San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

JAN 29 2013

Ryan Junio
Four J Farms Dairy
PO Box 835
Tipton, CA 93272

Re: Notice of Preliminary Decision - Authority to Construct
Project Number: S-1124061

Dear Mr. Junio:

Enclosed for your review and comment is the District's analysis of Four J Farms Dairy's application for an Authority to Construct for the construction of two freestalls, at 1223 W. Stanford Ave in Pixley, CA.

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

Thank you for your cooperation in this matter. If you have any questions regarding this matter, please contact Mr. Juscelino Siongco of Permit Services at (559) 230-5891.

Sincerely,

David Warner
Director of Permit Services

DW:jms

Enclosures

Seyed Sadredin
Executive Director/Air Pollution Control Officer

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

Central Region (Main Office)
1990 E. Gettysburg Avenue
Fresno, CA 93726-0244
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www.valleyair.org www.healthyairliving.com

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

JAN 29 2013

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

Re: Notice of Preliminary Decision - Authority to Construct
Project Number: S-1124061

Dear Mr. Tollstrup:

Enclosed for your review and comment is the District's analysis of Four J Farms Dairy's application for an Authority to Construct for the construction of two freestalls, at 1223 W. Stanford Ave in Pixley, CA.

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

Thank you for your cooperation in this matter. If you have any questions regarding this matter, please contact Mr. Juscelino Siongco of Permit Services at (559) 230-5891.

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Visalia Times-Delta

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

NOTICE IS HEREBY GIVEN that the San Joaquin Valley Unified Air Pollution Control District solicits public comment on the proposed issuance of Authority to Construct to Four J Farms Dairy for the construction of two freestalls, at 1223 W. Stanford Ave in Pixley, CA.

The analysis of the regulatory basis for this proposed action, Project #S-1124061, is available for public inspection at http://www.valleyair.org/notices/public_notices_idx.htm and the District office at the address below. Written comments on this project must be submitted within 30 days of the publication date of this notice to **DAVID WARNER, DIRECTOR OF PERMIT SERVICES, SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT, 1990 EAST GETTYSBURG AVENUE, FRESNO, CA 93726.**

San Joaquin Valley Air Pollution Control District
Authority to Construct Application Review
Construction of Two Freestalls

Facility Name:	Four J Farms Dairy	Date:	January 24, 2013
Mailing Address:	PO Box 835 Tipton, CA 93272	Engineer:	Juscelino Siongco
		Lead Engineer:	Martin Keast
Contact Person:	Ryan Junio		
Telephone:	(559) 757-2619		
Application #s:	S-4865-1-6 and -2-5		
Project #:	S-1124061		
Deemed Complete:	November 8, 2012		

I. PROPOSAL:

Four J Farms Dairy is applying for an Authority to Construct (ATC) permit to construct two freestalls that will house 700 milk cows and 1,105 milk cows. The two freestalls had been constructed without an ATC and this project documents the permitting of the two freestalls. Prior to the freestalls, the milk cows were housed in open corrals. The applicant had submitted an ATC application, Project S-1082870, to install one of the freestall barns on June 5, 2008, and stated that the additional freestall would not cause an increase in capacity. Since the addition of the freestall resulted in an increase in capacity, the ATCs under Project S-1082870 have been cancelled. This freestall will be processed in this project.

In addition, this project establishes the as-built capacity of the dairy at 1,805 milk cows not to exceed a combined total of 2,021 mature cows (milk and dry); 1,155 total support stock (heifers and bulls).

Although the addition of the two new freestalls have the potential to increase the capacity at the dairy, the applicant requested to limit the capacity to their existing capacity (prior to the construction of the freestalls), so that there is no increase in emissions and no additional requirements are triggered. The dairy capacity will be 1,805 milk cows not to exceed a combined total of 2,021 mature cows (milk and dry); 1,155 total support stock (heifers and bulls).

II. APPLICABLE RULES:

Rule 1070	Inspections (12/17/92)
Rule 2010	Permits Required (12/17/92)
Rule 2201	New and Modified Stationary Source Review Rule (4/21/11)

Rule 2410 Prevention of Significant Deterioration (6/16/11)
Rule 2520 Federally Mandated Operating Permits (6/21/01)
Rule 2550 Federally Mandated Preconstruction Review for Major Sources of Air Toxics (6/18/1998)
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)
CH&SC 41700 Health Risk Assessment
CH&SC 42301.6 School Notice
Public Resources Code 21000-21177: California Environmental Quality Act (CEQA)
California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000-15387: CEQA Guidelines

III. PROJECT LOCATION:

The facility is located at 1223 W. Stanford Ave in Pixley, CA. The equipment is not located within 1,000 feet of the outer boundary of a K-12 school. Therefore, the public notification requirement of California Health and Safety Code 42301.6 is not applicable to this project.

IV. PROCESS DESCRIPTION:

The primary function of Four J Farms Dairy is the production of milk, which is used to make dairy products for human consumption. Production of milk requires a herd of mature dairy cows that are lactating. In order to produce milk, the cows must be bred and give birth. The gestation period for a cow is 9 months, and dairy cows are bred again 4 months after calving. Thus, a mature dairy cow produces a calf every 12 to 14 months. Baby calves are raised at another facility and some are returned as mature cows.

Cow Milking

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. Currently, the cows at this dairy are milked in 25 stall flat barn milking parlor. The lactating cows will be milked at least two times per day in the milking parlor. The milking parlor will have concrete floors sloped to a drain. Manure that is deposited in the milking parlor will be sprayed or flushed into the drain using fresh water after each milking. The effluent from the milking parlor will be carried through pipes to the lagoon system.

Cow Housing

The existing dairy is currently designed to house milk cows in open corrals. All the milk cows will be moved to two new freestall barns. In freestall barns, cows are grouped in large pens with free access to feed bunks, water, and stalls for resting. A standard freestall barn design has a feed alley in the center of the barn separating two feed bunks on each side.

The applicant proposes to construct two freestall that will house 1,805 milk cows.

V. EQUIPMENT LISTING:

Pre-Project Equipment Description:

S-4865-1-4: 1,000 COW MILKING OPERATION WITH A 25 STALL FLAT MILKING PARLOR

S-4865-2-4: COW HOUSING - 1,000 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 1,165 MATURE COWS (MILK AND DRY); 980 TOTAL SUPPORT STOCK (HEIFERS AND BULLS)

Proposed Changes:

S-4865-1-6: MODIFICATION OF 1,000 COW MILKING OPERATION WITH A 25 STALL FLAT MILKING PARLOR: ESTABLISH AS BUILT CAPACITY OF 1,805 MILK COWS

S-4865-2-5: MODIFICATION OF COW HOUSING - 1,000 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 1,165 MATURE COWS (MILK AND DRY); 180 TOTAL SUPPORT STOCK (HEIFERS AND BULLS): CONSTRUCT 2 FREESTALLS TO HOUSE ALL MILK COWS AND ESTABLISH AS BUILT CAPACITY OF 1,805 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 2,021 MATURE COWS (MILK AND DRY); 1,155 SUPPORT STOCK (HEIFERS AND BULLS)

Post-Project Equipment Description:

S-4865-1-6: 1,805 COW MILKING OPERATION WITH A 25 STALL FLAT MILKING PARLOR

S-4865-2-5: COW HOUSING - 1,805 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 2,021 MATURE COWS (MILK AND DRY); 1,155 TOTAL SUPPORT STOCK (HEIFERS AND BULLS) AND 2 FREESTALLS WITH FLUSH/SCRAPE SYSTEM

VI. EMISSION CONTROL TECHNOLOGY EVALUATION:

PM_{10}, VOC, and NH_3 are the major pollutants of concern from dairy operations.

Particulate matter emissions from freestall barns are greatly reduced because the cows will be on a paved surface rather than on dry dirt. The feed lanes and walkways in the freestalls are flushed, generally 2 times or more per day. Manure, which is a source of emissions, will be removed from the freestall by flushing. Because of ammonia's high affinity for and solubility in water, flushing the feed lanes and walkways reduces volatilization of ammonia from the deposited manure. Additionally, flushing of the lanes creates a moist environment, which further decreases particulate matter emissions.

VII. GENERAL CALCULATIONS:

A. Assumptions:

- The two new freestalls are new emissions units in this project. Freestall #1 houses 700 milk cows. Freestall #2 houses 1,105 milk cows
- Pre-project Potential to Emit for the dairy will be re-established based on the as built capacity of the dairy of 1,805 milk cows not to exceed a combined total of 2,021 mature cows (milk and dry); 1,155 total support stock (heifers and bulls).
- There is no proposed change in the herd capacity in this project. Therefore, the pre and post-project herd capacities are the same.
- Pre and post-project emission factors include VOC control efficiencies resulting from the mitigation measures selected under Project #S-1111619 to comply with District Rule 4570.
- All PM_{10} emissions from the dairy will be allocated to the cow housing permit unit.
- For the dairy, only emissions from the lagoon/storage pond and internal combustion engines will be used in determining if this facility will be a major source since the lagoon/storage pond and internal combustion engines are considered to be the only non-fugitive emissions at a dairy.
- The PM_{10} emission factors for the dairy animals are based on a District document entitled "Dairy and Feedlot PM_{10} Emissions Factors," which compiled data from studies performed by Texas A&M ASAE and a USDA/UC Davis report quantifying dairy and feedlot emissions.
- The VOC and NH_3 emission factors for milk cows are based on an internal document entitled "*Breakdown of Dairy VOC Emission Factor into Permit Units.*" The VOC and 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.

B. Emission Factors:

PM_{10}, VOC, and NH_3

The dairy emissions calculation spreadsheet in Appendix A list the PM_{10}, VOC, and NH_3 emission factors for the animals at the dairy. These emission factors will be used to calculate the pre and post-project PM_{10}, VOC, and NH_3 emissions from the new dairy.

C. Calculations:

1. Pre-Project Potential to Emit (PE_1)

Pre-Project Potential to Emit (PE_1) for the dairy will be based on the maximum design capacity for each type of cow at the dairy and the controls required and proposed by the dairy.

All emission calculations for this project are included in the dairy emissions calculation spreadsheet in Appendix A. The summary of the Pre-Project emissions are shown in the table below:

Pre-Project Potential to Emit (PE1)						
	PM_{10}		VOC		NH_3	
	lbs/day	lbs/yr	lbs/day	lbs/yr	lbs/day	lbs/yr
S-4865-1-4 Cow Milking	0	0	2.0	715	0.9	343
S-4865-2-4 Cow Housing	55.9	20,366	61.7	22,565	314.1	114,617

2. Post-Project Potential to Emit (PE_2)

Post-Project Potential to Emit (PE2) for the dairy based on the maximum design capacity for each type of cow at the dairy and the controls required and proposed by the dairy.

All emission calculations for this project are included in the dairy emissions calculation spreadsheet in Appendix A. The summary of the Post-Project emissions are shown in the table below:

Post-Project Potential to Emit (PE2)						
	PM_{10}		VOC		NH_3	
	lbs/day	lbs/yr	lbs/day	lbs/yr	lbs/day	lbs/yr
S-4865-1-6 Cow Milking	0	0	2.0	715	0.9	343
S-4865-2-5 Cow Housing	40.2	14,629	61.7	22,565	314.1	114,617

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

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

Pre-Project Stationary Source Potential to Emit [SSPE1] (lb/year)						
	NO_X	SO_X	PM_{10}	CO	VOC	NH_3
S-4865-1-4	0	0	0	0	715	343
S-4865-2-4	0	0	20,366	0	22,565	114,617
S-4865-3-4	0	0	0	0	5,520	36,799
S-4865-4-2	0	0	0	0	1,092	7,352
S-4865-11-0	3,224	306	161	980	368	0
S-4865-18-1	0	0	0	0	36,267	0
S-4865-22-0	325	0	10	41	12	0
Pre-Project SSPE (SSPE1)	**3,549**	**306**	**20,537**	**1,021**	**66,539**	**159,111**

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

Pursuant to Section 4.10 of District Rule 2201, the Post-project Stationary Source Potential to Emit (SSPE2) is the post-project annual PE of all units at the Stationary Source. The SSPE2 is presented in the following table:

Post-Project Stationary Source Potential to Emit [SSPE2] (lb/year)						
	NO_X	SO_X	PM_{10}	CO	VOC	NH_3
S-4865-1-6	0	0	0	0	715	343
S-4865-2-5	0	0	14,629	0	22,565	114,617
S-4865-3-4	0	0	0	0	5,520	36,799
S-4865-4-2	0	0	0	0	1,092	7,352
S-4865-11-0	3,224	306	161	980	368	0
S-4865-18-1	0	0	0	0	36,267	0
S-4865-22-0	325	0	10	41	12	0
Post-Project SSPE (SSPE2)	**3,549**	**306**	**14,800**	**1,021**	**66,539**	**159,111**

5. Major Source Determination

Rule 2201 Major Source Determination:

Pursuant to District Rule 2201, a Major Source is a stationary source with a SSPE2 equal to or exceeding one or more of the following threshold values. 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 IC engines (i.e. IC engines at a particular site at the facility for less than 12 months)
- Fugitive emissions, except for the specific source categories specified in 40 CFR 51.165

(2) A major stationary source of air pollutants or any group of stationary sources as defined in section 302 of the Act, that directly emits, or has the potential to emit, 100 tpy or more of any air pollutant (including any major source of fugitive emissions of any such pollutant, as determined by rule by the Administrator). The fugitive emissions of a stationary source shall not be considered in determining whether it is a major stationary source for the purposes of section 302(j) of the Act, unless the source belongs to one of the following categories of stationary source: (i) Coal cleaning plants (with thermal dryers); (ii) Kraft pulp mills; (iii) Portland cement plants; (iv) Primary zinc smelters; (v) Iron and steel mills; (vi) Primary aluminum ore reduction plants; (vii) Primary copper smelters; (viii) Municipal incinerators capable of charging more than 250 tons of refuse per day; (ix) Hydrofluoric, sulfuric, or nitric acid plants; (x) Petroleum refineries; (xi) Lime plants; (xii) Phosphate rock processing plants; (xiii) Coke oven batteries; (xiv) Sulfur recovery plants; (xv) Carbon black plants (furnace process); (xvi) Primary lead smelters; (xvii) Fuel conversion plants; (xviii) Sintering plants; (xix) Secondary metal production plants; (xx) Chemical process plants; (xxi) Fossil-fuel boilers (or combination thereof) totaling more than 250 million British thermal units per hour heat input; (xxii) Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels; (xxiii) Taconite ore processing plants; (xxiv) Glass fiber processing plants; (xxv) Charcoal production plants; (xxvi) Fossil-fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input; or (xxvii) Any other stationary source category which, as of August 7, 1980, is being regulated under section 111 or 112 of the Act.

Because agricultural operations do not fall under any of the specific source categories listed above, fugitive emissions are not counted when determining if an agricultural operation is a major source. 40 CFR 71.2 defines fugitive emissions as "those emissions which could not reasonably pass through a stack, chimney, vent, or other functionally-equivalent opening."

Since emissions at the dairy are not actually collected, a determination of whether emissions could be reasonably collected must be made by the permitting authority. The California Air Pollution Control Association (CAPCOA) prepared guidance in 2005 for estimating potential to emit of Volatile Organic Compounds from dairy farms. The guidance states that *"VOC emissions from the milking centers, cow housing areas, corrals, common manure storage areas, and land application of manure are not physically contained and could not reasonably pass through a stack, chimney, vent, or other functionally-equivalent opening. No collection technologies currently exist for VOC emissions from these emissions units. Therefore, the VOC emissions from these sources are considered fugitive."* The guidance also concludes that, because VOC collection technologies do exist for liquid waste systems at dairies, *"...the VOC emissions from waste lagoons and storage ponds are considered non-fugitive."* The District has researched this issue and concurs with the CAPCOA assessment, as discussed in more detail below.

Milking Center

The mechanical system for the milking parlors can be utilized to capture the gases emitted from the milking parlors, however in order to capture all of the gases, and to keep an appropriate negative pressure throughout the system, the holding area would also need to be entirely enclosed. No facility currently encloses the holding area since cows are continuously going in and out of the barn throughout the day. The capital required to enclose this large area would also be significant. Since the holding area is primarily kept open, the District cannot reasonably demonstrate that emissions can pass through a stack, chimney, vent, or other functionally equivalent opening.

Cow Housing

Although there are smaller dairy farms that have enclosed freestall barns, these barns are not fully enclosed and none of the barns have been found to vent the exhaust through a collection device. The airflow requirements through dairy barns are extremely high, primarily for herd health purposes. The airflow requirements will be even higher in the San Joaquin valley, where temperatures reach in excess of 110 degrees in the dry summer. Collection and control of the exhaust including the large amounts of airflow have not yet been achieved by any facility. Due to this difficultly, the District cannot reasonably demonstrate that emissions can pass through a stack, chimney, vent, or other functionally equivalent opening.

Manure storage Areas

Many dairies have been found to cover dry manure piles. Covering dry manure piles is also a mitigation measure included in District Rule 4570. However, the District was not able to find any facility, which currently captures the emissions from the storage or handling of manure piles. Although many of these piles are covered, the emissions cannot easily be captured. Therefore, the District cannot reasonably demonstrate that these emissions can pass through a stack, chimney, vent, or other

functionally equivalent opening. In addition, emissions from manure piles have been shown to be insignificant from recent studies.

Land Application
Emissions generated from the application of manure on land cannot reasonably be captured due to the extremely large areas, in some cases thousands of acres, of cropland at dairies. Therefore, the District cannot reasonably demonstrate that these emissions can pass through a stack, chimney, vent, or other functionally equivalent opening.

Feed Handling and Storage
The majority of dairies store the silage piles underneath a tarp or in an agbag. The entire pile is covered except for the face of the pile. The face of the pile is kept open due to the continual need to extract the silage for feed purposes. The silage pile is disturbed 2-3 times per day. Because of the ongoing disturbance to these piles, it makes it extremely difficult to design a system to capture the emissions from these piles. In fact, as far as the District is aware, no system has been designed to successfully extract the gases from the face of the pile to capture them, and, as important, no study has assessed the potential impacts on silage quality of a continuous air flow across the silage pile, as would be required by such a collection system. Therefore, the District cannot demonstrate that these emissions can be reasonably expected to pass through a stack, chimney, vent, or other functionally equivalent opening.

Therefore, the VOC emissions from these sources are considered fugitive. The District has determined that control technology to capture emissions from lagoons (biogas collection systems, for instance) is in use and these emissions can be reasonably collected and are not fugitive. Therefore, only emissions from the lagoons, storage ponds, and IC engines will be used to determine if this facility is a major source. The emissions from the lagoon/storage pond are presented in the calculation section.

The following table shows the non-fugitive Post-Project Stationary Source Potential to Emit for the dairy.

Non-Fugitive Pre-Project Stationary Source Potential to Emit [SSPE1] (lb/year)					
	NO_X	SO_X	PM_{10}	CO	VOC
S-4865-3-4 – Lagoon Only	0	0	0	0	2,701
S-4865-11-0	3,224	306	161	980	368
S-4865-22-0	325	0	10	41	12
Non-Fugitive SSPE1	**3,549**	**306**	**171**	**1,021**	**3,081**

Non-Fugitive Post-Project Stationary Source Potential to Emit [SSPE2] (lb/year)					
	NO_X	SO_X	PM_{10}	CO	VOC
S-4865-3-4 – Lagoon Only	0	0	0	0	2,701
S-4865-11-0	3,224	306	161	980	368
S-4865-22-0	325	0	10	41	12
Non-Fugitive SSPE2	**3,549**	**306**	**171**	**1,021**	**3,081**

Rule 2201 Major Source Determination (lb/year)					
	NO_X	SO_X	PM_{10}	CO	VOC
Facility emissions pre-project	**3,549**	**306**	**171**	**1,021**	**3,081**
Facility emissions post-project	**3,549**	**306**	**171**	**1,021**	**3,081**
Major Source Threshold	20,000	140,000	140,000	200,000	20,000
Major Source?	No	No	No	No	No

As seen 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:

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

PSD Major Source Determination (tons/year)							
	NO2	VOC	SO2	CO	PM	PM10	CO2e
Estimated Facility PE before Project Increase	1.8	33.3	0.15	0.51	20.6	10.3	16,585
PSD Major Source Thresholds	250	250	250	250	250	250	100,000
PSD Major Source ? (Y/N)	N	N	N	N	N	N	N

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

6. Baseline Emissions (BE)

The BE calculation (in lb/year) is performed on a pollutant-by-pollutant basis to determine the amount of offsets required, where necessary, when the SSPE1 is greater than the offset threshold. This project is exempt from offsets pursuant to Rule 2201, Section 4.6.9. Therefore, BE calculations are not required.

7. SB 288 Major Modification

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

Since this facility is not a major source for any of the pollutants addressed in this project, this project does not constitute an SB 288 major modification.

8. Federal Major Modification

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

Since this facility is not a Major Source for any pollutants, this project does not constitute a Federal Major Modification. Additionally, since the facility is not a major source for PM_{10} (140,000 lb/year), it is not a major source for PM2.5 (200,000 lb/year).

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

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

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

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

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

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

PSD Major Source Determination: Potential to Emit (tons/year)							
	NO2	VOC	SO2	CO	PM	PM10	CO2e
Total PE from New and Modified Units	1.8	33.3	0.15	0.51	14.8	7.4	16,585
PSD Major Source threshold	250	250	250	250	250	250	100,000
New PSD Major Source?	N	N	N	N	N	N	N

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

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 the dairy emissions calculation spreadsheet in Appendix A.

VIII. COMPLIANCE:

Rule 1070 Inspections

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

- {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where

records must be kept under condition of the permit. [District Rule 1070]

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

Rule 2010 Permits Required

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

Pursuant to section 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. BACT

1. BACT Applicability:

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

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

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

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

As discussed in Section I above, the construction of two new freestall will be evaluated under this project. The new freestalls are considered as new emissions units. The following calculations determine if the PE > 2 lb/day is triggered for each new freestall.

Freestall #1 houses 700 milk cows and freestall #2 houses 1,105 milk cows.

From the dairy emissions calculation spreadsheet in Appendix A, the PM_{10}, VOC, and NH_3 emission factor (EF2) are 1.37 lb-PM_{10}/hd-yr, 9.86 lb-VOC/hd-yr, and 53.3 lb-NH_3/hd-yr.

Freestall #1 (700 milk cows):

PE_{PM10} = (700 milk cows x 1.37 lb-PM_{10}/hd-yr) ÷ 365 day/yr
= 2.6 lb-PM_{10}/day

PE_{VOC} = (700 milk cows x 9.86 lb-VOC/hd-yr) ÷ 365 day/yr
= 18.9 lb-VOC/day

PE_{NH3}= (700 milk cows x 53.3 lb-NH_3/hd-yr) ÷ 365 day/yr
= 102.2 lb-NH_3/day

As shown above, PE > 2 for PM_{10}, VOC, and NH_3 for the freestall. Therefore, BACT is triggered for VOC, PM10, and NH_3 for the new freestall.

Freestall #2 (1,105 milk cows):

PE_{PM10} = (1,105 milk cows x 1.37 lb-PM_{10}/hd-yr) ÷ 365 day/yr
= 4.1 lb-PM_{10}/day

PE_{VOC} = (1,105 milk cows x 9.86 lb-VOC/hd-yr) ÷ 365 day/yr
= 29.9 lb-VOC/day

PE_{NH3}= (1,105 milk cows x 53.3 lb-NH_3/hd-yr) ÷ 365 day/yr
= 161.4 lb-NH_3/day

As shown above, PE > 2 for PM_{10}, VOC, and NH_3 for the freestall. Therefore, BACT is triggered for VOC, PM10, and NH_3 for the new freestall.

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

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

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

Adjusted Increase in Permitted Emissions (AIPE)

AIPE = PE2 – HAPE,

Where,
AIPE = Adjusted Increase in Permitted Emissions, (lb/day)
PE2 = Post-Project Potential to Emit, (lb/day)
HAPE = Historically Adjusted Potential to Emit, (lb/day)

HAPE = PE1 x (EF2/EF1)

Where,
PE1 = The emissions unit's Potential to Emit prior to modification or relocation, (lb/day)
EF2 = The emissions unit's permitted emission factor for the pollutant after modification or relocation. If EF2 is greater than EF1 then EF2/EF1 shall be set to 1.
EF1 = The emissions unit's permitted emission factor for the pollutant before the modification or relocation

AIPE = PE2 – (PE1 x (EF2/EF1))

HAPE for the dairy permit units are calculated based on the pre-project annual emissions and the pre-project emission factors for each type of cow and the post-project emission factors for each type of cow.

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

2. Top-Down BACT Analysis

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

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

Freestalls in the Cow Housing Permit (S-4865-2-5)

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

VOC: 1) Concrete freestall feed lanes and walkways.
2) Freestall feed lanes and walkways flushed four times per day.

NH_3: 1) Concrete freestall feed lanes and walkways.
2) Freestall feed lanes and walkways flushed four times per day.

d. SB 288/Federal Major Modification

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

B. Offsets:

Pursuant to Section 4.6.9 of District Rule 2201, agricultural sources, to the extent provided by California Health and Safety Code, section 42301.18(c) are exempt from offsets as long as nothing in this Health and Safety Code section circumvents the requirements of section 42301.16(a). Therefore, offsets are not required for this project.

C. Public Notification:

1. Applicability

Public noticing is required for:
a. New Major Sources, Federal Major Modifications, and SB 288 Major Modifications,
b. Any new emissions unit with a Potential to Emit greater than 100 pounds during any one day for any one pollutant,
c. Any project which results in the offset thresholds being surpassed, and/or
d. Any project with an SSIPE of greater than 20,000 lb/year for any pollutant.

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

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

b. PE > 100 lb/day

The PE2 for each new freestall is compared to the daily PE Public Notice thresholds in the following table:

Freestall #1:

PE > 100 lb/day Public Notice Thresholds			
Pollutant	PE2 (lb/day)	Public Notice Threshold	Public Notice Triggered?
NO_X	0	100 lb/day	No
SO_X	0	100 lb/day	No
PM_{10}	2.6	100 lb/day	No
CO	0	100 lb/day	No
VOC	18.9	100 lb/day	No
NH_3	102.2	100 lb/day	Yes

Therefore, public noticing for PE > 100 lb/day purposes is required.

Freestall #2:

PE > 100 lb/day Public Notice Thresholds			
Pollutant	PE2 (lb/day)	Public Notice Threshold	Public Notice Triggered?
NO_X	0	100 lb/day	No
SO_X	0	100 lb/day	No
PM_{10}	4.1	100 lb/day	No
CO	0	100 lb/day	No
VOC	29.9	100 lb/day	No
NH_3	161.4	100 lb/day	Yes

Therefore, public noticing for PE > 100 lb/day purposes is required.

c. Offset Threshold

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

Offset Threshold				
Pollutant	SSPE1 (lb/year)	SSPE2 (lb/year)	Offset Threshold	Public Notice Required?
NO_X	3,549	3,549	20,000 lb/year	No
SO_X	306	306	54,750 lb/year	No
PM_{10}	20,537	14,800	29,200 lb/year	No
CO	1,021	1,021	200,000 lb/year	No
VOC	66,539	66,539	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] – Public Notice					
Pollutant	SSPE2 (lb/year)	SSPE1 (lb/year)	SSIPE (lb/year)	SSIPE Public Notice Threshold	Public Notice Required?
NO_x	3,549	3,549	0	20,000 lb/year	No
SO_x	306	306	0	20,000 lb/year	No
PM_{10}	14,800	20,537	-5,737	20,000 lb/year	No
CO	1,021	1,021	0	20,000 lb/year	No
VOC	66,539	66,539	0	20,000 lb/year	No
NH_3	159,111	159,111	0	20,000 lb/year	No

As demonstrated above, the SSIPEs for all pollutants were less than 20,000 lb/year; therefore public noticing for SSIPE purposes is not required.

2. Public Notice Action

As discussed above, public noticing is required for this project for NH_3 emissions in excess of 100 lb/day for each new freestall. Therefore, public notice documents will be submitted to the California Air Resources Board (CARB) and a public notice will be published in a local newspaper of general circulation prior to the issuance of the ATC for this equipment.

D. Daily Emission Limits (DEL)

Daily emissions limitations (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 the required controls and mitigation measures. The number and types of cows are listed in the permit equipment description for the Cow Housing. The following conditions are mitigation measures that are included in the permit.

S-4865-2-5: Cow Housing

- The freestall feed lanes and walkways at this dairy shall be constructed of concrete. [District Rule 2201]
- Freestall concrete feed lanes and walkways shall be flushed/vacuumed at least four times per day. [District Rules 2201]

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 for this project.

3. Record Keeping

S-4865-2-5: Cow Housing

- Permittee shall maintain records demonstrating that freestall concrete lanes are flushed/vacuumed at least four times a day. [District Rules 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 E of this document for the AAQA summary sheet.

Public notice was triggered for NH_3 emissions only. Since there are no ambient standards for NH_3, an AAQA is not required or performed for this project.

Rule 2410 Federally Mandated Operating Permits

The prevention of significant deterioration (PSD) program is a construction permitting program for new major stationary sources and major modifications to existing major stationary sources located in areas classified as attainment or in areas that are unclassifiable for any criteria air pollutant. The provisions of this rule applies to any

source and the owner or operator of any source subject to any requirement under Title 40 Code of Federal Regulations (40 CFR) Part 52.21 as incorporated into this rule.

As discussed in Section VII.C.9 above, the project's potential to emit does not exceed any of the PSD major source thresholds. Therefore Rule 2410 is not applicable.

Rule 2520 Federally Mandated Operating Permits

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

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

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

Under Rule 2550, newly constructed facilities or reconstructed units or sources[1] 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 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
Eythylbenzene	0.003	
o-Xylene	0.005	

[1] 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.

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[2]	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[3]	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[4]**		**lbs/yr**	**tons/yr**
Milking Cow	1,805	x	1.828	=	3,300	1.7
Dry Cow	216	x	1.123	=	243	0.1
Heifer (15-24 mo)	412	x	0.786	=	324	0.2
Heifer (7-14 mo)	418	x	0.686	=	287	0.1
Heifer (4-6 mo)	300	x	0.621	=	186	0.1
Calf (under 3 mo)	0	x	0.584	=	0	0.0
Bulls	0	x	1.123	=	0	0.0

[2] 0.01 + 0.07 = 0.08 lbs/hd-yr
[3] 0.012 + 0.15 = 0.162 lbs/hd-yr
[4] The emission factor has been adjusted for each type of cow based on the ratio of amount of manure generated for each cow.

Total		=	**4,340**	**2.2**

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 1.6 tons per year (2.2 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 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 PM10 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 states that no air contaminant shall be released into the atmosphere which causes a public nuisance.

This facility is expected to comply with the requirements of this rule.

California Health & Safety Code Section 41700 (Health Risk Assessment)

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

An HRA is not required for a project with a total facility prioritization score of less than or equal to one. According to the Technical Services Memo for this project (Appendix E), the total facility prioritization score including this project was less than or equal to one. Therefore, no future analysis is required to determine the impact from this project and compliance with the District's Risk Management Policy is expected.

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 CMP plan on January 23, 2012. 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).

The facility is in compliance with the requirements of the rule. To ensure ongoing compliance, the mitigation measures that the applicant has selected for the cow milking and cow housing will be incorporated into the ATC issued under this project.

California Health & Safety Code Section 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. This facility is not located within 1,000 feet of any K-12 school and therefore a school notice is not required.

California Environmental Quality Act (CEQA)

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

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

Greenhouse Gas (GHG) Significance Determination

It is determined that no other agency has or will prepare an environmental review document for the project. Thus the District is the Lead Agency for this project.

The greenhouse gas emissions are included in the dairy emissions calculation spreadsheet in Appendix A. A summary of the pre and post-project total GHG emissions are shown in the following table.

Change in Project GHG Emissions			
Animal Type	Pre-Project CO2e (metric tons/yr)	Post-Project CO2e (metric tons/yr)	Change (metric tons/yr)
Milk Cows	11191	11191	0
Dry Cows	1339	1339	0
Large Heifers	1093	1093	0
Medium Heifers	836	836	0
Small Heifers	600	600	0
Calves	0	0	0
		Total	**0**

As shown in the table, there is no change in project GHG emissions. Therefore, the District concludes that the project would have a less than cumulatively significant impact on global climate change.

District CEQA Findings

The District is the Lead Agency for this project because there is no other agency with broader statutory authority over this project. The District performed an Engineering Evaluation (this document) for the proposed project and determined that the activity will occur at an existing facility and the project involves negligible expansion of the existing use. Furthermore, the District determined that the activity will not have a significant effect on the environment. The District finds that the activity is categorically exempt from the provisions of CEQA pursuant to CEQA Guideline § 15031 (Existing Facilities),

IX. Recommendation

Compliance with all applicable rules and regulations is expected. Pending a successful NSR Public Noticing period, issue Authorities to Construct permits S-4865-1-6 and S-4865-2-5 subject to the permit conditions on the attached draft ATC in Appendix C.

X. Billing Information

Permit Number	Fee Schedule	Fee Description
S-4865-1-6	3020-06	Cow Milking
S-4865-2-5	3020-06	Cow Housing

XI. Appendices

A: Dairy Emissions Calculation Spreadsheet
B: Current Permits to Operate (S-4865-1-4 and S-4865-2-4)
C: Draft Authority to Construct (S-4865-1-6 and S-4865-2-5)
D: BACT Analysis
E: HRA/RMR Summary

Appendix A

Dairy Emissions Calculation Spreadsheet

Instructions: Provide the information required in the yellow-shaded cells below. Then go to the "Mitigation Measures" tabsheet and select the Rule 4570 mitigation measures practiced/proposed by the facility.

Pre-Project Dairy Information

Are all cows at this facility Jersey cows? no

Most dairies house Holstein cows unless explicitly stated on the PTO or application.

Does the facility have an anaerobic treatment lagoo no

Total support stock (heifers, calves, and bulls) should be entered as large heifers. However, if entering the entire support stock as large heifers will result in NSR implications, it may be appropriate to enter each herd size individually (talk to Supervisor). Enter bulls as large heifers.

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

Pre-Project Herd Size

Herd	Size	Total	Shades?	Shade CE
Milk Cows in Freestalls		1,805	N/A	0.0%
Milk Cows in Open Corrals	1,805		x	16.7%
Dry Cows in Freestalls		216	N/A	0.0%
Dry Cows in Open Corrals	216		x	16.7%
Large Heifers in Freestalls		437	N/A	0.0%
Large Heifers in Open Corrals	437		x	8.3%
Medium Heifers in Freestalls		418	N/A	0.0%
Medium Heifers in Open Corrals	418		x	8.3%
Small Heifers in Freestalls		300	N/A	0.0%
Small Heifers in Open Corrals	300		x	8.3%
Calves in Open Corrals		0		0.0%
Calves in On-Ground Hutches				0.0%
Calves in Above-Ground Flushed Hutche				0.0%
Calves in Above-Ground Scraped Hutche				0.0%
	Total Milk Cows	1,805		
	Total Mature Cows	2,021		
	Total Support Stock	1,155		
	Total Dairy Head	3,176		

If there are shades, enter "x". Otherwise leave blank.

Silage info may be found in the Rule 4570 Phase II application or EE.

Silage Information

Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	1	15	150
Alfalfa			
Wheat	1	15	150

Post-Project Dairy Information

Are all cows at this facility Jersey cows? no

Most dairies house Holstein cows unless explicitly stated on the PTO or application.

Does the facility have an anaerobic treatment lagoo no

Total support stock (heifers, calves, and bulls) should be entered as large heifers. However, if entering the entire support stock as large heifers will result in NSR implications, it may be appropriate to enter each herd size individually (talk to Supervisor). Enter bulls as large heifers.

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

Post-Project Herd Size

Herd	Size	Total	Shades?	Shade CE
Milk Cows in Freestalls	1,805	1,805	N/A	0.0%
Milk Cows in Open Corrals				0.0%
Dry Cows in Freestalls		216	N/A	0.0%
Dry Cows in Open Corrals	216		x	16.7%
Large Heifers in Freestalls		437	N/A	0.0%
Large Heifers in Open Corrals	437		x	8.3%
Medium Heifers in Freestalls		418	N/A	0.0%
Medium Heifers in Open Corrals	418		x	8.3%
Small Heifers in Freestalls		300	N/A	0.0%
Small Heifers in Open Corrals	300		x	8.3%
Calves in Open Corrals		0		0.0%
Calves in On-Ground Hutches				0.0%
Calves in Above-Ground Flushed Hutche				0.0%
Calves in Above-Ground Scraped Hutche				0.0%
	Total Milk Cows	1,805		
	Total Mature Cows	2,021		
	Total Support Stock	1,155		
	Total Dairy Head	3,176		

If there are shades, enter "x". Otherwise leave blank.

Silage info may be found in the Rule 4570 Phase II application or EE.

Silage Information

Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	1	15	150
Alfalfa			
Wheat	1	15	150

For each mitigation measure, enter "x" if the facility practices or is proposing the corresponding measure. Leave **blank** if not. This info may be found in the Rule 4570 Phase II application or EE.

Milking Parlor				
Measure Proposed?		**Mitigation Measure(s) per Emissions Point**	**Control Efficiency**	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Enteric Emissions Mitigations		
x	x	Feed according to NRC guidelines	10%	10%
		Total Control Efficiency	10%	10%
		Milking Parlor Floor Mitigations		
x	x	Feed according to NRC guidelines	10%	10%
x	x	Flush or hose milk parlor immediately prior to, immediately after, or duing 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**	**Control Efficiency (%)**	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Enteric Emissions Mitigations		
x	x	Feed according to NRC guidelines	10%	10%
		Total Control Efficiency	10%	10%
		Corrals/Pens Mitigations		
x	x	Feed according to NRC guidelines	10%	10%
x	x	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%
x	x	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.	0%	0%
x	x	Scrape, vacuum, or flush concrere 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.	10%	10%
x	x	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%
x	x	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.	5%	5%
		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 incldues a partial control for this measure.	0%	0%

		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 incldues a partial control for this measure.	0%	0%
x	x	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 manrue 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	23.05%	23.05%
		Bedding Mitigations		
x	x	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%
x	x	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.	10%	10%
		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		
x	x	Feed according to NRC guidelines	10%	10%
x	x	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%
x	x	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.	10%	10%
		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**	**Control Efficiency (%)**	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Lagoons/Storage Ponds Mitigations		
x	x	Feed according to NRC guidelines	10%	10%
		Use phototropic lagoon	0%	0%
		Use an anaerobic treatment lagoon designed according to NRCS Guideline No. 359	0%	0%
x	x	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		
x	x	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%
x	x	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**	**Control Efficiency (%)**	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Solid Manure Storage Mitigations		
x	x	Feed according to NRC guidelines	10%	10%
		Within 72 hours of removal from housing, either a) remove dry manure from the facility, or b) cover dry manure outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed 24 hours per event.	0%	0%
		Total Control Efficiency	10.00%	10.00%
		Separated Solids Piles Mitigations		
x	x	Feed according to NRC guidelines	10%	10%
x	x	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		
x	x	Feed according to NRC guidelines	10%	10%
x	x	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.	0%	0%
		Only apply solid manure that has been treated with an anerobic 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**	**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:		

x	x	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. Implement two of the following: Manage Exposed Silage. a) manage silage piles such that only one silage pile has an uncovered face and the uncovered face has a total exposed surface area of less than 2,150 sq. ft., or b) manage multiple uncovered silage piles such that the total exposed surface area of all silage piles is less than 4,300 sq ft. Maintain Silage Working Face. a) use a shaver/facer to remove silage from the silage pile, or b) maintain a smooth vertical surface on the working face of the silage pile Silage Additive: a) inoculate silage with homolactic acid bacteria in accordancew with manufacturer recommendations to achieve a concentration of at least 100,000 colony forming units per gram of wet forage or apply proprionic acid, benzoic acid, sorbic acid, sodium benzoate, or potassium sorbate at a rate specified by the manufacturer to reduce yeast counts when forming silage pile; or b) apply other additives at specified rates that have been demonstrated to reduce alcohol concentrations in silage and/or VOC emissions from silage and have been approved by the District and EPA.	39%	39%
		Total Control Efficiency*	39.00%	39.00%

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

		TMR Mitigations		
x	x	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%
x	x	Begin feeding total mixed rations within 2 hrs of grinding and mixing rations. Note: If selected for dairies > 999 milk cows, control efficiency already included in EF.	0%	0%
		Feed steam-flaked, dry rolled, cracked or ground corn or other ground cereal grains.	0%	0%
		Remove uneaten wet feed from feed bunks within 24 hrs after then end of a rain event.	0%	0%
		For total mixed rations that contain at least 30% by weight of silage, feed animals total mixed rations that contain at least 45% moisture.	0%	0%
		Total Control Efficiency	10.00%	10.00%

lb/hd-yr Dairy Emissions Factors																												
			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)			
			Uncontrolled		EF1	EF2	Uncontrolled		EF1	EF2	Uncontrolled		EF1	EF2	Uncontrolled		EF1	EF2	Uncontrolled		EF1	EF2	Uncontrolled		EF1	EF2
			<1000 milk cows	≥1000 milk cows			<1000 milk cows	≥1000 milk cows			<1000 milk cows	≥1000 milk cows			<1000 milk cows	≥1000 milk cows			<1000 milk cows	≥1000 milk cows			<1000 milk cows	≥1000 milk cows		
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**	**0.19**	**0.19**	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-
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
		Corrals/Pens	10.00	6.60	5.08	5.08	5.40	3.59	2.76	2.76	4.20	2.76	2.12	2.12	2.85	1.88	1.45	1.45	1.60	1.04	0.80	0.80	0.75	0.50	0.39	0.39
		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
		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
		Total	**15.78**	**12.09**	**9.86**	**9.86**	**8.75**	**6.80**	**5.57**	**5.57**	**6.81**	**5.22**	**4.27**	**4.27**	**4.62**	**3.56**	**2.91**	**2.91**	**2.59**	**1.98**	**1.62**	**1.62**	**1.22**	**0.95**	**0.78**	**0.78**
	NH3	Total	**53.30**	**53.30**	**53.30**	**53.30**	**27.00**	**27.00**	**27.00**	**27.00**	**14.00**	**14.00**	**14.00**	**14.00**	**10.00**	**10.00**	**10.00**	**10.00**	**7.60**	**7.60**	**7.60**	**7.60**	**2.20**	**2.20**	**2.20**	**2.20**
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
		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
		Total	**3.16**	**2.70**	**2.43**	**2.43**	**1.71**	**1.47**	**1.32**	**1.32**	**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**
	NH3	Lagoons/Storage Ponds	8.20	8.20	8.20	8.20	4.20	4.20	4.20	4.20	2.20	2.20	2.20	2.20	1.50	1.50	1.50	1.50	1.20	1.20	1.20	1.20	0.35	0.35	0.35	0.35
		Liquid Manure Land Application	8.90	8.90	8.90	8.90	4.50	4.50	4.50	4.50	2.30	2.30	2.30	2.30	1.70	1.70	1.70	1.70	1.30	1.30	1.30	1.30	0.37	0.37	0.37	0.37
		Total	**17.10**	**17.10**	**17.10**	**17.10**	**8.70**	**8.70**	**8.70**	**8.70**	**4.50**	**4.50**	**4.50**	**4.50**	**3.20**	**3.20**	**3.20**	**3.20**	**2.50**	**2.50**	**2.50**	**2.50**	**0.72**	**0.72**	**0.72**	**0.72**
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
		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
		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
		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**
	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
		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
		Solid Manure Land Application	2.09	2.09	2.09	2.09	1.06	1.06	1.06	1.06	0.55	0.55	0.55	0.55	0.39	0.39	0.39	0.39	0.30	0.30	0.30	0.30	0.09	0.09	0.09	0.09
		Total	**3.42**	**3.42**	**3.42**	**3.42**	**1.73**	**1.73**	**1.73**	**1.73**	**0.90**	**0.90**	**0.90**	**0.90**	**0.64**	**0.64**	**0.64**	**0.64**	**0.48**	**0.48**	**0.48**	**0.48**	**0.15**	**0.15**	**0.15**	**0.15**

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	11,750	11,750

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

PM_{10} Emission Factors (lb/hd-yr)		
Type of Cow	Dairy EF	Source
Cows in Freestalls	1.37	Based on a Summer 2003 study by Texas A&M ASAE at a West Texas Dairy
Milk/Dry in Corrals	5.46	Based on a Summer 2003 study by Texas A&M ASAE at a West Texas Dairy
Heifers/Bulls in Open Corrals	10.55	Based on a USDA/UC Davis report quantifying dairy and feedlot emissions in Tulare & Kern Counties (April '01)
Calf (under 3 mo) open corrals	1.37	SJVAPCD
Calf on-ground hutches	0.343	SJVAPCD (75% control efficiency)
Calf above-ground flushed	0.069	SJVAPCD (95% control efficiency)
Calf above-ground scraped	0.206	SJVAPCD (85% control efficiency)

Pre-Project Potential to Emit (PE1)

Pre-Project Herd Size				
Herd	Size	Total	Shades?	Shade CE
Milk Cows in Freestalls	0	1,805	N/A	0.0%
Milk Cows in Open Corrals	1,805		x	16.7%
Dry Cows in Freestalls	0	216	N/A	0.0%
Dry Cows in Open Corrals	216		x	16.7%
Large Heifers in Freestalls	0	437	N/A	0.0%
Large Heifers in Open Corrals	437		x	8.3%
Medium Heifers in Freestalls	0	418	N/A	0.0%
Medium Heifers in Open Corrals	418		x	8.3%
Small Heifers in Freestalls	0	300	N/A	0.0%
Small Heifers in Open Corrals	300		x	8.3%
Calves in Open Corrals	0	0		0.0%
Calves in On-Ground Hutches	0			0.0%
Calves in Above-Ground Flushed Hutches	0			0.0%
Calves in Above-Ground Scraped Hutches	0			0.0%
Total Milk Cows		1,805		
Total Mature Cows		2,021		
Total Support Stock		1,155		
Total Dairy Head		**3,176**		

Silage Information				
Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)	Open Face Area (ft^2)
Corn	1	15	150	1,530
Alfalfa	0	0	0	
Wheat	1	15	150	1,530

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

Feed Handling and Storage		
	Daily PE (lb/day)	Annual PE (lb/yr)
Corn Emissions	9.5	3,477
Alfalfa Emissions	0.0	0
Wheat Emissions	12.0	4,396
TMR*	77.8	28,395
Total	**99.3**	**36,267**

*Total support stock, including any calves, will be included in TMR calculation.

Calculations for annual 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

Calculations for annaul TMR emissions:

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

Calculations for daily emissions:

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

Milking Parlor				
Cow	VOC		NH3	
Milk Cows	lb/day	lb/yr	lb/day	lb/yr
	2.0	715	0.9	343

Cow Housing						
Cow	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	48.7	17,793	263.6	96,207	22.5	8,209
Dry Cows	3.3	1,202	16.0	5,832	2.7	982
Large Heifers	5.1	1,867	16.8	6,118	11.6	4,228
Medium Heifers	3.3	1,217	11.5	4,180	11.1	4,044
Small Heifers	1.3	485	6.2	2,280	8.0	2,902
Calves	0.0	0	0.0	0	0.0	0
Total	**61.7**	**22,565**	**314.1**	**114,617**	**55.9**	**20,366**

Liquid Manure Handling				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	12.0	4,386	84.6	30,866
Dry Cows	0.8	286	5.1	1,879
Large Heifers	1.2	444	5.4	1,967
Medium Heifers	0.8	289	3.7	1,338
Small Heifers	0.3	115	2.1	750
Calves	0.0	0	0.0	0
Total	**15.1**	**5,520**	**100.9**	**36,799**

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 all other permits:

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)]

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

Solid Manure Handling				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	2.4	867	16.9	6,173
Dry Cows	0.2	56	1.0	374
Large Heifers	0.2	88	1.1	393
Medium Heifers	0.2	57	0.7	268
Small Heifers	0.1	23	0.4	144
Calves	0.0	0	0.0	0
Total	**3.1**	**1,092**	**20.1**	**7,352**

Total Daily Pre-Project Potential to Emit (lb/day)						
Permit	**NOx**	**SOx**	**PM10**	**CO**	**VOC**	**NH3**
Milking Parlor	0.0	0.0	0.0	0.0	2.0	0.9
Cow Housing	0.0	0.0	55.9	0.0	61.7	314.1
Liquid Manure	0.0	0.0	0.0	0.0	15.1	100.9
Solid Manure	0.0	0.0	0.0	0.0	3.1	20.1
Feed Handling	0.0	0.0	0.0	0.0	99.3	0.0
Total	**0.0**	**0.0**	**55.9**	**0.0**	**181.2**	**436.0**

Total Annual Pre-Project Potential to Emit (lb/yr)						
Permit	**NOx**	**SOx**	**PM10**	**CO**	**VOC**	**NH3**
Milking Parlor	0	0	0	0	715	343
Cow Housing	0	0	20,366	0	22,565	114,617
Liquid Manure	0	0	0	0	5,520	36,799
Solid Manure	0	0	0	0	1,092	7,352
Feed Handling	0	0	0	0	36,267	0
Total	**0**	**0**	**20,366**	**0**	**66,159**	**159,110**

Post-Project Potential to Emit (PE2)

Post-Project Herd Size				
Herd	Size	Total	Shades?	Shade CE
Milk Cows in Freestalls	1,805	1,805	N/A	0.0%
Milk Cows in Open Corrals	0			0.0%
Dry Cows in Freestalls	0	216	N/A	0.0%
Dry Cows in Open Corrals	216		x	16.7%
Large Heifers in Freestalls	0	437	N/A	0.0%
Large Heifers in Open Corrals	437		x	8.3%
Medium Heifers in Freestalls	0	418	N/A	0.0%
Medium Heifers in Open Corrals	418		x	8.3%
Small Heifers in Freestalls	0	300	N/A	0.0%
Small Heifers in Open Corrals	300		x	8.3%
Calves in Open Corrals	0	0		0.0%
Calves in On-Ground Hutches	0			0.0%
Calves in Above-Ground Flushed Hutches	0			0.0%
Calves in Above-Ground Scraped Hutches	0			0.0%
Total Milk Cows		1,805		
Total Mature Cows		2,021		
Total Support Stock		1,155		
Total Dairy Head		**3,176**		

Silage Information				
Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)	Open Face Area (ft^2)
Corn	1	15	150	1,530
Alfalfa	0	0	0	
Wheat	1	15	150	1,530

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

Feed Handling and Storage		
	Daily PE (lb/day)	Annual PE (lb/yr)
Corn Emissions	9.5	3,477
Alfalfa Emissions	0.0	0
Wheat Emissions	12.0	4,396
TMR*	77.8	28,395
Total	**99.3**	**36,267**

*Total support stock, including any calves, will be included in TMR calculation.

Calculations for annual silage emissions:

Annual PE = (EF1) x (area ft^3) x (0.0929 m^2/ft^2) x (8,760 hr/yr) x (60 min/hr) x 2.20E-9 lb/µg

Calculations for annaul TMR emissions:

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

Calculations for daily emissions:

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

Milking Parlor				
Cow	VOC		NH3	
Milk Cows	lb/day	lb/yr	lb/day	lb/yr
	2.0	715	0.9	343

Cow Housing						
Cow	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	48.7	17,793	263.6	96,207	6.8	2,473
Dry Cows	3.3	1,202	16.0	5,832	2.7	982
Large Heifers	5.1	1,867	16.8	6,118	11.6	4,228
Medium Heifers	3.3	1,217	11.5	4,180	11.1	4,044
Small Heifers	1.3	485	6.2	2,280	8.0	2,902
Calves	0.0	0	0.0	0	0.0	0
Total	**61.7**	**22,565**	**314.1**	**114,617**	**40.2**	**14,629**

Liquid Manure Handling				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	12.0	4,386	84.6	30,866
Dry Cows	0.8	286	5.1	1,879
Large Heifers	1.2	444	5.4	1,967
Medium Heifers	0.8	289	3.7	1,338
Small Heifers	0.3	115	2.1	750
Calves	0.0	0	0.0	0
Total	**15.1**	**5,520**	**100.9**	**36,799**

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 all other permits:

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)]

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

Solid Manure Handling				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	2.4	867	16.9	6,173
Dry Cows	0.2	56	1.0	374
Large Heifers	0.2	88	1.1	393
Medium Heifers	0.2	57	0.7	268
Small Heifers	0.1	23	0.4	144
Calves	0.0	0	0.0	0
Total	**3.1**	**1,092**	**20.1**	**7,352**

Total Daily Post-Project Potential to Emit (lb/day)						
Permit	NOx	SOx	PM10	CO	VOC	NH3
Milking Parlor	0.0	0.0	0.0	0.0	2.0	0.9
Cow Housing	0.0	0.0	40.2	0.0	61.7	314.1
Liquid Manure	0.0	0.0	0.0	0.0	15.1	100.9
Solid Manure	0.0	0.0	0.0	0.0	3.1	20.1
Feed Handling	0.0	0.0	0.0	0.0	99.3	0.0
Total	**0.0**	**0.0**	**40.2**	**0.0**	**181.2**	**436.0**

Total Annual Post-Project Potential to Emit (lb/yr)						
Permit	NOx	SOx	PM10	CO	VOC	NH3
Milking Parlor	0	0	0	0	715	343
Cow Housing	0	0	14,629	0	22,565	114,617
Liquid Manure	0	0	0	0	5,520	36,799
Solid Manure	0	0	0	0	1,092	7,352
Feed Handling	0	0	0	0	36,267	0
Total	**0**	**0**	**14,629**	**0**	**66,159**	**159,111**

Quarterly Net Emissions Change (QNEC)

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

QNEC = PE2 - PE1, where:

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

Using the values in Sections VII.C.1 and VII.C.2 in the evaluation above, quarterly PE1 and quarterly PE2 can be calculated as follows:

(Delete tables as necessary for units not part of project.)

Milking Parlor					
	PE2 (lb/yr)	PE2 (lb/qtr)	PE1 (lb/yr)	PE1 (lb/qtr)	QNEC (lb/qtr)
NOx	0	0	0	0	0
SOx	0	0	0	0	0
PM10	0	0	0	0	0
CO	0	0	0	0	0
VOC	715	179	715	179	0
NH3	343	86	343	86	0

Cow Housing					
	PE2 (lb/yr)	PE2 (lb/qtr)	PE1 (lb/yr)	PE1 (lb/qtr)	QNEC (lb/qtr)
NOx	0	0	0	0	0
SOx	0	0	0	0	0
PM10	14,629	3,657	20,366	5,091	-1,434
CO	0	0	0	0	0
VOC	22,565	5,641	22,565	5,641	0
NH3	114,617	28,654	114,617	28,654	0

Liquid Manure					
	PE2 (lb/yr)	PE2 (lb/qtr)	PE1 (lb/yr)	PE1 (lb/qtr)	QNEC (lb/qtr)
NOx	0	0	0	0	0
SOx	0	0	0	0	0
PM10	0	0	0	0	0
CO	0	0	0	0	0
VOC	5,520	1,380	5,520	1,380	0
NH3	36,799	9,200	36,799	9,200	0

Solid Manure					
	PE2 (lb/yr)	PE2 (lb/qtr)	PE1 (lb/yr)	PE1 (lb/qtr)	QNEC (lb/qtr)
NOx	0	0	0	0	0
SOx	0	0	0	0	0
PM10	0	0	0	0	0
CO	0	0	0	0	0
VOC	1,092	273	1,092	273	0
NH3	7,352	1,838	7,352	1,838	0

Feed Storage and Handling					
	PE2 (lb/yr)	PE2 (lb/qtr)	PE1 (lb/yr)	PE1 (lb/qtr)	QNEC (lb/qtr)
NOx	0	0	0	0	0
SOx	0	0	0	0	0
PM10	0	0	0	0	0
CO	0	0	0	0	0
VOC	36,267	9,067	36,267	9,067	0
NH3	0	0	0	0	0

Adjusted Increase in Permitted Emissions

Milking Parlor

VOC Emissions

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	2.0	2.0	0.40	0.40	0.0
				Total	0.0

NH3 Emissions

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	0.9	0.9	0.19	0.19	0.0
				Total	0.0

Cow Housing

VOC Emissions

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	48.7	48.7	9.86	9.86	0.0
Dry Cows	3.3	3.3	5.57	5.57	0.0
Large Heifers	5.1	5.1	4.27	4.27	0.0
Medium Heifers	3.3	3.3	2.91	2.91	0.0
Small Heifers	1.3	1.3	1.62	1.62	0.0
Calves	0.0	0.0	0.78	0.78	0.0
				Total	0.0

NH3 Emissions

NH3	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	263.6	263.6	53.30	53.30	0.0
Dry Cows	16.0	16.0	27.00	27.00	0.0
Large Heifers	16.8	16.8	14.00	14.00	0.0
Medium Heifers	11.5	11.5	10.00	10.00	0.0
Small Heifers	6.2	6.2	7.60	7.60	0.0
Calves	0.0	0.0	2.20	2.20	0.0
				Total	0.0

PM10 Emissions

PM10	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows (Freestalls)	6.8	0.0	1.37	1.37	0.0
Milk Cows (Corrals)	0.0	22.5	5.46	4.55	0.0
Dry Cows (Freestalls)	0.0	0.0	1.37	1.37	0.0
Dry Cows (Corrals)	2.7	2.7	4.55	4.55	0.0
Large Heifers (Freestalls)	0.0	0.0	1.37	1.37	0.0
Large Heifers (Corrals)	11.6	11.6	9.67	9.67	0.0
Medium Heifers (Freestalls)	0.0	0.0	1.37	1.37	0.0
Medium Heifers (Corrals)	11.1	11.1	9.67	9.67	0.0
Small Heifers (Freestalls)	0.0	0.0	1.37	1.37	0.0
Small Heifers (Corrals)	8.0	8.0	9.67	9.67	0.0
Calves (Corrals)	0.0	0.0	1.37	1.37	0.0
Calves (O-G Hutches)	0.0	0.0	0.343	0.343	0.0
Calves (A-G Flushed)	0.0	0.0	0.069	0.069	0.0
Calves (A-G Scraped)	0.0	0.0	0.206	0.206	0.0
				Total	0.0

Liquid Manure Handling

VOC Emissions - Lagoon/Storage Pond(s)

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	5.8	5.8	1.17	1.17	0.0
Dry Cows	0.4	0.4	0.64	0.64	0.0
Large Heifers	0.6	0.6	0.49	0.49	0.0
Medium Heifers	0.4	0.4	0.33	0.33	0.0
Small Heifers	0.2	0.2	0.19	0.19	0.0
Calves	0.0	0.0	0.09	0.09	0.0
				Total	0.0

VOC Emissions - Land Application

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	6.2	6.2	1.26	1.26	0.0
Dry Cows	0.4	0.4	0.69	0.69	0.0
Large Heifers	0.6	0.6	0.53	0.53	0.0
Medium Heifers	0.4	0.4	0.36	0.36	0.0
Small Heifers	0.2	0.2	0.20	0.20	0.0
Calves	0.0	0.0	0.10	0.10	0.0
				Total	0.0

NH3 Emissions - Lagoon/Storage Pond(s)

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	40.6	40.6	8.20	8.20	0.0
Dry Cows	2.5	2.5	4.20	4.20	0.0
Large Heifers	2.6	2.6	2.20	2.20	0.0
Medium Heifers	1.7	1.7	1.50	1.50	0.0
Small Heifers	1.0	1.0	1.20	1.20	0.0
Calves	0.0	0.0	0.35	0.35	0.0
				Total	0.0

NH3 Emissions - Land Application

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	44.0	44.0	8.90	8.90	0.0
Dry Cows	2.7	2.7	4.50	4.50	0.0
Large Heifers	2.8	2.6	2.30	2.30	0.0
Medium Heifers	1.9	1.9	1.70	1.70	0.0
Small Heifers	1.1	1.1	1.30	1.30	0.0
Calves	0.0	0.0	0.37	0.37	0.0
				Total	0.0

Solid Manure Handling

VOC Emissions - Solid Manure Storage

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	0.7	0.7	0.14	0.14	0.0
Dry Cows	0.0	0.0	0.07	0.07	0.0
Large Heifers	0.1	0.1	0.06	0.06	0.0
Medium Heifers	0.0	0.0	0.04	0.04	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
				Total	0.0

VOC Emissions - Separated Solids Piles

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	0.2	0.2	0.05	0.05	0.0
Dry Cows	0.0	0.0	0.03	0.03	0.0
Large Heifers	0.0	0.0	0.02	0.02	0.0
Medium Heifers	0.0	0.0	0.01	0.01	0.0
Small Heifers	0.0	0.0	0.01	0.01	0.0
Calves	0.0	0.0	0.00	0.00	0.0
				Total	0.0

VOC Emissions - Land Application

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	1.5	1.5	0.30	0.30	0.00
Dry Cows	0.1	0.1	0.16	0.16	0.00
Large Heifers	0.1	0.1	0.12	0.12	0.00
Medium Heifers	0.1	0.1	0.08	0.08	0.00
Small Heifers	0.0	0.0	0.05	0.05	0.00
Calves	0.0	0.0	0.02	0.02	0.00
				Total	0.0

NH3 Emissions - Solid Manure Storage

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	4.7	4.7	1.0	1.0	0.0
Dry Cows	0.3	0.3	0.5	0.5	0.0
Large Heifers	0.3	0.3	0.3	0.3	0.0
Medium Heifers	0.2	0.2	0.2	0.2	0.0
Small Heifers	0.1	0.1	0.1	0.1	0.0
Calves	0.0	0.0	0.0	0.0	0.0
				Total	0.0

NH3 Emissions - Separated Solids Piles

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	1.9	1.9	0.4	0.4	0.0
Dry Cows	0.1	0.1	0.2	0.2	0.0
Large Heifers	0.1	0.1	0.1	0.1	0.0
Medium Heifers	0.1	0.1	0.1	0.1	0.0
Small Heifers	0.0	0.0	0.1	0.1	0.0
Calves	0.0	0.0	0.0	0.0	0.0
				Total	0.0

NH3 Emissions - Land Application

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	10.3	10.3	2.1	2.1	0.0
Dry Cows	0.6	0.6	1.1	1.1	0.0
Large Heifers	0.7	0.7	0.6	0.6	0.0
Medium Heifers	0.4	0.4	0.4	0.4	0.0
Small Heifers	0.2	0.2	0.3	0.3	0.0
Calves	0.0	0.0	0.1	0.1	0.0
				Total	0.0

Feed Storage and Handling

VOC Emissions - Silage

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Corn Silage	9.5	9.5	21,155	21,155	0.0
Alfalfa Silage	0.0	0.0	10,649	10,649	0.0
Wheat Silage	12.0	12.0	26,745	26,745	0.0
				Total	0.0

VOC Emissions - TMR

	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
TMR	77.8	77.8	11,750	11,750	0.0
				Total	0.0

Total Change in Emissions

Total Daily Change in Emissions (lb/day)

	NOx	SOx	PM10	CO	VOC	NH3
Milking Parlor	0.0	0.0	0.0	0.0	0.0	0.0
Cow Housing	0.0	0.0	-15.7	0.0	0.0	0.0
Liquid Manure	0.0	0.0	0.0	0.0	0.0	0.0
Solid Manure	0.0	0.0	0.0	0.0	0.0	0.0
Feed Handling	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	0.0	-15.7	0.0	0.0	0.0

Total Annual Change in Emissions (lb/yr)

	NOx	SOx	PM10	CO	VOC	NH3
Milking Parlor	0	0	0	0	0	0
Cow Housing	0	0	-5,737	0	0	1
Liquid Manure	0	0	0	0	0	0
Solid Manure	0	0	0	0	0	0
Feed Handling	0	0	0	0	0	0
Total	0	0	-5,737	0	0	1

Greenhouse Gas Emissions

Uncontrolled GHG Emission Factors (lbs-hd/yr)						
Animal Type	CH4 (Anaerobic Treatment Lagoon)	CH4 (Lagoon)	CH4 (manure spreading)	CH4 (solid manure storage)	CH4 (enteric)	CO2 equivalent multiplier for CH4
Milk Cows	513	307.8	3.5	27.7	271.5	21
Dry Cows	513	307.8	3.5	27.7	271.5	21
Large Heifers	110.4	110.4	1.6	–	151.6	21
Medium Heifers	110.4	110.4	1.6	–	100.5	21
Small Heifers	110.4	110.4	1.6	–	100.5	21
Calves	–	–	–	–	–	–

Uncontrolled GHG Emission Factors (lbs-hd/yr)					
Animal Type	N2O (Anaerobic Treatment Lagoon	N2O (manure spreading)	N2O (solid manure storage)	N2O (enteric)	N2O equivalent multiplier for N2O
Milk Cows	1.5	0	2.6	0	310
Dry Cows	1.5	0	2.6	0	310
Large Heifers	1.4	0	–	0	310
Medium Heifers	1.4	0	–	0	310
Small Heifers	1.4	0	–	0	310
Calves	–	0	–	0	–

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

CO2e from N2O= [N20 anearobic treatment lagoon + N2O manure spreading + N20 solid manure storage + N2O enteric] x 310 x 0.9072 metric tons/short tons ÷ 2000 lb/ton

Pre-Project: Does the facility have an anaerobic treatment lagoon? no
Post-Project: Does the facility have an anaerobic treatment lagoon? no

Pre-Project CO2 Equivalent Emission Factors from Animal Type (metric tons-hd/yr)			
Animal Type	CO2e for CH4	CO2e for N2O	CO2e Total
Milk Cows	5.8	0.4	6.2
Dry Cows	5.8	0.4	6.2
Large Heifers	2.5	0.0	2.5
Medium Heifers	2.0	0.0	2.0
Small Heifers	2.0	0.0	2.0
Calves	0.0	0.0	0.0

Post-Project CO2 Equivalent Emission Factors from Animal Type (metric tons-hd/yr)			
Animal Type	CO2e for CH4	CO2e for N2O	CO2e Total
Milk Cows	5.8	0.4	6.2
Dry Cows	5.8	0.4	6.2
Large Heifers	2.5	0.0	2.5
Medium Heifers	2.0	0.0	2.0
Small Heifers	2.0	0.0	2.0
Calves	0.0	0.0	0.0

Pre-Project Total GHG Emissions			
Animal Type	Herd Size (hd)	CO2e (metric tons-hd/yr)	CO2e Total (metric tons/yr)
Milk Cows	1,805	6.2	11,191
Dry Cows	216	6.2	1,339
Large Heifers	437	2.5	1,093
Medium Heifers	418	2.0	836
Small Heifers	300	2.0	600
Calves	0	0.0	0
		Total	**15,059**

Post-Project Total GHG Emissions			
Animal Type	Herd Size (hd)	CO2e (metric tons-hd/yr)	CO2e Total (metric tons/yr)
Milk Cows	1,805	6.2	11,191
Dry Cows	216	6.2	1,339
Large Heifers	437	2.5	1,093
Medium Heifers	418	2.0	836
Small Heifers	300	2.0	600
Calves	0	0.0	0
		Total	**15,059**

Change in Project GHG Emissions			
Animal Type	Pre-Project CO2e (metric tons/yr)	Post-Project CO2e (metric tons/yr)	Change (metric tons/yr)
Milk Cows	11191	11191	0
Dry Cows	1339	1339	0
Large Heifers	1093	1093	0
Medium Heifers	836	836	0
Small Heifers	600	600	0
Calves	0	0	0
		Total	**0**

Per District Policy, project specific greenhouse gas emissions less than or equal to 230 metric tons-CO2e/year are considered to be zero for District permitting purposes and are exempt from further environmental review.

Appendix B

Current Permits to Operate

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: S-4865-1-4 **EXPIRATION DATE:** 12/31/2014

EQUIPMENT DESCRIPTION:
1000 COW MILKING OPERATION WITH 25 STALL FLAT BARN MILKING PARLOR

PERMIT UNIT REQUIREMENTS

1. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. Permittee shall implement and maintain all the Mitigation Measures contained in this permit on and after January 12, 2013. [District Rule 4570]
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 Rule 4570]
6. Permittee shall provide verification that milk parlors are flushed or hosed prior to, immediately after, or during each milking. [District Rule 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 Rule 4570]
8. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: S-4865-2-4 **EXPIRATION DATE:** 12/31/2014

EQUIPMENT DESCRIPTION:
COW HOUSING - 1,000 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 1,165 MATURE COWS (MILK AND DRY); 980 TOTAL SUPPORT STOCK (HEIFERS, CALVES AND BULLS): AND 1 FREESTALL 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. Permittee shall implement and maintain all the Mitigation Measures contained in this permit on and after January 12, 2013 [District Rule 4570]
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 pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers. [District Rule 4570]
6. Permittee shall remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every seven (7) days. [District Rule 4570]
7. Permittee shall record the date that manure that is not dry is removed from individual cow freestall beds or raked, harrowed, scraped, or freestall bedding is graded at least once every seven (7) days. [District Rule 4570]
8. Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rule 4570]
9. Permittee shall maintain records demonstrating that water pipes and troughs are inspected and leaks are repaired at least once every seven (7) days. [District Rule 4570]
10. 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]
11. Permittee shall demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning or demonstrate that corrals are cleaned at least once between April and July and at least once between September and December. [District Rule 4570]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

12. 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]
13. 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]
14. Permittee shall scrape, vacuum or flush concrete lanes in corrals at least once every day for mature cows and every seven (7) days for support stock. [District Rule 4570]
15. Permittee shall maintain records demonstrating that concrete lanes in corrals are scraped, vacuumed, or flushed at least once every day for mature cows and at least once every seven (7) days for support stock. [District Rule 4570]
16. Permittee shall install all shade structures uphill of any slope in the corral. [District Rule 4570]
17. Permittee shall manage corrals such that the manure depth in the corral does not exceed twelve (12) inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rule 4570]
18. Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rule 4570]
19. Permittee shall maintain a record of the number of animals of each species and production group at the facility and shall maintain quarterly records of any changes to this information. [District Rule 4570]
20. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]
21. This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

Appendix C

Draft Authority to Construct

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-4865-1-6 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: FOUR J DAIRY FARMS
MAILING ADDRESS: PO BOX 835
TIPTON, CA 93272

LOCATION: 1253 W STANFORD AVE
PIXLEY, CA 93256

EQUIPMENT DESCRIPTION:
MODIFICATION OF 1,000 COW MILKING OPERATION WITH 25 STALL FLAT BARN MILKING PARLOR: CORRECT NUMBER OF MILK COWS TO 1,805

CONDITIONS

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

CONDITIONS CONTINUE ON NEXT PAGE

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

Seyed Sadredin, Executive Director / APCO

DRAFT

DAVID WARNER, Director of Permit Services
S-4865-1-6 : Jan 24 2013 9:08AM – SIONGCOJ : Joint Inspection NOT Required

6. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rules 1070 and 4570]

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

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: S-4865-2-5 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: FOUR J DAIRY FARMS
MAILING ADDRESS: PO BOX 835
TIPTON, CA 93272

LOCATION: 1253 W STANFORD AVE
PIXLEY, CA 93256

EQUIPMENT DESCRIPTION:
MODIFICATION OF COW HOUSING - 1,000 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 1,165 MATURE COWS (MILK AND DRY); 980 TOTAL SUPPORT STOCK (HEIFERS, CALVES AND BULLS): DOCUMENT THE CONSTRUCTION OF THE TWO FREESTALLS FOR 1,105 AND 700 MILK COWS, AND CORRECT HERD NUMBERS TO 1,805 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 2,021 MATURE COWS (MILK AND DRY) AND 1,155 TOTAL SUPPORT STOCK

CONDITIONS

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

CONDITIONS CONTINUE ON NEXT PAGE

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

Seyed Sadredin, Executive Director / APCO

DAVID WARNER, Director of Permit Services
S-4865-2-5 : Jan 17 2013 5:17PM – SIONGCOJ : Joint Inspection NOT Required

6. Permittee shall maintain records demonstrating that freestall concrete lanes are flushed/vacuumed at least four times a day. [District Rule 2201]
7. {4486} Permittee shall pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers. [District Rule 4570]
8. {4492} Permittee shall remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every seven (7) days. [District Rule 4570]
9. {4493} Permittee shall record the date that manure that is not dry is removed from individual cow freestall beds or raked, harrowed, scraped, or freestall bedding is graded at least once every seven (7) days. [District Rule 4570]
10. {4499} Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rule 4570]
11. {4500} Permittee shall maintain records demonstrating that water pipes and troughs are inspected and leaks are repaired at least once every seven (7) days. [District Rule 4570]
12. {4501} Permittee shall clean manure from corrals at least four (4) times per year with at least sixty (60) days between each cleaning, or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rule 4570]
13. {4502} Permittee shall demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning or demonstrate that corrals are cleaned at least once between April and July and at least once between September and December. [District Rule 4570]
14. {4554} Permittee shall implement at least one of the following corral mitigation measures: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 square feet or less and shall slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 square feet per animal; 2) maintain corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface except during periods of rainy weather. [District Rule 4570]
15. {4555} Permittee shall either 1) maintain sufficient records to demonstrate that corrals are maintained to ensure proper drainage preventing water from standing for more than forty-eight hours or 2) maintain records of dates pens are groomed (i.e., harrowed, raked, or scraped, etc.). [District Rule 4570]
16. {4508} Permittee shall scrape, vacuum or flush concrete lanes in corrals at least once every day for mature cows and every seven (7) days for support stock. [District Rule 4570]
17. {4556} Permittee shall maintain records demonstrating that concrete lanes in corrals are scraped, vacuumed, or flushed at least once every day for mature cows and at least once every seven (7) days for support stock. [District Rule 4570]
18. {4513} Permittee shall install all shade structures uphill of any slope in the corral. [District Rule 4570]
19. {4518} Permittee shall manage corrals such that the manure depth in the corral does not exceed twelve (12) inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rule 4570]
20. {4519} Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rule 4570]
21. {4449} Permittee shall maintain a record of the number of animals of each species and production group at the facility and shall maintain quarterly records of any changes to this information. [District Rule 4570]
22. {4453} Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]
23. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

Appendix D

BACT Analysis

Four J Farms Dairy (S-4865, Project # S-1124061)

TOP-DOWN BACT ANALYSIS

Pursuant to Section 5.2 of the Settlement Agreement between the District and the Western United Dairyman and the Alliance of Western Milk Producers Inc, signed September 20, 2004, "... *the District will not make any Achieved in Practice BACT determinations for individual dairy permits or for the dairy BACT guidance until the final BACT guidance has been adopted by the APCO....*".[5] Therefore, a cost effectiveness analysis will be performed for all the technologies, which have not been proposed by the applicant.

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

I. Pollutants Emitted from Dairies

1. PM_{10} Emissions from Dairies

The National Ambient Air Quality Standards currently regulate concentrations of particulate matter with an aerodynamic diameter of 10 micrometers or less (PM_{10}) and particulate matter with an aerodynamic diameter of 2.5 micrometers or less ($PM_{2.5}$). Studies have shown that particles in the smaller size fractions contribute most to human health effects. The $PM_{2.5}$ standard was published in 1997, but is only recently beginning to be implemented because of the time that was required to resolve litigation regarding the standard. On April 5, 2005, EPA finalized classification of areas for the $PM_{2.5}$ standard. On April 21, 2011 District Rule 2201 – New and Modified Stationary Source Review Rule was amended to incorporate PM2.5 new and modified source review requirements.

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

The mass of particulate matter emitted from totally or partially enclosed confinement facilities, as well as the particle size distribution, depend on type of ventilation and

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

ventilation rate. Particulate matter emissions from naturally ventilated buildings will be lower than those from mechanically ventilated buildings.

2. VOC Formation and Emissions from Manure:

Volatile Organic Compounds (VOCs) result from ruminant digestive processes and are formed as intermediate metabolites when organic matter manure decomposes. Under aerobic conditions, any VOCs formed in the manure are rapidly oxidized to carbon dioxide and water. Under anaerobic conditions, complex organic compounds are microbially decomposed to volatile organic acids and other volatile organic compounds, which in turn are mostly converted to methane and carbon dioxide by methanogenic bacteria. When the activity of the methanogenic bacteria is not inhibited, virtually all of the VOCs are metabolized to simpler compounds, and the potential for VOC emissions is minimized. However, the inhibition of methane formation results in a buildup of VOCs in the manure and ultimately to volatilization to the air. Inhibition of methane formation typically is caused by low temperatures or excessive loading rates, which both create an imbalance between the populations of microorganisms responsible for the formation of VOC and methane. VOC emissions will vary with temperature because the rate of VOC formation, reduction to methane, and volatilization and the solubility of individual compounds vary with temperature.[6] VOC emissions from manure and the associated field application site can be minimized by a properly designed and operated stabilization process (such as an anaerobic treatment lagoon). In contrast, VOC emissions will be higher from storage tanks, ponds, overloaded anaerobic lagoons, and the land application sites associated with these systems.

3. Emissions from Silage and Total Mixed ration (TMR):

Volatile Organic Compounds (VOCs) are created during the process that is used to create silage, which is preserved, fermented plant matter that is fed to cattle. The purpose of silage production is to move the ensiled plant material from an aerobic phase to an anaerobic phase as quickly as possible and achieve a rapid drop in pH that will hinder further microbial decomposition in order to preserve the nutritive value of the forage. The rapid drop in pH is primarily caused by conversion of soluble carbohydrates to nonvolatile lactic acid. In addition to lactic acid, alcohols (primarily ethanol), volatile fatty acids (primarily acetic acid), and other VOC compounds (primarily oxygenated VOCs) are also formed during the process. These VOCs largely remain trapped in the silage piles until the silage is exposed to the surrounding atmosphere at the open face of the silage pile from where silage is removed, during mixing, or when placed in feed lanes for the cattle to consume as a Total Mixed Ration (TMR). Once exposed to the surrounding air much of the VOCs contained in the silage and TMR will begin to be rapidly emitted to the atmosphere and the concentration of the VOCs in the silage and TMR will decrease. Loss of VOCs from the silage and TMR can be reduced by minimizing the area exposed to the atmosphere and good silage management practices that will reduce the formation of

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

these VOCs in the silage reduce aerobic deterioration, which leads to heating of the open faces of silage piles and of the TMR placed in the feed lanes.

4. Ammonia Emissions from Dairies

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

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

The potential for ammonia volatilization exists wherever manure is present, and ammonia will be emitted from confinement buildings, open lots, stockpiles, anaerobic lagoons, and land application from both wet and dry handling systems. The rate of ammonia volatilization is influenced by a number of factors including the concentrations of nitrogenous compounds in the manure, temperature, air velocity, surface area, moisture, and pH. Because of its high solubility in water, the loss of ammonia to the atmosphere will be more rapid when drying of manure occurs. However, there may be little difference in total ammonia emissions between solid and liquid manure handling systems if liquid manure is stored over extended periods of time prior to land application.[8]

5. Hydrogen Sulfide Emissions from Dairies

Hydrogen Sulfide (H_2S) is produced from the anaerobic decomposition of organic sulfur compounds. In the absence of oxygen, sulfur reducing bacteria in the lagoons and storage ponds reduce sulfate ions in the manure into sulfide. Aqueous sulfide exists in three different forms: molecular (un-dissociated) hydrogen sulfide (H_2S) and the bisulfide (HS^-) and sulfide (S^{2-}) ions. In aqueous solutions molecular H_2S exists in equilibrium with the bisulfide (HS-) and sulfide (S^{2-}) ions but only molecular H_2S, not the ionized forms, can be transferred across the gas-liquid interface and emitted to

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

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

the atmosphere. The fractional amount of the form of sulfide present in a solution is a function of temperature and pH. Under acidic conditions (pH < 7) greater amounts of sulfide will be in the form of molecular H_2S and the potential for H_2S emissions will increase. As the pH increases, a greater proportion of sulfide will be in the ionic form and the potential for H_2S emissions will decrease.

In a dairy, the conditions for the production of hydrogen sulfide exist in small amounts such as wet indentions in corrals, manure piles, and separated solids piles. However, the most significant sources are the liquid manure lagoons and storage ponds.

Top Down BACT Analysis for the Cow Housing Permit Unit (S-4865-2-5)

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

a. Step 1 - Identify all control technologies

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

1) Design and Management Practices
   - Concrete all feed lanes and walkways for milk cows

Description of Control Technologies

Concrete all feedlanes
Constructing the freestall 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.

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) Design and Management Practices
   - Concrete all feed lanes and walkways for milk cows

d. Step 4 - Cost Effectiveness Analysis

Design and Management Practices:

- Concrete all feed lanes and walkways for milk cows

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

e. Step 5 - Select BACT

The facility is proposing concrete freestall feed lanes and walkways that satisfy BACT requirements.

2. BACT Analysis for VOC Emissions from the Cow Housing Permit Unit:

a. Step 1 - Identify all control technologies

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

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

1) Enclosed freestalls vented to an incinerator – milk cows (≈93%; 95% Capture, 98% Control of 100% of cow housing emissions)
2) Enclosed freestalls vented to a biofilter – milk cows (≈76%; 95% Capture, 80% Control of 100% of cow housing emissions)
3) Manure Management Practices (≈22%)
   - Freestall Concrete feed lanes and walkways
   - Freestall feed lanes and walkways for milk cows flushed four times per day (≈18% for total emissions from cow housing.

Description of Control Technologies

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

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

reasonably collecting the biogas through a stack, chimney, or vent remains in question considering the extremely large amounts of airflow going through the barns needed to keep the cows cool. The airflow requirements will be even higher in the San Joaquin valley, where temperatures reach in excess of 110 degrees in the dry summer. Although the feasibility of such a technology is in question, it will be considered in this analysis. If the gases can be properly captured and sent to a control device, then those gases may be either incinerated or treated in a biofilter (see biofilter discussed in the option below). It is assumed that 95% of the gasses emitted from the freestall barns will be captured by the mechanical ventilation system and that 98% of the captured VOCs will be eliminated by thermal incineration; therefore the total control for VOCs from the freestall barns = 0.95 x 0.98 = 93.1%.

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

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

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

3) Manure Management Practices

<u>Concrete Feed Lanes and Walkways</u>

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

are necessary for an effective flush system, they do not individually reduce emissions of gaseous pollutants, therefore, no VOC control efficiency will be assigned for this practice.

Increased Flushing for feed lanes and walkways

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

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

It must be noted that the flush system will only control the VOCs emitted from the manure. It will have little or no effect on enteric emissions produced from the cows' digestive processes. As stated above, the feed lanes and walkways in the cow housing areas are typically flushed twice per day. Flushing the lanes four times per day will increase the frequency that manure is removed from the cow housing permit unit and should result in a higher percentage of soluble volatile compounds being dissolved in the flush. Based on calculations given in the final DPAG report[9], flushing the freestall lanes four times per day will be assumed to have a control efficiency of 47% for VOCs emitted from manure until better data becomes available. Enteric emissions compose approximately 61% of the VOC emissions from the cow housing permit unit and VOC emissions from the manure make up the remaining 39%; therefore the total VOC control for flushing the feed lanes and walkways in the cow housing areas four times per day is calculated as follows: 0.47 x 0.39 =18%.

b. Step 2 - Eliminate technologically infeasible options

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

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) Enclosed freestalls vented to an incinerator (≈93%; 95% Capture, 98% Control)
2) Enclosed freestalls vented to a biofilter (≈76%; 95% Capture, 80% Control)
3) Manure Management Practices (≈22%)
   - Freestall Concrete feed lanes and walkways.
   - Freestall feed lanes and walkways for milk cows flushed four times per day (≈18% for total emissions from cow housing; 47% for emissions from manure).

d. Step 4 - Cost Effectiveness Analysis

Thermal and Catalytic Incineration:

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

Required Airflow Rate of the Freestall Barns

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

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

The minimum summer ventilation rate listed for mature cows is 500 cfm per cow. However, according to the University of Minnesota publication and Cornell

University's publication "Natural or Tunnel Ventilation of Freestall Structures: What is Right for Your Dairy Facility?" the required airflow rate in the summer increases to 1,000 cfm per cow if tunnel ventilation is used to provide additional cooling.[10]

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

Milk Cows in Freestall Emissions Controlled by Thermal Incineration:

As discussed in the evaluation, the new freestalls house 1,805 milk cows. Enclosed freestalls with thermal incineration will be evaluated as a housing alternative for the milk cows.

The total required airflow rate for the freestalls is calculated as follows:

Type of cow	# of cows	cfm/cow	min/hr	ft^3/hr
Milk cow	1,805	335	60	36,280,500
Total				**36,280,500**

Fuel Requirement for Thermal Incineration

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

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

Where:

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

[10] Improving Mechanical Ventilation in Dairy Barns, J.P. Chastain, http://www.bae.umn.edu/extens/aeu/aeu3.html and Natural or Tunnel Ventilation of Freestall Structures: What is Right for Your Dairy Facility?, C.A. Gooch, http://www.ansci.cornell.edu/tmplobs/doc225.pdf)

the air stream would increase in temperature from 100 °F to 600 °F.)

HEF = heat exchanger factor: 0.7

Natural Gas Requirement for Thermal Incineration

= (36,280,500 scf/hr)(0.0194 Btu/scf-°F)(600 °F - 100 °F)(1-0.7)
= 105,576,255 Btu/hr

Fuel Cost for Thermal Incineration:

The cost for natural gas will be based upon the average spot market contract price for the May 2012 – October 2012 taken from the Energy Information Administration website: http://www.eia.gov/dnav/ng/ng_pri_sum_dcu_nus_m.htm

Average Cost for natural gas = $3.51/MMBtu

The oxidizer is assumed to operate 12 hours per day and 365 days per year.

The fuel costs to operate the incinerator are calculated as follows:

105,576,255 Btu/hr x 1 MMBtu/10^6 Btu x 12 hr/day x 365 day/year x $3.51/MMBtu
= $1,623,108/year

VOC Emission Reductions for Thermal Incineration

Uncontrolled Housing VOC EF for Milk Cows = 12.4 lb-VOC/cow-year

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

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

Type of cow	# of cows	EF- lbs/hd-yr	CE	lbs-VOC/yr
Milk cow	1,805	12.4	93%	20,815
Total				**20,815**

Cost of VOC Emission Reductions

Cost of reductions = ($1,623,108/year)/((20,815 lb-VOC/year)(1 ton/2000lb))
= **$155,955/ton of VOC reduced**

As shown above, the natural gas cost alone for thermal or catalytic incineration would cause the cost of the VOC reductions to be greater than the $17,500/ton cost effectiveness threshold of the District BACT policy. Additional costs such as the cost of enclosing all freestalls, and the cost of installing and operating a

cooling system for cow comfort would make it even less cost effective to install this technology. The equipment is therefore not cost effective and is being removed from consideration at this time.

Biofiltration:

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

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

Cost of Biofiltration

The cost estimate for a biofiltration system is taken from the United States EPA Report "Using Bioreactors to Control Air Pollution."[11] The cost is largely dependent on the airflow rate that the filter must handle. According to University of Minnesota, Biofilters used to treat ventilating air exhausted from a livestock building should be sized to treat the maximum ventilation rate, which is typically the warm weather rate. The EPA report gives a range of $2.35 - $37.06 per cfm for the initial construction of a biofilter. As shown above in the thermal/catalytic incineration section, the following average year round airflow requirements will be assumed for worst-case purposes (based on the averages from the Minnesota's publication "Improving Mechanical Ventilation in Dairy Barns"[11]. For mature cows, the average year round airflow requirements is 335 cfm/cow (average of 170 and 500 cfm per cow);

Milk Cows in Freestalls with Biofiltration:

As discussed in the evaluation, the new freestalls will house 1,805 milk cows. Enclosed freestalls with biofiltration will be evaluated as a housing alternative for the milk cows.

The total maximum airflow entering the biofilter from the enclosed freestalls is calculated as follows:

[11] "Using Bioreactors to Control Air Pollution" EPA-456/R-03-003, The Clean Air Technology Center (CATC), U.S. Environmental Protection Agency (E143-03) (September 2003) http://www.epa.gov/ttn/catc/dir1/fbiorect.pdf

Type of cow	# of cows	cfm/cow	cfm
Milk cow	1,805	335	604,675
Total			**604,675**

Capital Cost

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

The capital cost of the biofilter is calculated as follows:

$2.35 per cfm x 604,675 cfm = $1,420,986

Pursuant to District Policy APR 1305, section X (11/09/99), the cost for the purchase of the biofilter will be spread over the expected life of the system using the capital recovery equation. The biofilter media (e.g., soil, compost, wood chips) must be replaced after 3-5 years in order to remain effective. This is an additional cost that is not being considered in this cost analysis. Therefore, the expected life of the entire system (fans, media, plenum, etc.) will be estimated at 10 years. A 10% interest rate is assumed in the equation and the assumption will be made that the equipment has no salvage value at the end of the ten-year cycle.

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

Where: A = Annual Cost
P = Present Value
I = Interest Rate (10%)
N = Equipment Life (10 years)

$$A = [\$1,420,986 \times 0.1(1.1)^{10}]/[(1.1)^{10}-1]$$
$$= \mathbf{\$231,259/year}$$

VOC Emission Reductions for Biofiltration

Uncontrolled Housing VOC EF Milk Cows = 12.4 lb-VOC/cow-year

The annual VOC Emission Reductions for enclosed freestalls vented to a biofilter are calculated as follows:

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

Type of cow	# of cows	EF- lbs/hd-yr	CE	lbs-VOC/yr
Milk cow	1,805	12.4	76%	17,010
Total				**17,010**

Cost of VOC Emission Reductions

Cost of reductions = ($231,259/year)/((17,010 lb-VOC/year)(1 ton/2000 lb))
= **$27,190/ton of VOC reduced**

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

Manure Management Practices:

- Concrete feed lanes and walkways for all cows.
- Freestall feed lanes and walkways for milk cows flushed four times per day .

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

e. Step 5 - Select BACT

The facility is proposing concrete freestall feed lanes and walkways and to flush the freestall feed lanes and walkways four times per day, which satisfies the BACT requirements.

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

3. BACT Analysis for NH_3 Emissions from the Cow Housing Permit Unit:

a. Step 1 - Identify all control technologies

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

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

1) Manure Management Practices
   - Concrete feed lanes and feed walkways for all cows
   - Freestall feed lanes and walkways for milk cows flushed four times per day.

Description of Control Technologies

1) Manure Management Practices

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

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

In addition to cleaning the freestall feed lanes and walkways, the flush system also serves as an emission control for reducing PM_{10}, VOC, and ammonia emissions. The manure deposited in the lanes, which is also a source of NH_3 emissions, is removed from the cow housing area by the flush system. Ammonia has a high affinity for water and is highly soluble in water. Therefore, a large portion of ammonia will be flushed away with the flush water and will not be emitted from the cow housing permit unit.

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) Manure Management Practices
   - Concrete feed lanes and feed walkways for all cows
   - Freestall feed lanes and walkways for milk cows flushed four times per day

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The facility is proposing concrete freestall feed lanes and feed walkways and to flush the freestall feed lanes and walkways for the milk four times per day, which satisfies the BACT requirements.

Additionally, District Rule 2201 defines BACT as including the most stringent emission limitation or control technique, including process and equipment changes that 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 mitigation measures required by District Rule 4570 are technologically feasible for confined animal facilities and the applicant has proposed these options. Although District Rule 4570 is only intended to reduce VOC emissions, many of these measures also reduce ammonia emissions. Therefore, in addition to the BACT requirements determined in the Top-Down BACT Analysis above, implementation of the mitigation measures that the applicant has selected to comply with Rule 4570 will also be required as part of BACT for NH_3 emissions from the cow housing permit.

Appendix E

HRA/RMR Summary

San Joaquin Valley Air Pollution Control District
Risk Management Review

To:	Joe Siongco – Permit Services
From:	Cheryl Lawler – Technical Services
Date:	January 17, 2013
Facility Name:	Four J Farms Dairy
Location:	1223 W. Stanford Avenue, Pixley
Application #(s):	S-4865-1-6 & 2-5
Project #:	S-1124061

A. RMR SUMMARY

RMR Summary			
Categories	**Milking Operation & Cow Housing (Units 1-6 & 2-5)**	**Project Totals**	**Facility Totals**
Prioritization Score	**0.01***	0.01	0.01
Acute Hazard Index	N/A	N/A	0.00
Chronic Hazard Index	N/A	N/A	0.00
Maximum Individual Cancer Risk	N/A	N/A	0.00
T-BACT Required?	**No**		
Special Permit Conditions?	**No**		

*The prioritization score was less than 1; therefore, no further analysis was required.

B. RMR REPORT

I. Project Description

Technical Services was asked to perform an Ambient Air Quality Analysis (AAQA) and a Risk Management Review (RMR) for an existing dairy proposing a modification by constructing two new freestalls that are currently open corrals. There will be no change in the current herd size. The only increase will be in Ammonia emissions.

Public notice was triggered for VOC emissions only. Since there are no ambient standards for VOCs, an AAQA was not required or performed for this project.

II. Analysis

Technical Services performed a prioritization using the increased Ammonia emission rates which were calculated and supplied by the processing engineer. In accordance with the District's *Risk Management Policy for Permitting New and Modified Sources* (APR 1905-1, March 2, 2001), risks from the proposed project were prioritized using the procedures in the 1990 CAPCOA Facility Prioritization Guidelines and incorporated in the District's HEART's

database. The prioritization score for the project was less than 1 (see RMR Summary Table). Therefore, no further analysis was necessary.

The following parameters were used for the review:

Analysis Parameters			
Total Increase of NH3 (lb/hr)	0.04	**Closest Receptor (m)**	213
Total Increase of NH3 (lb/yr)	350	**Receptor Type**	Residence & Business

III. Conclusions

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

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

Attachments

RMR Request Form
Prioritization
Facility Summary