	1.7	635
7	FS6	milk cows	230	10.13	38.38	1.20	6.4	2,330	24.2	8,826	0.8	276
8	LB	dry cows	270	5.71	19.44	1.20	4.2	1,542	14.4	5,249	0.9	324
40												
	Post-Project # of Cows (non-expansion)		**2,870**				**74.7**	**27,306**	**280.9**	**102,563**	**9.3**	**3,440**

*Multiple emissions units (freestalls, corrals, calf hutch areas, etc.) are combined in these rows.

	Post-Project Potential to Emit - Cow Housing: New Housing Units at an Expanding 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	FS7	milk cows	530	10.13	38.38	0.12	14.7	5,369	55.7	20,339	0.2	64
2	OC1	support stock	348	4.38	10.08	6.66	4.2	1,524	9.6	3,508	6.4	2,318
3	OC2	support stock	348	4.38	10.08	6.66	4.2	1,524	9.6	3,508	6.4	2,318
4	OC3	support stock	348	4.38	10.08	6.66	4.2	1,524	9.6	3,508	6.4	2,318
5	OC4	support stock	348	4.38	10.08	6.66	4.2	1,524	9.6	3,508	6.4	2,318
6	OC5	support stock	348	4.38	10.08	6.66	4.2	1,524	9.6	3,508	6.4	2,318
7	OC7	support stock	349	4.38	10.08	6.66	4.2	1,529	9.6	3,518	6.4	2,325
14												
	Total # of Cows From Expansion		**2,619**				**39.9**	**14,518**	**113.3**	**41,397**	**38.6**	**13,979**

*Multiple emissions units (freestalls, corrals, calf hutch areas, etc.) are combined in these rows.

Post-Project Totals						
Total # of Cows	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
5,489	**114.6**	**41,824**	**394.2**	**143,960**	**47.9**	**17,419**

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 Worst Case BACT Calculations - Cow Housing

This table uses the worst case emission factor for each cow type and the maximum design capacity of the housing unit. This should only be used for BACT calculation purposes.

Worst-Case Pre-Project Potential to Emit - Cow Housing

	Housing Name(s) or #(s)	Type of Cow	Capacity per housing unit	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	FS1	milk cows	530	10.13	38.38	9.23	14.7	5,369	55.7	20,339	13.4	4,892
2	FS2	milk cows	530	10.13	38.38	9.23	14.7	5,369	55.7	20,339	13.4	4,892
3	FS3	milk cows	120	10.13	38.38	9.23	3.3	1,216	12.6	4,605	3.0	1,108
4	FS3.5	dry cows	130	10.13	38.38	9.23	3.6	1,317	13.7	4,989	3.3	1,200
5	FS4	milk cows	530	10.13	38.38	9.23	14.7	5,369	55.7	20,339	13.4	4,892
6	FS5	milk cows	530	10.13	38.38	9.23	14.7	5,369	55.7	20,339	13.4	4,892
7	FS6	milk cows	230	10.13	38.38	9.23	6.4	2,330	24.2	8,826	5.8	2,123
8	LB	dry cows	270	10.13	38.38	9.23	7.5	2,735	28.4	10,362	6.8	2,492
40												
							79.6	**29,074**	**301.7**	**110,138**	**72.5**	**26,491**

*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.

Pre-Project Totals

VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
79.6	**29,074**	**301.7**	**110,138**	**72.5**	**26,491**

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 Worst Case BACT Calculations - Existing Cow Housing

This table uses the worst case emission factor for each cow type and the maximum design capacity of the housing unit. This should only be used for BACT calculation purposes.

Post-Project Worst Case BACT Calculations - Existing Cow Housing

	Housing Name(s) or #(s)	Type of Cow	Capacity per housing unit	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)	VOC AIPE	NH3 AIPE	PM10 AIPE	BACT Triggered for VOC?	BACT Triggered for NH3?	BACT Triggered for PM10?
1	FS1	milk cows	530	10.13	38.38	9.23	14.7	5,369	55.7	20,339	13.4	4,892	0.0	0.0	0.0	No	No	No
2	FS2	milk cows	530	10.13	38.38	9.23	14.7	5,369	55.7	20,339	13.4	4,892	0.0	0.0	0.0	No	No	No
3	FS3	milk cows	120	10.13	38.38	9.23	3.3	1,216	12.6	4,605	3.0	1,108	0.0	0.0	0.0	No	No	No
4	FS3.5	dry cows	130	10.13	38.38	9.23	3.6	1,317	13.7	4,989	3.3	1,200	0.0	0.0	0.0	No	No	No
5	FS4	milk cows	530	10.13	38.38	9.23	14.7	5,369	55.7	20,339	13.4	4,892	0.0	0.0	0.0	No	No	No
6	FS5	milk cows	530	10.13	38.38	9.23	14.7	5,369	55.7	20,339	13.4	4,892	0.0	0.0	0.0	No	No	No
7	FS6	milk cows	230	10.13	38.38	9.23	6.4	2,330	24.2	8,826	5.8	2,123	0.0	0.0	0.0	No	No	No
8	LB	dry cows	270	10.13	38.38	9.23	7.5	2,735	28.4	10,362	6.8	2,492	0.0	0.0	0.0	No	No	No
40																		
							79.6	**29,074**	**301.7**	**110,138**	**72.5**	**26,491**						

*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.

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)

Post-Project Worst Case BACT Calculations - New Cow Housing

This table uses the worst case emission factor for each cow type and the maximum design capacity of the housing unit. This should only be used for BACT calculation purposes.

Post-Project Potential to Emit - Cow Housing: New Freestalls at Existing Dairy														
	Housing Name(s) or #(s)	Type of Cow	Capacity per housing unit	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)	BACT Triggered for VOC?	BACT Triggered for NH3?	BACT Triggered for PM10?
1	FS7	milk cows	530	10.13	38.38	0.92	14.7	5,369	55.7	20,339	1.3	489	Yes	Yes	No
2	OC1	support stock	348	10.13	38.38	6.66	9.7	3,525	36.6	13,355	6.4	2,318	Yes	Yes	Yes
3	OC2	support stock	348	10.13	38.38	6.66	9.7	3,525	36.6	13,355	6.4	2,318	Yes	Yes	Yes
4	OC3	support stock	348	10.13	38.38	6.66	9.7	3,525	36.6	13,355	6.4	2,318	Yes	Yes	Yes
5	OC4	support stock	348	10.13	38.38	6.66	9.7	3,525	36.6	13,355	6.4	2,318	Yes	Yes	Yes
6	OC5	support stock	348	10.13	38.38	6.66	9.7	3,525	36.6	13,355	6.4	2,318	Yes	Yes	Yes
7	OC7	support stock	349	10.13	38.38	6.66	9.7	3,535	36.7	13,393	6.4	2,325	Yes	Yes	Yes
14															
							72.9	**26,529**	**275.4**	**100,507**	**39.7**	**14,404**			

*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.

Post-Project Totals					
VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
152.5	**55,603**	**577.1**	**210,645**	**112.2**	**40,895**

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)

BACT Applicability

Milking Parlor

VOC Emissions

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	3.3	2.7	0.40	0.40	0.6
				Total	**0.6**

NH3 Emissions

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	1.1	0.9	0.14	0.14	0.2
				Total	**0.2**

Cow Housing

See detailed cow housing AIPE calculations on the BACT Calcs page.

Liquid Manure Handling

VOC Emissions - Lagoon/Storage Pond(s)

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	9.6	7.9	1.17	1.17	1.7
Dry Cows	0.7	0.7	0.64	0.64	0.0
Support Stock (Heifers, Calves, and Bulls)	2.8	0.0	0.49	0.49	2.8
Large Heifers	0.0	0.0	0.49	0.49	0.0
Medium Hefiers	0.0	0.0	0.33	0.33	0.0
Small Heifers	0.0	0.0	0.19	0.19	0.0
Calves	0.0	0.0	0.09	0.09	0.0
Bulls	0.0	0.0	0.30	0.30	0.0
BACT triggered for VOC for Lagoon/Storage Ponds				**Total**	**4.5**

VOC Emissions - Land Application

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	10.4	8.5	1.26	1.26	1.9
Dry Cows	0.8	0.8	0.69	0.69	0.0
Support Stock (Heifers, Calves, and Bulls)	3.0	0.0	0.53	0.53	3.0
Large Heifers	0.0	0.0	0.53	0.53	0.0
Medium Hefiers	0.0	0.0	0.36	0.36	0.0
Small Heifers	0.0	0.0	0.20	0.20	0.0
Calves	0.0	0.0	0.10	0.10	0.0
Bulls	0.0	0.0	0.32	0.32	0.0
BACT triggered for VOC for Liquid Manure Land Application				**Total**	**4.9**

NH3 Emissions - Lagoon/Storage Pond(s)

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	9.7	8.0	1.18	1.18	1.7
Dry Cows	0.7	0.7	0.60	0.60	0.0
Support Stock (Heifers, Calves, and Bulls)	1.8	0.0	0.32	0.32	1.8
Large Heifers	0.0	0.0	0.32	0.32	0.0
Medium Hefiers	0.0	0.0	0.22	0.22	0.0
Small Heifers	0.0	0.0	0.17	0.17	0.0
Calves	0.0	0.0	0.05	0.05	0.0
Bulls	0.0	0.0	0.43	0.43	0.0
BACT triggered for NH3 for Lagoon/Storage Ponds				**Total**	**3.5**

NH3 Emissions - Land Application

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	30.5	25.2	3.72	3.72	5.3
Dry Cows	2.1	2.1	1.88	1.88	0.0
Support Stock (Heifers, Calves, and Bulls)	5.5	0.0	0.96	0.96	5.5
Large Heifers	0.0	0.0	0.96	0.96	0.0
Medium Hefiers	0.0	0.0	0.71	0.71	0.0
Small Heifers	0.0	0.0	0.54	0.54	0.0
Calves	0.0	0.0	0.15	0.15	0.0
Bulls	0.0	0.0	1.35	1.35	0.0
BACT triggered for NH3 for Liquid Manure Land Application				**Total**	**10.8**

H2S Emissions - Lagoon/Storage Pond(s)

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	1.0	1.0	0.12	0.12	0.0
Dry Cows	0.1	0.1	0.06	0.06	0.0
Support Stock (Heifers, Calves, and Bulls)	0.2	0.2	0.03	0.03	0.0
Large Heifers	0.0	0.0	0.03	0.03	0.0
Medium Hefiers	0.0	0.0	0.02	0.02	0.0
Small Heifers	0.0	0.0	0.02	0.02	0.0
Calves	0.0	0.0	0.01	0.01	0.0
Bulls	0.0	0.0	0.04	0.04	0.0
				Total	**0.0**

Solid Manure Handling

VOC Emissions - Solid Manure Storage/Separated Solids Piles

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	1.5	1.2	0.18	0.18	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	0.08	0.08	0.0
Medium Hefiers	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	2.4	2.0	0.30	0.30	0.4
Dry Cows	0.2	0.2	0.16	0.16	0.0
Support Stock (Heifers, Calves, and Bulls)	0.7	0.0	0.12	0.12	0.7
Large Heifers	0.0	0.0	0.12	0.12	0.0
Medium Hefiers	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	10.9	9.0	1.33	1.33	1.9
Dry Cows	0.7	0.7	0.67	0.67	0.0
Support Stock (Heifers, Calves, and Bulls)	2.0	0.0	0.35	0.35	2.0
Large Heifers	0.0	0.0	0.35	0.35	0.0
Medium Hefiers	0.0	0.0	0.25	0.25	0.0
Small Heifers	0.0	0.0	0.18	0.18	0.0
Calves	0.0	0.0	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**	**3.9**

NH3 Emissions - Land Application

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	7.2	5.9	0.87	0.87	1.3
Dry Cows	0.5	0.5	0.44	0.44	0.0
Support Stock (Heifers, Calves, and Bulls)	1.3	0.0	0.23	0.23	1.3
Large Heifers	0.0	0.0	0.23	0.23	0.0
Medium Hefiers	0.0	0.0	0.16	0.16	0.0
Small Heifers	0.0	0.0	0.13	0.13	0.0
Calves	0.0	0.0	0.04	0.04	0.0
Bulls	0.0	0.0	0.32	0.32	0.0
BACT triggered for NH3 for Solid Manure Land Application				**Total**	**2.6**

Feed Storage and Handling

VOC Emissions - Silage

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Corn Silage	6.8	6.8	21,155	21,155	0.0
Alfalfa Silage	0.4	0.4	10,649	10,649	0.0
Wheat Silage	5.2	5.2	26,745	26,745	0.0
				Total	0.0

VOC Emissions - TMR

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
TMR	121.0	63.3	10,575	10,575	57.7
		BACT triggered for VOC for TMR		**Total**	**57.7**

Pre-Project Potential to Emit (PE1)

Pre-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals
Milk Cows	2,470	0	0	0	2,470
Dry Cows	130	0	270	0	400
Support Stock (Heifers, Calves and Bulls)	0	0	0	0	0
Large Heifers	0	0	0	0	0
Medium Heifers	0	0	0	0	0
Small Heifers	0	0	0	0	0
Bulls	0	0	0	0	0

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

Silage Information

Feed Type	Maximum # Open Piles	Maximum Height (ft)	Maximum Width (ft)	Open Face Area (ft^2)
Corn	1	15	100	1,087
Alfalfa	1	10	36	285
Wheat	1	12	75	659

Milking Parlor

Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	**2.7**	**988**	**0.9**	**338**

Cow Housing

Cow	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Total	**74.7**	**27,306**	**280.9**	**102,563**	**9.3**	**3,440**

Liquid Manure Handling

Cow	VOC		NH3		H2S*	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	16.4	6,002	33.2	12,103	1	354
Dry Cows	1.5	532	2.7	992	0.1	24
Support Stock (Heifers, Calves and Bulls)	0.0	0	0.0	0	0.2	66
Large Heifers	0.0	0	0.0	0	0	0
Medium Heifers	0.0	0	0.0	0	0	0
Small Heifers	0.0	0	0.0	0	0	0
Calves	0.0	0	0.0	0	0	0
Bulls	0.0	0	0.0	0	0	0
Total	**17.9**	**6,534**	**35.9**	**13,095**	**1.3**	**445**

Solid Manure Handling

Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	3.2	1,186	14.9	5,434
Dry Cows	0.3	104	1.2	444
Support Stock (Heifers, Calves and Bulls)	0.0	0	0.0	0
Large Heifers	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0
Calves	0.0	0	0.0	0
Bulls	0.0	0	0.0	0
Total	**3.5**	**1,290**	**16.1**	**5,878**

Feed Handling and Storage

	Daily PE (lb-VOC/day)	Annual PE (lb-VOC/yr)
Corn Emissions	6.8	2,471
Alfalfa Emissions	0.4	163
Wheat Emissions	5.2	1,893
TMR	63.3	23,093
Total	**75.7**	**27,621**

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

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

Calculation for TMR emissions:

Annual PE = (# cows) x (EF1) x (0.658 m²) x (525,600 min/yr) x (2.20E-9 lb/µg)

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

Notes

Calves are not included in TMR calculation.

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

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

Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0.0	0.0	0.0	0.0	2.7	0.9	0.0
Cow Housing	0.0	0.0	9.3	0.0	74.7	280.9	0.0
Liquid Manure	0.0	0.0	0.0	0.0	17.9	35.9	1.3
Solid Manure	0.0	0.0	0.0	0.0	3.5	16.1	0.0
Feed Handling	0.0	0.0	0.0	0.0	75.7	0.0	0.0
Total	**0.0**	**0.0**	**9.3**	**0.0**	**174.5**	**333.8**	**1.3**

Major Source Emissions (lb/yr)

Permit	NOx	SOx	PM10	CO	VOC
Milk Parlor	0	0	0	0	0
Cow Housing	0	0	0	0	0
Liquid Manure	0	0	0	0	3,146
Solid Manure	0	0	0	0	0
Feed Handling	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**3,146**

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

Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	988	338	0
Cow Housing	0	0	3,440	0	27,306	102,563	0
Liquid Manure	0	0	0	0	6,534	13,095	445
Solid Manure	0	0	0	0	1,290	5,878	0
Feed Handling	0	0	0	0	27,621	0	0
Total	**0**	**0**	**3,440**	**0**	**63,739**	**121,874**	**445**

Post-Project Potential to Emit (PE2)

Post-Project Herd Size							
Herd	**Flushed Freestalls**	**Scraped Freestalls**	**Flushed Corrals**	**Scraped Corrals**	**Total # of Animals**		
Milk Cows	3,000	0	0	0	3,000		
Dry Cows	130	0	270	0	400		
Support Stock (Heifers, Calves, and Bulls)	0	0	0	2,089	2,089		
Large Heifers	0	0	0	0	0		
Medium Heifers	0	0	0	0	0		
Small Heifers	0	0	0	0	0		
Bulls	0	0	0	0	0		
	Calf Hutches				**Calf Corrals**		
	Aboveground Flushed	**Aboveground Scraped**	**On-Ground Flushed**	**On-Ground Scraped**	**Flushed**	**Scraped**	**Total # of Calves**
Calves	0	0	0	0	0	0	0

Silage Information				
Feed Type	Maximum # Open Piles	Maximum Height (ft)	Maximum Width (ft)	Open Face Area (ft^2)
Corn	1	15	100	1,087
Alfalfa	1	10	36	285
Wheat	1	12	75	659

Milking Parlor				
Cow	VOC		NH3	
Milk Cows	lb/day	lb/yr	lb/day	lb/yr
Total	**3.3**	**1,200**	**1.1**	**410**

Cow Housing						
	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Total	**114.6**	**41,824**	**394**	**143,960**	**48**	**17,419**

Liquid Manure Handling						
Cow	VOC		NH3		H2S	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	20.0	7,290	40.3	14,700	1	354
Dry Cows	1.5	532	2.7	992	0.1	24
Support Stock (Heifers, Calves, and Bulls)	5.8	2,131	7.3	2,674	0.2	66
Large Heifers	0.0	0	0.0	0	0	0
Medium Heifers	0.0	0	0.0	0	0	0
Small Heifers	0.0	0	0.0	0	0	0
Calves	0.0	0	0.0	0	0	0
Bulls	0.0	0	0.0	0	0	0
Total	**27.3**	**9,953**	**50.3**	**18,366**	**1.3**	**445**

Solid Manure Handling				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	3.9	1,440	18.1	6,600
Dry Cows	0.3	104	1.2	444
Support Stock (Heifers, Calves, and Bulls)	1.1	418	3.3	1,212
Large Heifers	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0
Calves	0.0	0	0.0	0
Bulls	0.0	0	0.0	0
Total	**5.3**	**1,962**	**22.6**	**8,256**

Feed Handling and Storage		
	Daily PE (lb-VOC/day)	Annual PE (lb-VOC/yr)
Corn Emissions	6.8	2,471
Alfalfa Emissions	0.4	163
Wheat Emissions	5.2	1,893
TMR	121.0	44,166
Total	**133.4**	**48,694**

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	3.3	1.1	0.0
Cow Housing	0.0	0.0	47.9	0.0	114.6	394.2	0.0
Liquid Manure	0.0	0.0	0.0	0.0	27.3	50.3	1.3
Solid Manure	0.0	0.0	0.0	0.0	5.3	22.6	0.0
Feed Handling	0.0	0.0	0.0	0.0	133.4	0.0	0.0
Total	**0.0**	**0.0**	**47.9**	**0.0**	**283.9**	**468.2**	**1.3**

Major Source Emissions (lb/yr)					
Permit	**NOx**	**SOx**	**PM10**	**CO**	**VOC**
Milk Parlor	0	0	0	0	0
Cow Housing	0	0	0	0	0
Liquid Manure	0	0	0	0	4,790
Solid Manure	0	0	0	0	0
Feed Handling	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**4,790**

Total Annual Post-Project Potential to Emit (lb/yr)							
Permit	**NOx**	**SOx**	**PM10**	**CO**	**VOC**	**NH3**	**H2S**
Milking Parlor	0	0	0	0	1,200	410	0
Cow Housing	0	0	17,419	0	41,824	143,960	0
Liquid Manure	0	0	0	0	9,953	18,366	445
Solid Manure	0	0	0	0	1,962	8,256	0
Feed Handling	0	0	0	0	48,694	0	0
Total	**0**	**0**	**17,419**	**0**	**103,633**	**170,992**	**445**

Increase in Emissions

SSIPE (lb/yr)							
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	212	73	0
Cow Housing	0	0	13,979	0	14,518	41,397	0
Liquid Manure	0	0	0	0	3,419	5,271	0
Solid Manure	0	0	0	0	672	2,378	0
Feed Handling	0	0	0	0	21,073	0	0
Total	**0**	**0**	**13,979**	**0**	**39,894**	**49,118**	**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	0.6	0.2	0.0
Cow Housing	0.0	0.0	38.6	0.0	39.9	113.3	0.0
Liquid Manure	0.0	0.0	0.0	0.0	9.4	14.4	0.0
Solid Manure	0.0	0.0	0.0	0.0	1.8	6.5	0.0
Feed Handling	0.0	0.0	0.0	0.0	57.7	0.0	0.0
Total	**0.0**	**0.0**	**38.6**	**0.0**	**109.4**	**134.4**	**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	1,644	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**	**1,644**	**0**	**0**

Appendix C
Major Source Determination

Using the calculations shown in Appendices B, the pre-project and post-project major source determinations are summarized in the following tables.

Pre-Project Major Source Determination (lb/year)					
	NO_X	SO_X	PM_{10}	CO	VOC
N-7787-1-1 (milking parlor)	0	0	0	0	0
N-7787-2-1 (cow housing)	0	0	0	0	0
N-7787-3-2 (liquid manure handling)	0	0	0	0	3,146
N-7787-4-1 (solid manure handling)	0	0	0	0	0
N-7787-5-1 (feed storage/handling)	0	0	0	0	0
N-7787-6-0 (Emergency IC Engine)	585	1	3	58	30
Non-Fugitive SSPE1	**585**	**1**	3	58	**3,176**

Post-Project Major Source Determination (lb/year)					
	NO_X	SO_X	PM_{10}	CO	VOC
N-7787-1-2 (milking parlor)	0	0	0	0	0
N-7787-2-3 (cow housing)	0	0	0	0	0
N-7787-3-3 (liquid manure handling)	0	0	0	0	4,790
N-7787-4-2 (solid manure handling)	0	0	0	0	0
N-7787-5-2 (feed storage/handling)	0	0	0	0	0
N-7787-6-0 (Emergency IC Engine)	585	1	3	58	30
Non-Fugitive SSPE2	**585**	**1**	3	**58**	**4,820**

Appendix D
QNEC

Quarterly Net Emissions Change (QNEC)

The QNEC is used to complete the emissions profile for the District's PAS database. It is assumed that the unit's annual emissions are evenly distributed throughout the year. Therefore, for the proposed project the QNEC is calculated as follows:

QNEC = [Annual PE2 (lb/year) – Annual PE1 (lb/year)] ÷ 4 Quarters/year

Using the values in Sections VII.C.1 and VII.C.2, the QNEC is calculated in the following table:

QNEC for ATC N-7787-1-1			
Pollutant	Annual PE2 (lb/year)	Annual PE1 (lb/year)	QNEC (lb/qtr)
NOx	0	0	0
SOx	0	0	0
PM_{10}	0	0	0
CO	0	0	0
VOC	1200	988	53

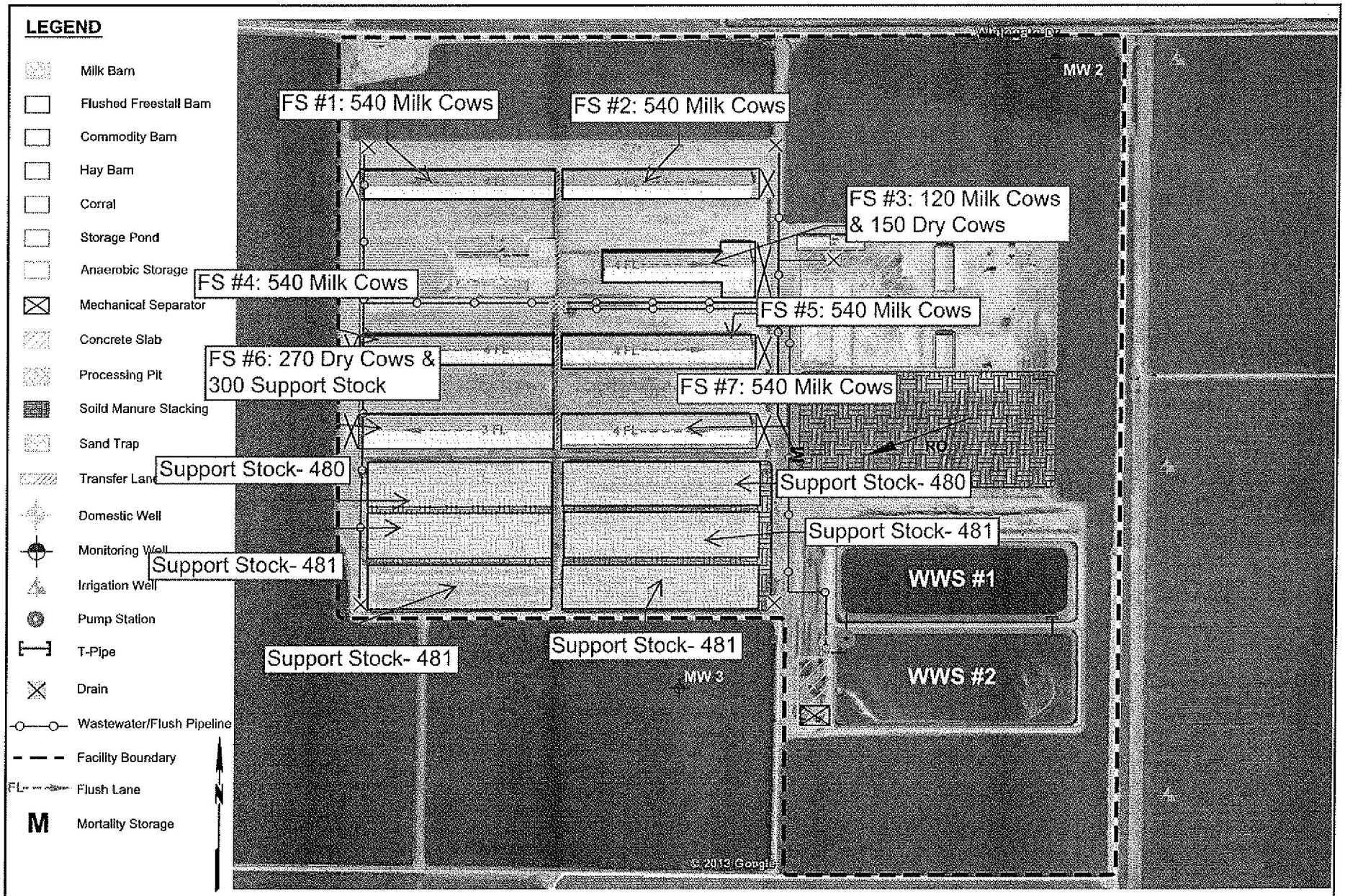
QNEC for ATC N-7787-2-3			
Pollutant	Annual PE2 (lb/year)	Annual PE1 (lb/year)	QNEC (lb/qtr)
NOx	0	0	0
SOx	0	0	0
PM_{10}	18,679	3,440	3809.75
CO	0	0	0
VOC	41,824	27,306	3629.5

QNEC for ATC N-7787-3-3			
Pollutant	Annual PE2 (lb/year)	Annual PE1 (lb/year)	QNEC (lb/qtr)
NOx	0	0	0
SOx	0	0	0
PM_{10}	0	0	0
CO	0	0	0
VOC	9,953	6,534	854.75

QNEC for ATC N-7787-4-2			
Pollutant	Annual PE2 (lb/year)	Annual PE1 (lb/year)	QNEC (lb/qtr)
NOx	0	0	0
SOx	0	0	0
PM_{10}	0	0	0
CO	0	0	0
VOC	1,962	1,290	168.0

QNEC for ATC N-7787-5-2			
Pollutant	Annual PE2 (lb/year)	Annual PE1 (lb/year)	QNEC (lb/qtr)
NOx	0	0	0
SOx	0	0	0
PM_{10}	0	0	0
CO	0	0	0
VOC	48,649	27,621	5,257.0

Appendix E
Site Map



FR Ag Services, Inc.

SCALE:
0 500 1000
APPROXIMATE SCALE IN FEET

RED ROCK DAIRY
MERCED, CALIFORNIA

FIGURE 2
SITE PLAN - DAIRY FACILITY

PROJECT NO.	DATE:	DRAWN BY:	APP. BY:
06-FR-005	3/4/2014	SB	AR

06-FR-005_Red Rock

Appendix F
BACT Guidelines

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.8.2*

Last Update: 12/18/2013

Cow Housing - Freestall and Saudi-Style Barns

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC	1) Concrete feed lanes and walkways; 2) Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, Scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning lanes and walkways for support stock (heifers) at least once per day); 3) Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines; 4) Properly sloping 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) Rule 4570 Measures		
PM10	1) Concrete feed lanes and walkways; 2) Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions		

NH3	1) Concrete feed lanes and walkways; 2) Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, Scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning lanes and walkways for support stock (heifers) at least once per day); 3) Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines; 4) Properly sloping 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;

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

***This is a Summary Page for this Class of Source**

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.8.3*

Last Update: 3/17/2015

Cow Housing - Open Corrals

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC	1) Concrete feed lanes and walkways; 2) Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, Scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning lanes and walkways for support stock (heifers) at least once per day); 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) Rule 4570 Measures (only for facilities subject to Rule 4570)		

PM10	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; 4) Feeding heifers in corrals near dusk (within 1 hour of dusk); and 5) Windbreaks controlling dust from corrals (when feasible, supported by soil conditions, and there is adequate space at existing facilities); or 6) An alternative measure with equivalent PM control (e.g. sprinkling/water application over at least 25% of the corral surface or average corral surface moisture content (wet-based) ≥ 16%) may be applied as a replacement for the previous measures	

NH3	1) Concrete feed lanes and walkways; 2) Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, Scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning lanes and walkways for support stock (heifers) at least once per day); 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;

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

***This is a Summary Page for this Class of Source**

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.8.6*

Last Update: 12/18/2013

Liquid Manure Handling - Lagoon/Storage Pond

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC	Anaerobic treatment lagoon designed according to NRCS Guideline, and solids removal/separation system (mechanical separator(s) or settling basin(s)/weeping wall(s))	1) Aerobic treatment lagoon or mechanically aerated lagoon; 2) Covered lagoon digester vented to a control device with minimum 95% control	
NH3	All animals fed in accordance with NRCS or other District-approved guidelines		

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

***This is a Summary Page for this Class of Source**

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.8.7*

Last Update: 12/18/2013

Liquid Manure Handling - Liquid/Slurry Land Application

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC	Irrigation of crops using liquid/slurry manure from the secondary lagoon/holding/storage pond preceded by an uncovered anaerobic treatment lagoon designed to meet Natural Resources Conservation Service (NRCS) standards	1) Irrigation of crops using liquid manure from an aerobic treatment lagoon or mechanically aerated lagoon (95% VOC control efficiency) 2) Irrigation of crops using liquid manure from a holding/storage pond after being treated in a covered lagoon/digester (80% VOC control efficiency)	
NH3	All animals fed in accordance with NRCS or other District-approved guidelines		

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

***This is a Summary Page for this Class of Source**

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.8.8*

Last Update: 12/18/2013

Solid Manure Handling - Storage/Separated Solids Piles

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
NH3	All animals fed in accordance with NRCS or other District-approved guidelines		

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

***This is a Summary Page for this Class of Source**

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.8.9*

Last Update: 12/18/2013

Solid Manure Handling - Land Application

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC	Rapid incorporation of solid manure into the soil after land application	1a) 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; 1b) Land Application of Solid Manure Processed by In-Vessel/Enclosed Negatively-Aerated Static Piles vented to biofilter ≥ 80% destruction efficiency; 2) Land Application of Solid Manure Processed by Open Negatively-Aerated Static Piles vented to biofilter ≥ 80% destruction efficiency; 3) 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	
NH3	Rapid incorporation of solid manure into the soil after land application, and all animals fed in accordance with NRCS or other District-approved guidelines		

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

***This is a Summary Page for this Class of Source**

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.8.11*

Last Update: 12/18/2013

Feed Storage and Handling - Feed/TMR

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC	District Rule 4570 Measures for Feed/TMR		

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

***This is a Summary Page for this Class of Source**

Appendix G
Top-Down BACT Analysis

Top-Down BACT Analysis for Cow Housing
ATC Permit N-7787-2-3

BACT Analysis for PM_{10} Emissions from the Open Corral Cow Housing:

a. Step 1 - Identify all control technologies

The following control options were identified for PM_{10} emissions from the open corrals.

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

Description of Control Technologies

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 emitted as PM_{10}.

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

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 the heifers near dusk will reduce their activity at 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.

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

d. Step 4 - Cost Effectiveness Analysis

The applicant has proposed the above mentioned Design and Management Practices. Therefore cost-effective analysis is not required.

e. Step 5 - Select BACT

The facility is proposing to concrete all feed lanes and walkways; weekly scraping of open corrals in the morning hours except when prevented by wet conditions; installation of shade structures in all open corrals: feeding heifers near dusk; install windbreaks upwind and downwind of the facility; and house the milk and dry cows in frestall barn and use of water sprinklers in open corrals, which satisfy the BACT requirements for PM_{10} emissions from the cow housing.

BACT Analysis for VOC Emissions from Open Corrals and Freestall cow housing:

a. Step 1 - Identify all control technologies

Description of Control Technologies

1) Feed and Manure Management Practices

Concrete Feed Lanes and Walkways

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

Many dairy operations use flush or scrape systems to remove manure from the corral and freestall lanes and walkways. When dairies use a flush system, a large volume of water is introduced at the head of the paved area of the corrals or freestalls, and the cascading water removes the manure. The required volume of flush water varies with the size and slope of the area to be flushed. When dairies use a scrape system for manure management, manure is typically scraped from the cow housing lanes using a tractor or skid steer with a scraping attachment, or using an automatic mechanical scraper. The automatic scraper usually consists of a hinged v-shaped scraper driven by a cable or chain. The mechanical scraper is periodically dragged forward to draw manure to the end of a lane. After completing a pass, the chain or cable reverses direction and pulls the scraper back in the opposite direction. The scraped manure is either temporarily stored in a pile where liquids are allowed to drain off, or loaded onto a truck or tractor for transport or land application. A smaller number of dairies may also use vacuum trucks to remove manure from the cow housing areas. Manure vacuumed from the lanes can be applied to adjacent cropland, transported offsite, or placed in a digester. The freestall and corral lanes for milk and dry cows are typically flushed or scraped twice per day, but the cleaning frequency can vary between one to four times per day. The lanes for support stock are usually flushed or scraped once per day or less frequently.

In addition to cleaning the corral and freestall lanes and walkways, the flush, scrape, and vacuum systems also serve 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 flush, scrape, or vacuum system. Flush systems also reduce PM_{10} and ammonia emissions. Additionally, many of the VOCs emitted from fresh cow manure, such as alcohols (ethanol and methanol) and many Volatile Fatty Acids (VFAs), are highly soluble in water. Therefore, when a flush system is used, a large percentage of these compounds will dissolve in the flush water and will not be emitted from the cow housing permit unit. The flush water can then carry the manure and the dissolved volatile compounds to an anaerobic treatment lagoon or other manure stabilization process for treatment.

It must be noted that the 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 lanes and walkways in the cow housing areas are typically cleaned twice per day. Cleaning the lanes four times per day will increase 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.

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

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.

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

Many dairies use equipment pulled by tractors to periodically scrape the surfaces of corrals. Frequent scraping the freestall exercise pens and corrals will reduce the amount of manure on the corral surfaces, which will reduce VOC and ammonia emissions resulting from decomposition of this manure. This practice will also provide a uniform surface, reducing anaerobic conditions on the corral surface, which will reduce gaseous pollutants from this area. The frequency that corrals are scraped at dairies can vary from as little as once a year to every week.

Increasing the frequency that corrals are scraped is expected to reduce emissions of gaseous pollutants from the corral surface and PM that results from the cattle hooves acting on the surface of the corrals; however, requiring an excessively high frequency may negate these emission reductions because of the NO_X and PM emitted from combustion of fuel for the tractor and PM emissions resulting from use of the tractor on the corral surface.

b. Step 2 - Eliminate Options

There are no technologically infeasible options to eliminate from step 1. However, the following options will be eliminated from consideration because the emissions from increased use of tractors are expected to offset the benefits of any VOC reductions from these practices.

a) Lanes and walkways for mature cows (milk and dry cows) scraped four times per day with a tractor/skid steer. Lanes and walkways for support stock (heifers) cleaned at least once per day;
b) Lanes and walkways for mature cows (milk and dry cows) vacuumed four times per day. Lanes and walkways for support stock (heifers) cleaned at least once per day

c. Step 3 - Rank remaining options by control effectiveness

The only control technology that is identified above is the use of the above listed achieved-in-practice control methods, therefore ranking is not required.

d. Step 4 - Cost Effectiveness Analysis

The above listed control technology is achieved-in-practice; therefore a cost analysis is not required.

e. Step 5 - Select BACT

BACT for VOC from cow housing is: Feed and Manure Management Practices

1) Concrete feed lanes and walkways;
2) Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, Scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning lanes and walkways for support stock (heifers) at least once per day);
3) Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
4) Properly sloping 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 exercise pens 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

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

BACT analysis for NH_3 emissions from Open Corrals and Freestall cow housing:

a. Step 1 - Identify all control technologies

A cost effectiveness threshold has not been established for ammonia. 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 cow housing. No other control technologies that meet the definition of Achieved-in-Practice have been identified for the cow housing.

Achieved-in-Practice:

- 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;
- 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 per animal 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.

b. Step 2 - Eliminate Technologically Infeasible Options

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

c. Step 3 - Rank Remaining Control Technologies by Control Effectiveness

The only control technology that is identified above is the use of the above listed achieved-in-practice control methods, therefore ranking is not required.

d. Step 4 - Cost Effectiveness Analysis

The above listed control technology is achieved-in-practice; therefore a cost analysis is not required.

e. Step 5 - Select BACT

The most effective NH_3 control technology not eliminated in Steps 2 and 4 above is the following listed achieved-in-practice NH_3 control method:

- 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;
- Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
- Properly sloping exercise pens (minimum of 3% slope where the available space for each animal is 400 square feet per animal 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 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.

The applicant is proposing the use of the achieved-in-practice NH_3 control methods. Therefore, BACT for NH_3 is being proposed.

Top-Down BACT Analysis for Liquid Manure Land Application
ATC Permit N-7787-3-3

BACT for VOC Emissions from the Liquid Manure Land Application

a. Identify All Possible Control Technologies

Step 1 - Identify all control technologies

1) 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) 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.

2) 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 (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.

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.

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

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 12 feet or greater. Maximizing the depth of the lagoon minimizes the surface area, which in turn minimizes the cover size and cost. Increasing the lagoon depth has the following advantages:

- Minimizes surface area in contact with the atmosphere, thus reducing surface available to convection, evaporation
- Smaller surface areas provide a more favorable and stable environment for methane bacteria
- Better mixing of lagoon due to rising gas bubbles
- Requires less land
- More efficient for mechanical mixing

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

The NRCS guideline suggests that this system consist of two cells, a treatment lagoon (primary lagoon) and a storage pond (secondary lagoon). The first stage of the lagoon system is the biological treatment stage and is designed with a constant liquid level to stabilize the anaerobic digestion. The effluent from the first stage overflows into a second lagoon designed for liquid storage capacity. Effluent from the second lagoon is used in the flush lanes and for the irrigation of cropland. The secondary (overflow) lagoon acts as the storage pond, which can be emptied when necessary.

A properly designed anaerobic treatment lagoon will reduce the Volatile Solids (VS) by at least 50% and will reduce the biological oxygen demand (BOD), which will result in greater efficiency in degrading compounds that contain carbon into methane and carbon dioxide rather than VOCs. Since 50% of the Volatile Solids in the liquid manure will have been removed or digested in the lagoon, there will be less Volatile Solids remaining in the effluent to decompose into VOCs. Although, the Volatile Solids reduction will be at least 50%, to be conservative a 40% control will be applied to irrigation from a storage pond after an anaerobic treatment lagoon.

4) Irrigation of crops using liquid/slurry manure from the primary lagoon and/or secondary lagoon

Currently, this is the practice for many existing dairies, especially dairies that only have one lagoon at their facility. However, some dairies with multiple lagoons still flush their cropland with liquid manure from either of their lagoons including the primary lagoon.

Control efficiency is unknown at this time and is expected to depend on treatment volume in the lagoon and residence time (digestion time) prior to application, as well as overall loading rate (dilution). However, control efficiency may be much lower from this system than a two-stage anaerobic treatment lagoon system.

5) Land application of lagoon water such that there is no standing water

During land application, minimize or eliminate standing water in an irrigated field within 24 hours, which reduces the potential to volatilize into the atmosphere and/or emit due to anaerobic conditions.

Control efficiency is unknown at this time and additional study will be required. While emission rates are not well known for land application practices, new data may be available soon from on-going research in California. In the absence of emission rates, emission reductions could potentially be assumed to occur where practices are used that

decrease the time, temperature or area of water surface from which VOCs could be emitted.

6) Injection of liquid and slurry manure

Liquid and slurry manure is used to irrigate crops on land farmed by dairies. Manure can either be injected into the soil or left on the surface of the soil and allowed to soak in. Because the liquid and slurry manure is high in Nitrogen, Phosphorus, and Potassium (N-P-K), it supplies nutrients needed by crops. Dairies have nutrient management programs to regulate the amount of liquid and slurry manure applied to cropland. This program is used to balance the specific nutrients applied to the crops, such as nitrogen, with the amount of nutrients that the crops can utilize. Balancing the needs of the crop with what is supplied helps to minimize contamination of ground water. During the process of liquid and slurry manure application to the crops, VOC and NH_3 are emitted. Injecting manure hinders volatilization and speeds the uptake of nutrients that would degrade into gaseous pollutants. It is estimated that injection of manure will reduce VOC emissions from land application of manure by 50%.

The manure can only be injected during the time when the crop is not fully mature. This is because a tractor must be used to pull a cultivator with the liquid and slurry manure shanks. Once the crop is planted and grown to a certain height, it is no longer feasible for the tractor to get into the field due to the potential of damaging the crop. Ron Prong of Till-Tech Systems [(519) 775-2575] states that his company's liquid and slurry manure injection system can be used up to four weeks after planting of the crops without causing damage. Therefore, injection of slurry manure can only be required until the crops become so tall that damage will occur.

b. Step 2 - Eliminate technologically infeasible options

Injection of Liquid and Slurry Manure

The Dairy Permitting Advisory Group (DPAG) found that injection of flushed manure was not be a feasible BACT option in their report of BACT options for dairies in the San Joaquin Valley.[10]

Injection is typically restricted to slurry manure that has been vacuumed from the cow housing or that has been removed from settling basins and/or weeping walls. Injection of flushed liquid manure from the lagoons is not considered feasible because the additional water from flushing increases the amount of liquid that must be transported by the trucks or honey wagons, which will generate more emissions. Because of the added time and expense, injection is not used for flushed liquid manure; therefore, this option will be removed from consideration at this time.

c. Step 3 - Rank remaining options by control effectiveness

1) Irrigation of crops using liquid/slurry manure from an aerobic treatment lagoon or mechanically aerated lagoon (95% VOC control efficiency)

[10] Page 150 of the Final DPAG Report - "Recommendations to the San Joaquin Valley Air Pollution Control Officer Regarding Best Available Control Technology for Dairies in the San Joaquin Valley" January 31, 2006 (http://www.valleyair.org/busind/pto/dpag/dpag_idx.htm)

2) Irrigation of crops using liquid/slurry manure from a holding/storage pond after being treated in a covered lagoon/digester (80% VOC control efficiency)
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 (40% VOC control efficiency)
4) Irrigation of crops using liquid/slurry manure from the primary lagoon and/or secondary lagoon
5) Land application of lagoon water such that there is no standing water

d. Step 5 - Cost Effectiveness Analysis

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

The following analysis is based on the treatment of manure from 3,000 milk cows in naturally aerobic lagoons and mechanically aerated lagoons. 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.

Space Requirement for a Naturally Aerobic Lagoon

NRCS Practice Standard Code 359 requires that naturally aerobic lagoons be designed to have a minimum treatment surface area as determined on the basis of daily 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 5,500 milk cows in the San Joaquin Valley can be calculated as follows:

BOD loading (lb/day) = 3,000 milk cows x 2.9 lb-BOD/cow-day x 0.80 = 6,960 lb/day

Calculate Minimum Surface Area (acres) in areas of the San Joaquin Valley with a maximum loading rate of 55 lb-BOD_5/acre-day.

Minimum Surface Area = 6,960 lb-BOD/day ÷ 55 lb-BOD/acre-day = 127 acres

Calculate Minimum Surface Area (acres) in areas of the San Joaquin Valley with a maximum loading rate of 45 lb-BOD_5/acre-day.

Minimum Surface Area = 6,960 lb-BOD/day ÷ 45 lb-BOD/acre-day = 155 acres

As shown above the minimum surface area required for a naturally aerobic lagoon treating manure from 3,000 milk cows in the San Joaquin Valley would range from approximately 127 to 155 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.

Analysis for a 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 3,000 milk cows.

Biological Oxygen Demand (BOD)

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) 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 loading. As discussed above, the total daily manure produced by a milk cow will have a BOD of 2.9 lb/day and a lagoon handling flushed manure from 3,000 milk cows will have a loading rate of approximately 6,960 lb-BOD/day (3,164 kg-BOD/day).

Energy Requirement a Mechanically Aerated:

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 3,000 milk cows is calculated as follows:

High Efficiency Aerator
3,164 kg-BOD/day ÷ (0.68 kg-O_2/kW-hr) x (365 day/year) = 1,698,324 kW-hr/year

Low Efficiency Aerator
3,164 kg-BOD/day ÷ (0.10 kg-O_2/kW-hr) x (365 day/year) = 11,548,600 kW-hr/year

Cost of Electricity for Complete Aeration:

The cost for electricity is based upon on an average retail price of commercial electricity in California for the January 2020 taken from the Energy Information Administration (EIA) Website:
https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_6_a

Average Cost for electricity = $0.154/kW-hr

The electricity costs for complete aeration are calculated as follows:

Low Cost Estimate (High Efficiency Aerator)
1,698,324 kW-hr/year x $0.154/kW-hr = $261,542/year

High Cost Estimate (Low Efficiency Aerator)
11,548,600 kW-hr/year x $0.154/kW-hr = $1,778,485/year

VOC Emission Reductions for Complete Aeration

It will be conservatively assumed that a mechanically aerated lagoon providing 1 lb of oxygen for every 1 lb of BOD 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 loading rate for complete aeration; therefore, the actual control from providing 1 lb of oxygen for every 1 lb of BOD loading is probably closer to 50%.

The annual VOC Emission Reductions for mechanically aerated lagoon(s) treating the manure from 3,000 milk cows are calculated as follows and shown in the table below:

VOC Emission Reductions = [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)	3,000	x	1.3	x	90%	=	**3,510**

Cost of VOC Emission Reductions
Low Estimate = ($261,542/year)/[(3,510 lb-VOC/year)(1 ton/2000 lb)]
= $145,301/ton of VOC reduced

High Estimate = ($1,778,485/year)/[(3,510 lb-VOC/year)(1 ton/2000 lb)]
= $988,047/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 $145,301/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 since cost is greater than the $17,500/ton cost effectiveness threshold of the District BACT policy.

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

The technology is currently proposed for this. ATC N-7787-3-2 was issued for installation of covered lagoon/digester and is used as base document for this project. Therefore cost effective analysis is not required.

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, and is therefore cost effective.

4) Irrigation of crops using liquid/slurry manure from the primary lagoon and/or secondary lagoon

The technology/practice is currently used at multiple dairies located throughout the valley, and is therefore cost effective.

5) Land application of lagoon water such that there is no standing water

This technology is currently required by the Central Valley Regional Water Quality Control Board, and is therefore cost effective.

e. Step 5 - Select BACT

Achieved in Practice option is determined to be BACT. Therefore, BACT for this operation is the option with the greatest VOC control: irrigation of crops using liquid manure from the secondary lagoon/holding/storage pond where preceded by an covered anaerobic treatment lagoon.

BACT for NH_3 Emissions from the Liquid Manure Land Application

a. Step 1 - Identify all control technologies

A cost effectiveness threshold has not been established for ammonia. Therefore, 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 liquid manure land application. No other control technologies that meet the

definition of Achieved-in-Practice have been identified for the liquid manure land application.

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

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

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

All options are ranked according to their control efficiency.

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

d. Step 4 - Cost Effectiveness Analysis

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

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

e. Step 5 - Select BACT

Achieved in Practice option is determined to be BACT. Therefore, BACT for this operation is feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines are determined to be BACT.

Top-Down BACT Analysis for Solid Manure Land Application
ATC Permit N-7787-4-2

BACT Analysis for NH_3 Emissions from Solid Manure Storage/Separated Solids Piles for NH_3 Emissions

a. Identify All Possible Control Technologies

Step 1 - Identify all control technologies

A cost effectiveness threshold has not been established for ammonia. 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 practices have been identified as possible control options for NH3 emissions from solid manure storage/separated solids piles. No other control technologies that meet the definition of Achieved-in-Practice have been identified for solid manure storage/separated solids piles.

1) <u>All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines</u>

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

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

d. Cost Effectiveness Analysis

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

e. Select BACT

Achieved in Practice option is determined to be BACT. Therefore, BACT for this operation is to feed all animals at the dairy in accordance with National Research Council (NRC) or other District-approved guidelines.

BACT Analysis for NH_3 Emissions from Solid Manure Land Application

a. Step 1 - Identify all control technologies

A cost effectiveness threshold has not been established for ammonia. 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 practices have been identified as possible control options for NH_3 emissions from solid manure land application. No other control technologies that meet the definition of Achieved-in-Practice have been identified for solid manure land application.

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

Various types of spreading techniques, such as box spreaders, flail type spreaders, side discharge spreaders, and spinner spreaders, are used to apply solid manure to cropland. Regardless of which technique is used, this practice requires the immediate incorporation of the manure into the soil, reducing emissions and surface run-off while minimizing the loss of nitrogen into the atmosphere. Based on a study by a local Valley dairy, there is a great potential of reducing emissions by incorporating slurry manure rapidly into the soil. A similar reduction may be obtained by the rapid incorporation of solid manure. This technology is expected to yield a NH_3 control efficiency ranging from 49% to upwards of 98%.[11]

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

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

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

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

1) Rapid incorporation of solid manure into the soil after land application
2) All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines

d. Step 4 - Cost Effectiveness Analysis

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

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

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

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

e. Step 5 - Select BACT

Achieved in Practice option is determined to be BACT. Therefore, BACT for this operation is rapid incorporation of solid manure into the soil after land application, and to feed all animals at the dairy in accordance with National Research Council (NRC) or other District-approved guidelines.

Top-Down BACT Analysis for Feed Storage and Handling
Total Mixed Ration (TMR)
ATC Permit N-7787-5-2

BACT analysis for VOC emissions:

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):

1) Enclosed Buildings for Animals and TMR with Emissions Vented to a Control Device (e.g. incinerator, biofilter, e.g) (≈64-72%; 80% Capture and 80-90% Control of emissions from cow housing and total mixed ration (TMR) feed placed in the cow housing unit)

Total Mixed Ration (TMR) refers to feed (primarily silage with grains, oils, minerals, and other additives) that has been mixed to meet the nutritional needs of dairy animals and placed in the feeding areas of the cow housing unit for consumption by the cattle. Because the TMR is placed in the cow housing areas, if emissions from enclosed freestall barns could be captured and vented to a control device, emissions from the TMR could also be controlled.

Description of Dairy Housing
In a freestall barn, cows are grouped in large pens with free access to feed bunks, water, and stalls for resting. In the mild climate of the San Joaquin Valley, the typical freestall barn is an open structure (roof but no sides). The primary freestall design consists of a roof that provides shade with all sides open to allow air to flow through, which keeps the cows cool. The open freestall barns take advantage of natural summer winds in the San Joaquin Valley that are generally greater than four mph. The natural winds result in an excellent summer ventilation rate that is equivalent to 1,000 cfm per cow more, which is why open dairy barns are generally recommended in the San Joaquin Valley. In colder climates enclosed or partially enclosed barns may be utilized to protect cows from winter extremes. However, no completely enclosed freestall barns that were installed at a California dairy were identified.

Although the potential to enclose cows and TMR in a barn may exist, the feasibility of reasonably collecting the gas through a stack, chimney, or vent remains in question considering the extremely large amounts of airflow going through the barns needed to keep the cows cool. The airflow requirements would be even higher in the San Joaquin valley, where temperatures can exceed 110° F in the hot summer. If the barn exhaust can be properly captured it may be possible to vent it to a VOC control device. It is estimated that up to 80% of the gases emitted from enclosed freestall barns can be captured by the mechanical ventilation system and sent to a control device, such as an incinerator or biofilter.

Thermal incineration is a well-established VOC control technique. During combustion, gaseous hydrocarbons are oxidized to form CO_2 and water. In addition to the difficulty of capturing all of the gases in a freestall barn, a disadvantage of thermal incineration is that

when concentrations of combustible VOCs in the gas stream are very low very large amounts of supplemental fuel must be used to sufficiently increase the temperature of all of the ventilation air in order to incinerate these VOCs. This generally renders incineration cost prohibitive for large flows of dilute VOCs, such as in the ventilation air from a freestall barn. Because of this biofilters have generally been found to be more cost-effective for handling dilute streams of biodegradable VOCs. A biofilter is a device for removing contaminants from a gas in which the gas is passed through a media that supports microbial activity by which pollutants are degraded by biological oxidation. During biofiltration microorganisms oxidize the gaseous organic contaminants, ammonia, and sulfur compounds in the exhaust air resulting in carbon dioxide, nitrogen, water, salt, and biomass. Additional information on biofiltration is given above in the analysis for the cow housing permit unit for enclosed freestall barns vented to a control device. One of the disadvantages related to the use of a biofilter to control emissions from enclosed livestock barns is the large space requirement for the traditional biofilter design. To illustrate this, a low-cost natural bed biofilter designed to treat the VOC emissions from 1,000 milk cows and 180 dry cows with no support stock would cover more than 5.4 acres and would need to be maintained free of pests and approved by the appropriate permitting agencies. To avoid such expansive land requirements, the dairy would likely need to use much more expensive bio-trickling filters or bio-scrubbers.

Although many questions remain about the feasibility of requiring animals and TMR to be confined in buildings and capturing the exhaust gas and venting it to a control device, it will be considered for purposes of this analysis.

2) 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; feeding stream-flaked, dry rolled, cracked or ground corn or other ground cereal grains; removal of uneaten wet feed from feeding areas; and preparing TMR with a minimum mooisture 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 Control Technologies by Control Effectiveness

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

1) Enclosed Buildings for Animals and TMR with Emissions Vented to a Control Device (e.g. incinerator, biofilter, e.g) (≈64-72%; 80% Capture and 80-90% Control of emissions from cow housing and total mixed ration (TMR) feed placed in the cow housing unit)
2) Rule 4570 Management Practices for TMR

Step 4 - Cost Effectiveness Analysis

Enclosed Freestall Barns Vented to a Control Device (Biofilter)
The cost analysis performed for the BACT analysis for VOC emissions from the cow housing permit demonstrated that this option exceeded the District VOC cost effective threshold by a significant amount. (See BACT analysis for the Cow Housing Permit for details of the analysis.) This analysis included VOC reductions from Total Mixed Ration (TMR) as well as the cow housing since enclosed freestall barns vented to a control device would control emissions from both sources because the TMR is placed in the cow housing areas to feed the cows. Therefore, no further cost analysis is required for enclosed freestall barns to control emissions from TMR.

Rule 4570 Management Practices for TMR:
This option is achieved in practice; therefore a cost analysis is not required.

Step 5 - Select BACT

BACT for VOC from TMR is to implement the management practices required by District Rule 4570 to reduce VOC emissions from the TMR.

Appendix H
Risk Management Review & AAQA Summary

San Joaquin Valley Air Pollution Control District
Risk Management Review and Ambient Air Quality Analysis

To:	Kamaljit Sran – Permit Services
From:	Will Worthley – Technical Services
Date:	March 31, 2020
Facility Name:	RED ROCK DAIRY
Location:	E OF HIGHWAY 59, N CANTON RD, 37 DEG 12'42.3" N 120 DEG 27' 53.2" W, MERCED
Application #(s):	N-7787-1-2, -2-3, -3-3, -4-2, -5-2
Project #:	N-1200547

1. Summary

1.1 RMR

Units	Prioritization Score	Acute Hazard Index	Chronic Hazard Index	Maximum Individual Cancer Risk	T-BACT Required	Special Permit Requirements
1-2	0.02	0.00	0.00	5.12E-09	No	No
2-3	2.00	0.08	0.07	1.87E-06	No	No
3-3	7.74	0.01	0.00	1.54E-06	No	No
4-2	0.00	0.00	0.00	0.00E+00	No	No
5-2	NA[1]	NA[1]	NA[1]	NA[1]	No	No
Project Totals	9.76	0.09	0.07	3.41E-06		
Facility Totals	>1	0.29	0.07	5.99E-06		

Notes:
1. There is no risk associated with Unit 5 as the District does not have an approved toxic speciation profile for dairy feed and storage handling operations.

1.2 AAQA

Pollutant	Air Quality Standard (State/Federal)				
	1 Hour	3 Hours	8 Hours	24 Hours	Annual
PM10				Pass[3]	Pass[3]
PM2.5				Pass[4]	Pass[4]

Notes:
1. Results were taken from the attached AAQA Report.
2. The criteria pollutants are below EPA's level of significance as found in 40 CFR Part 51.165 (b)(2) unless otherwise noted below.
3. Modeled PM10 concentrations were below the District SIL for non-fugitive sources of 5 $\mu g/m^3$ for the 24-hour average concentration and 1 $\mu g/m^3$ for the annual concentration.
4. Modeled PM2.5 concentrations were below the District SIL for non-fugitive sources of 1.2 $\mu g/m^3$ for the 24-hour average concentration and 0.2 $\mu g/m^3$ for the annual concentration.

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

Unit # 1-2, 2-3, 3-3, 4-2, & 5-2

1. No special requirements.

2. Project Description

Technical Services received a request on March 9, 2020 to perform a Risk Management Review (RMR) and Ambient Air Quality Analysis (AAQA) for the following:

- Unit -1-2: MODIFICATION OF 2,650 COW MILKING OPERATION WITH ONE 72 STALL ROTARY MILKING PARLOR: INCREASE MILK COWS TO 3000
- Unit -2-3: MODIFICATION OF COW HOUSING - 2,650 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 3,000 MATURE COWS (MILK AND DRY); 2,636 TOTAL SUPPORT STOCK (HEIFERS, CALVES AND BULLS); AND FIVE AND HALF FREESTALL BARNS AND A LOAFING BARN WITH FLUSH/SCRAPE SYSTEM: INCREASE MILK COWS TO 3000, DRY COWS TO 400 AND AD SIX OPEN CORRALS TO HOUSE 2,089 SUPPORT STOCK
- Unit -3-3: MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF MECHANICAL SEPARATOR(S); ONE ANAEROBIC TREATMENT LAGOON (922 'X 372' X 14'), AND ONE STORAGE POND; MANURE IS LAND APPLIED THROUGH FLOOD/FURROW IRRIGATION: ALLOW INCREASE IN THROUGHPUT DUE TO HERD EXPANSION
- Unit -4-2: MODIFICATION OF SOLID MANURE HANDLING CONSISTING OF MANURE STOCK PILES; SOLID MANURE APPLICATION TO LAND AND/OR HAULED OFFSITE: ALLOW INCREASE IN THROUGHPUT DUE TO HERD EXPANSION
- Unit -5-2: MODIFICATION OF FEED STORAGE AND HANDLING CONSISTING OF COMMODITY BARN(S), SILAGE PILE(S), AND TOTAL MIXED RATION FEEDING: ALLOW INCREASE IN THROUGHPUT DUE TO HERD EXPANSION

3. RMR Report

3.1 Analysis

The District performed an analysis pursuant to the District's Risk Management Policy for Permitting New and Modified Sources (APR 1905, May 28, 2015) to determine the possible cancer and non-cancer health impact to the nearest resident or worksite. This policy requires that an assessment be performed on a unit by unit basis, project basis, and on a facility-wide basis. If a preliminary prioritization analysis demonstrates that:

- A unit's prioritization score is less than the District's significance threshold and;
- The project's prioritization score is less than the District's significance threshold and;
- The facility's total prioritization score is less than the District's significance threshold

Then, generally no further analysis is required.

The District's significant prioritization score threshold is defined as being equal to or greater than1.0. If a preliminary analysis demonstrates that either the unit(s) or the project's or the facility's total prioritization score is greater than the District threshold, a screening or a refined assessment is required

If a refined assessment is greater than one in a million but less than 20 in one million for carcinogenic impacts (Cancer Risk) and less than 1.0 for the Acute and Chronic hazard indices(Non-Carcinogenic) on a unit by unit basis, project basis and on a facility-wide basis the proposed application is considered less than significant. For unit's that exceed a cancer risk of 1 in one million, Toxic Best Available Control Technology (TBACT) must be implemented.

Toxic emissions for this project were calculated using the following methods:

- Toxic emissions from this proposed unit were calculated using District approved emission factors derived from a 2007 VOC profile "Dairies-Flushing Lanes" in EPA's speciation program.
- Toxic emissions for the Cow Housing, Lagoon(s), and Milk Parlor(s) 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.

These emissions were input into the San Joaquin Valley APCD's Hazard Assessment and Reporting Program (SHARP). In accordance with the District's Risk Management Policy, risks from the proposed unit's toxic emissions were prioritized using the procedure in the 2016 CAPCOA Facility Prioritization Guidelines. The prioritization score for this proposed facility was 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 2013-2017 from Merced (rural dispersion coefficient selected) 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:

Source Process Rates										
Unit ID	Process ID	Housing Name	VOC (lb/hr)	VOC (lb/yr)	NH_3 (lb/hr)	NH_3 (lb/yr)	PM_{10} (lb/hr)	PM_{10} (lb/yr)	PM2.5 (lb/hr)	PM2.5 (lb/yr)
2	1	FS7	0.6125	5,369	2.3208	20,339	0.0083	64	0.0023917	18
2	2	OC1	0.1750	1,524	0.4000	3,508	0.2667	2,318	0.0765333	665
2	3	OC2	0.1750	1,524	0.4000	3,508	0.2667	2,318	0.0765333	665
2	4	OC3	0.1750	1,524	0.4000	3,508	0.2667	2,318	0.0765333	665
2	5	OC4	0.1750	1,524	0.4000	3,508	0.2667	2,318	0.0765333	665

2	6	OC5	0.1750	1,524	0.4000	3,508	0.2667	2,318	0.0765333	665
2	7	OC7	0.1750	1,529	0.4000	3,518	0.2667	2,325	0.0765333	667

Source Process Rates						
	PM10 lb/hr	PM10 lb/yr	VOC lb/hr	VOC lb/yr	NH3 lb/hr	NH3 lb/yr
Milking Parlor	-	-	0	212	0.008	73
Cow Housing	2	13,979	2	14,518	4.726	41,397
Liquid Manure	-	-	0	3,419	0.602	5,271
Solid Manure	-	-	0	672	0.271	2,378
Lagoon/Storage Pond	-	-	0	1,643	0.146	1,278
Land Application (Liquid)	-	-	0	1,789	0.450	3,942
Land Application (Solid)	-	-	0	402	0.108	949
Solid Manure Storage	-	-	0	256	0.163	1,424

Polygon Area Source Parameters				
Unit ID	Unit Description	Release Height (m)	No. Vertices	Area (m^2)
1	Milk Parlor 1	1.00	4	3438
2	FS7	1.00	4	20468
2	OC7	1.00	4	12584
2	OC5	1.00	4	12584
2	OC4	1.00	4	12584
2	OC3	1.00	4	12584
2	OC2	1.00	4	12584
2	OC1	1.00	4	12584
3	Land App Liquid	0.00	20	5345307
3	Lagoon 1	0.00	4	62082
4	Land App Solid	0.00	20	5345307
4	Soild Pile Storage	0.00	4	1669

4. AAQA Report

The District modeled the impact of the proposed project on the National Ambient Air Quality Standard (NAAQS) and/or California Ambient Air Quality Standard (CAAQS) in accordance with District Policy APR-1925 (Policy for District Rule 2201 AAQA Modeling) and EPA's Guideline for Air Quality Modeling (Appendix W of 40 CFR Part 51). The District uses a progressive three level approach to perform AAQAs. The first level (Level 1) uses a very conservative approach. If this analysis indicates a likely exceedance of an AAQS or Significant Impact Level (SIL), the analysis proceeds to the second level (Level 2) which implements a more refined approach. For the 1-

hour NO_2 standard, there is also a third level that can be implemented if the Level 2 analysis indicates a likely exceedance of an AAQS or SIL.

The modeling analyses predicts the maximum air quality impacts using the appropriate emissions for each standard's averaging period. Required model inputs for a refined AAQA include background ambient air quality data, land characteristics, meteorological inputs, a receptor grid, and source parameters including emissions. These inputs are described in the sections that follow.

Ambient air concentrations of criteria pollutants are recorded at monitoring stations throughout the San Joaquin Valley. Monitoring stations may not measure all necessary pollutants, so background data may need to be collected from multiple sources. The following stations were used for this evaluation:

Monitoring Stations				
Pollutant	**Station Name**	**County**	**City**	**Measurement Year**
PM10	2334 'M' ST.	Merced	Merced	2016
PM2.5	Merced-Coffee	Merced	Merced	2016

Technical Services performed modeling for directly emitted criteria pollutants with the emission rates below:

Emission Rates (lbs/hour)						
Unit ID	**Process**	**NOx**	**SOx**	**CO**	**PM10**	**PM2.5**
2	1	0.00	0.00	0.00	1.59	0.458

Emission Rates (lbs/year)						
Unit ID	**Process**	**NOx**	**SOx**	**CO**	**PM10**	**PM2.5**
2	1	000	000	000	13,979	4,011.97

The AERMOD model was used to determine if emissions from the project would cause or contribute to an exceedance of any state of federal air quality standard. The parameters outlined below and meteorological data for 2013-2017 from Merced (rural dispersion coefficient selected) were used for the analysis:

The following parameters were used for the review:

Polygon Area Source Parameters				
Unit ID	Unit Description	Release Height (m)	No. Vertices	Area (m^2)
1	Milk Parlor 1	1.00	4	3438
2	FS7	1.00	4	20468
2	OC7	1.00	4	12584
2	OC5	1.00	4	12584
2	OC4	1.00	4	12584
2	OC3	1.00	4	12584
2	OC2	1.00	4	12584
2	OC1	1.00	4	12584
3	Land App Liquid	0.00	20	5345307
3	Lagoon 1	0.00	4	62082
4	Land App Solid	0.00	20	5345307
4	Soild Pile Storage	0.00	4	1669

5. Conclusion

5.1 RMR

The cumulative acute and chronic indices for this facility, including this project, are below 1.0; and the cumulative cancer risk for this facility, including this project, is less than 20 in a million. In addition, the cancer risk for each unit in this project is less than 1.0 in a million. **In accordance with the District's Risk Management Policy, the project is approved without Toxic Best Available Control Technology (T-BACT).**

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 this proposed unit.

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

5.2 AAQA

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.

6. Attachments

A. Modeling request from the project engineer

B. Additional information from the applicant/project engineer

C. Prioritization score w/ toxic emissions summary

D. Facility Summary

E. AAQA results

Appendix I

Draft Authority to Construct Permits N-7787-1-2, N-7787-2-3, N-7787-3-3, N-7787-4-2, and N-7787-5-2

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: N-7787-1-2 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: RED ROCK DAIRY
MAILING ADDRESS: 5914 S HIGHWAY 59
MERCED, CA 95341

LOCATION: E OF HIGHWAY 59, N CANTON RD
37 DEG 12'42.3" N 120 DEG 27' 53.2" W
MERCED, CA

EQUIPMENT DESCRIPTION:
MODIFICATION OF 2,650 COW MILKING OPERATION WITH ONE 72 STALL ROTARY MILKING PARLOR: INCREASE MAXIMUM NUMBER OF MILK COWS TO 3000

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. {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]
4. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

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

Samir Sheikh, Executive Director / APCO

Arnaud Marjollet, Director of Permit Services
N-7787-1-2 : Jul 13 2020 7:57AM -- SRANK : Joint Inspection NOT Required

5. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
6. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
7. Permittee shall flush or hose milk parlor immediately prior to, immediately after, or during each milking. [District Rules 2201 and 4570]
8. Permittee shall provide verification that milk parlors are flushed or hosed prior to, immediately after, or during each milking. [District Rules 2201 and 4570]
9. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 2201 and 4570]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: N-7787-2-3 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: RED ROCK DAIRY
MAILING ADDRESS: 5914 S HIGHWAY 59
MERCED, CA 95341

LOCATION: E OF HIGHWAY 59, N CANTON RD
37 DEG 12'42.3" N 120 DEG 27' 53.2" W
MERCED, CA

EQUIPMENT DESCRIPTION:
MODIFICATION OF COW HOUSING - 2,650 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 3,000 MATURE COWS (MILK AND DRY); AND FIVE AND HALF FREESTALL BARNS AND A LOAFING BARN WITH FLUSH/SCRAPE SYSTEM: INCREASE MAXIMUM NUMBER OF COWS TO 3,000 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 3,400 MATURE COWS (MILK AND DRY), AND INCREASE SUPPORT STOCK TO 2,089 TOTAL SUPPORT (HEIFERS, CALVES, AND BULLS), AND CONSTRUCT SIX NEW CORRALS AND ONE NEW FREESTALL BARN

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. {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]

CONDITIONS CONTINUE ON NEXT PAGE

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

Samir Sheikh, Executive Director / APCO

Arnaud Marjollet, Director of Permit Services
N-7787-2-3 : Jul 13 2020 7:57AM -- SRANK : Joint Inspection NOT Required

4. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
5. The total number of cattle housed at this dairy at any one time shall not exceed any of the following: 3,000 milk cows, 400 dry cows housed in freestall barns and loafing barn, and 2,089 support stock housed in open corrals. [District Rule 2201]
6. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
7. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
8. Permittee shall establish windbreaks along 1,150 ft of the East boundary and 1,580 ft of the South boundary of the cow housing. South and East windbreaks shall consist of a first row (closest to the dairy) of Leland Cypress planted 10 feet apart and the final row shall consist of Aptos Blue Redwood tree planted 14 feet apart. Spacing between rows shall be sufficient to accommodate cultivation equipment. This spacing shall not exceed 20 feet. Any alternative windbreak proposal must be approved by the District. [District Rule 2201]
9. Trees that are initially planted as part of the windbreak shall have a minimum container size of five gallons. [District Rule 2201]
10. Windbreaks shall be irrigated and maintained for survivability and rapid growth. Dead trees and shrubs shall be replaced as necessary to maintain a windbreak density of 65%. [District Rule 2201]
11. Density is the percentage of the background view that is obscured or hidden when viewing through the windbreak from 60 ft to 100 ft upwind of the rows. [District Rule 2201]
12. The feed lanes and feed walkways at this dairy shall be constructed of concrete. [District Rule 2201]
13. 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]
14. The feed lanes and walkways for milk cows and dry cows at this dairy shall be flushed at least four times per day. The feed lanes and walkways in the corrals for the remaining animals at this dairy shall be flushed at least two times per day. [District Rule 2201]
15. Permittee shall maintain records of: (1) the number of times feed lanes are flushed per day and (2) the frequency of scraping and manure removal from open corrals. [District Rule]
16. At least one of the feedings of the heifers at this dairy shall be near (within one hour of) dusk. [District Rule 2201]
17. Open corrals and freestall exercise pens shall be scraped weekly using a pull-type scraper in the morning hours, except when this is prevented by wet conditions. [District Rule 2201]
18. Permittee shall slope the surface of the pens at least 3% where the available space for each animal is 400 square feet or less and shall slope the surface of the pens at least 1.5% where the available space for each animal is more than 400 square feet per animal. [District Rules 2201 and 4570]
19. Permittee shall maintain records to demonstrate that the surface of the pens are sloped and maintained properly to ensure proper drainage. [District Rules 2201 and 4570]
20. Permittee shall flush, scrape or vacuum freestall lanes immediately prior to, immediately after or during each milking. [District Rules 2201 and 4570]
21. Permittee shall maintain records sufficient to demonstrate that freestall lanes are flushed, scraped or vacuumed immediately prior to, immediately after or during each milking. [District Rules 2201 and 4570]

CONDITIONS CONTINUE ON NEXT PAGE

22. Permittee shall remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every seven (7) days. [District Rules 2201 and 4570]
23. Permittee shall record the date that manure that is not dry is removed from individual cow freestall beds or freestall bedding is raked, harrowed, scraped, or graded at least once every seven (7) days. [District Rules 2201 and 4570]
24. Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rules 2201 and 4570]
25. 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]
26. 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]
27. Permittee shall demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning or demonstrate that corrals are cleaned at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]
28. Permittee shall clean concreted lanes such that the depth of manure does not exceed twelve (12) inches at any point or time [District Rules 2201 and 4570]
29. Permittee shall measure and document the depth of manure on the concrete lanes at least once every ninety (90) days. [District Rules 2201 and 4570]
30. 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]
31. Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rules 2201 and 4570]
32. 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]
33. 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]
34. Open corrals at this dairy shall be equipped with at least one shade structure. [District Rule 2201]
35. 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]
36. 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 Rule 4570]
37. 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]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: N-7787-3-3 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: RED ROCK DAIRY
MAILING ADDRESS: 5914 S HIGHWAY 59
MERCED, CA 95341

LOCATION: E OF HIGHWAY 59, N CANTON RD
37 DEG 12'42.3" N 120 DEG 27' 53.2" W
MERCED, CA

EQUIPMENT DESCRIPTION:
MODIFICATION OF LIQUID MANURE HANDLING SYSTEM CONSISTING OF PROCESSING PIT(S); SAND LANE(S), MECHANICAL SEPARATOR(S); DIGESTER SYSTEM CONSISTING OF A COVERED DIGESTER LAGOON, WITH AN AIR INJECTION SYSTEM FOR CONTROL OF H2S, AND CARBON DRY H2S SCRUBBER, AND TWO STORAGE PONDS, MANURE IS LAND APPLIED THROUGH FLOOD/FURROW IRRIGATION: ALLOW INCREASE IN THROUGHPUT DUE TO HERD EXPANSION

CONDITIONS

1. Authority to Construct N-7787-3-2 shall be implemented prior to or concurrently with this Authority to Construct. [District Rule 2201]
2. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
3. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
4. {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]

CONDITIONS CONTINUE ON NEXT PAGE

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

Samir Sheikh, Executive Director / APCO

Arnaud Marjollet, Director of Permit Services
N-7787-3-3 : Jul 13 2020 7:57AM -- SRANK : Joint Inspection NOT Required

5. {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]
6. {271} All equipment shall be maintained in good operating condition and shall be operated in a manner to minimize emissions of air contaminants into the atmosphere. [District Rule 2201]
7. The VOC content of the digester gas produced by the digester system shall not exceed 10% by weight. [District Rule 2201]
8. The oxygen/air injection system shall be maintained and operated in accordance with the supplier's recommendations to minimize the concentration of hydrogen sulfide (H2S) in the digester gas. [District Rule 2201]
9. Permittee shall remove solids with a solid separator system, prior to the manure entering the lagoon. [District Rules 2201 and 4570]
10. Permittee shall only land apply liquid manure that has been treated in the lagoon, with the exception of periods of maintenance, repair, or cleaning. [District Rules 2201 and 4570]
11. Permittee shall maintain records to demonstrate that only liquid manure treated in the lagoon is applied to fields. [District Rules 2201 and 4570]
12. 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]
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]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: N-7787-4-2 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: RED ROCK DAIRY
MAILING ADDRESS: 5914 S HIGHWAY 59
MERCED, CA 95341

LOCATION: E OF HIGHWAY 59, N CANTON RD
37 DEG 12'42.3" N 120 DEG 27' 53.2" W
MERCED, CA

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

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. {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]
4. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

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

Samir Sheikh, Executive Director / APCO

Arnaud Marjollet, Director of Permit Services
N-7787-4-2 : Jul 13 2020 7:58AM -- SRANK : Joint Inspection NOT Required

5. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
6. Within seventy two (72) hours of removal of separated solids from the drying process, permittee shall either 1) remove separated solids from the facility, or 2) 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 twenty-four (24) hours per event. [District Rules 2201 and 4570]
7. Permittee shall keep records of dates when separated solids are removed from the facility or permittee shall maintain records to demonstrate that separated solids piles outside the pens are covered with a weatherproof covering from October through May. [District Rules 2201 and 4570]
8. Permittee shall maintain records, such as manufacturer warranties or other documentation, demonstrating that the weatherproof covering over separated solids 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 201 and 4570]
9. Permittee shall incorporate all solid manure within seventy-two (72) hours of land application. [District Rules 2201 and 4570]
10. Permittee shall maintain records to demonstrate that all solid manure has been incorporated within seventy-two (72) hours of land application. [District Rules 2201 and 4570]
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]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: N-7787-5-2 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: RED ROCK DAIRY
MAILING ADDRESS: 5914 S HIGHWAY 59
MERCED, CA 95341

LOCATION: E OF HIGHWAY 59, N CANTON RD
37 DEG 12'42.3" N 120 DEG 27' 53.2" W
MERCED, CA

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

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. {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]
4. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

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

Samir Sheikh, Executive Director / APCO

Arnaud Marjollet, Director of Permit Services

Northern Regional Office • 4800 Enterprise Way • Modesto, CA 95356-8718 • (209) 557-6400 • Fax (209) 557-6475

5. Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rules 2201 and 4570]
6. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
7. Permittee shall push feed so that it is within three feet of feedlane fence within two hours of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]
8. Permittee shall maintain an operating plan or record that requires feed to be pushed within three feet of feedlane fence within two hours of putting out the feed, or use of a feed trough or other structure designed to maintain feed within reach of the animals. [District Rules 2201 and 4570]
9. Permittee shall begin feeding total mixed rations within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
10. Permittee shall maintain an operating plan or record of when feeding of total mixed rations began within two hours of grinding and mixing rations. [District Rules 2201 and 4570]
11. Permittee shall store grain in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]
12. Permittee shall maintain records demonstrating grain is/was stored in a weatherproof storage structure or under a weatherproof covering from October through May. [District Rules 2201 and 4570]
13. Permittee shall feed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. [District Rules 2201 and 4570]
14. Permittee shall maintain records to demonstrate animals are fed steam-flaked, dry rolled, cracked or ground corn or other steam-flaked, dry rolled, cracked or ground cereal grains. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rules 2201 and 4570]
15. For bagged silage/feedstuff, permittee shall utilize a sealed feed storage system (e.g., ag bag). [District Rules 2201 and 4570]
16. 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]
17. 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]
18. 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]
19. 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]

CONDITIONS CONTINUE ON NEXT PAGE

20. 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]

21. 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]

22. 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]

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

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

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 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]

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

27. 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]

28. 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]

29. 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]

30. 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]

31. 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]