San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

APR 07 2016

Philip Verwey
Philip Verwey Farms #2
19765 13th Ave
Hanford, CA 93230

Re: Notice of Preliminary Decision - Authority to Construct
Facility Number: C-6817
Project Number: C-1151019

Dear Mr. Verwey:

Enclosed for your review and comment is the District's analysis of Philip Verwey Farms #2's application for an Authority to Construct to increase your herd profile from 4,800 milk cows, 5,760 mature cows (milk and dry cows combined) and 5,184 support stock (10,944 total head) to 10,000 milk cows, 12,000 mature cows (milk and dry cows combined) and 7,508 support stock (19,508 total head), at 19765 13th Ave in Hanford.

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

Thank you for your cooperation in this matter. If you have any questions regarding this matter, please contact Mr. John Yoshimura of Permit Services at (559) 230-5887.

Sincerely,

Arnaud Marjollet
Director of Permit Services

AM:JY

Enclosures

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

Seyed Sadredin
Executive Director/Air Pollution Control Officer

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

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

Southern Region
34946 Flyover Court
Bakersfield, CA 93308-9725
Tel: 661-392-5500 FAX: 661-392-5585

www.valleyair.org www.healthyairliving.com

San Joaquin Valley Air Pollution Control District

Authority to Construct Application Review

Cow Housing Expansion

Facility Name:	Philip Verwey Farms #2	Date:	January 6, 2016
Mailing Address:	19765 13th Ave Hanford, CA 93230	Engineer:	John Yoshimura
		Lead Engineer:	Joven Refuerzo
Contact Person:	Philip Verwey		
Telephone:	(559) 908-0836		
Application #(s):	C-6817-2-4		
Project #:	C-1151019		
Deemed Complete:	April 21, 2015		

I. Proposal

Philip Verwey Farms #2 requests an Authority to Construct (ATC) permit to expand their existing dairy operation. The dairy is currently permitted to house 4,800 milk cows, 5,760 mature cows (milk and dry cows combined) and 5,184 support stock (10,944 total head). After their expansion is complete, the post-project herd capacity will be 10,000 milk cows, 12,000 mature cows (milk and dry cows combined), and 7,508 support stock (19,508 total head). The facility has confirmed that the additional animals can be accommodated within the current cow milking, cow housing, and liquid manure handling system.

The facility received ATCs ('-1-3, '-2-3, '-3-3, '-4-2, and '-5-2) to allow the aforementioned herd expansion (see project C-1120348). The expansion triggered Best Available Control Technology (BACT) on the cow housing permit unit for open corrals and required the construction of vegetative windbreaks to control PM_{10} emissions. However, according to the District draft BACT Guideline for cow housing units (see Appendix C), windbreaks are not required if they are determined to be infeasible. On August 19, 2014, the facility submitted an agronomic soil analysis report that indicated vegetative windbreaks could not be sustained at their facility (see Appendix J); the report was reviewed and confirmed by the Natural Resources Conservation Service (NRCS). Therefore, the facility submitted this application to account for the increase in emissions for the cow housing permit unit as a result of not including windbreaks as a PM_{10} control measure.

Furthermore, the current cow housing permit lists an incorrect bedding mitigation measure. The facility has indicated they do not remove manure that is not dry from individual cow freestall beds at least once every 7 days; instead, the facility uses non-manure-based bedding and non-separated solids based bedding for at least 90% of the bedding by material, by weight. Therefore, the cow housing permit will be corrected and there will be no change in emissions as a result.

As previously mentioned, the facility has ATCs to allow the herd increase for the milking parlor ('-1-4), liquid manure ('-3-3), solid manure ('-4-2), and feed and storage ('-5-2) permits. These units do not emit PM_{10} emissions and will not be affected by the proposed project; therefore, the ATCs are still valid and will be implemented concurrently with this ATC.

This ATC will replace the modifications proposed in ATC C-6817-2-3. Therefore, the following conditions will be listed the permit:

- This Authority to Construct (ATC) cancels and supersedes ATC C-6817-2-3. [District Rule 2201]
- Authorities to Construct (ATC) C-6817-3-3, '-4-2, and '-5-2 shall be implemented concurrently with this Authority to Construct. [District Rule 2201]

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 (616/11)
Rule 2520 Federally Mandated Operating Permits (6/21/01)
Rule 2550 Federally Mandated Preconstruction Review for Major Sources of Air Toxics (6/18/98)
Rule 4101 Visible Emissions (2/17/05)
Rule 4102 Nuisance (12/17/92)
Rule 4550 Conservation Management Practices (CMP) (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 19765 13th Ave, Hanford, in Kings County. The equipment is not located within 1,000 feet of the outer boundary of a K-12 school. Therefore, the public notification requirement of California Health and Safety Code 42301.6 is not applicable to this project.

IV. Process Description

The primary function of Philip Verwey Farms #2 is the production of milk, which is used to make products for human consumption. Production of milk requires a herd of mature dairy cows that are lactating. In order to produce milk, the cows must be bred and give birth. The gestation period for a cow is 9 months, and dairy cows are bred again 4 months after calving. Thus, a mature dairy cow produces a calf every 12 to 14 months, which is why there will be different ages and types of cows at a typical dairy, including calves, heifers, lactating cows, dry cows, and mature bulls.

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

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

Cow Housing
The existing dairy currently houses 4,800 milk cows in ten freestall barns with flush lanes. After the modification is complete, the facility will house 10,000 milk cows in ten freestall barns with flush lanes. In freestall barns, cows are grouped in large pens with free access to feed bunks, water, and stalls for resting. A standard freestall barn design has a feed alley in the center of the barn separating two feed bunks on each side. All support stocks are housed in open corrals with flushed lanes. An open corral is a large open area where cows are confined with unlimited access to feed and water. The open corrals at this dairy include structures that provide shade for all animals except the dry cows. The dairy proposes to increase the herd size at the dairy without changing the housing and manure management practices.

V. Equipment Listing

Pre-Project Equipment Description:

C-6817-2-2: COW HOUSING - 4,800 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 5,760 MATURE COWS (MILK AND DRY); 5,184 TOTAL SUPPORT STOCK (HEIFERS AND CALVES); AND 10 FREESTALLS WITH FLUSH/SCRAPE SYSTEM

Proposed Modification:

C-6817-2-4: MODIFICATION OF COW HOUSING - 4,800 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 5,760 MATURE COWS (MILK AND DRY); 5,184 SUPPORT STOCK (HEIFERS, CALVES, AND BULLS); AND 10 FREESTALLS WITH FLUSH/SCRAPE SYSTEM: INCREASE HERD TO 10,000 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 12,000 MATURE COWS (MILK AND DRY); 7,508 TOTAL SUPPORT STOCK (HEIFERS, CALVES, AND BULLS)

Post Project Equipment Description:

C-6817-2-4: COW HOUSING – 10,000 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 12,000 MATURE COWS (MILK AND DRY); 7,508 TOTAL SUPPORT STOCK (HEIFERS, CALVES, AND BULLS); AND 10 FREESTALLS WITH FLUSH/SCRAPE SYSTEM

VI. Emission Control Technology Evaluation

PM_{10}, VOC, NH_3, and H_2S are the major pollutants of concern from cow housing, liquid manure handling, solid manure handling, and feed storage & handling at cattle facilities.

The facility currently complies with all applicable Phase II mitigation measure requirements of District Rule 4570, as previously processed under District project C-1110587. This project does not involve any change to the mitigation measures practiced at the facility. All mitigation measures result in VOC emissions reductions; reductions in ammonia emissions are also expected.

Additionally, all animals housed at this dairy will be fed in accordance with National Research Council (NRC) guidelines using routine nutritional analysis for rations. Feeding the cows in accordance with NRC guidelines minimizes undigested protein and other undigested nutrients in the manure, which would emit NH_3 and VOCs upon decomposition. Refused feed will be removed from the feed lanes on a daily basis to minimize gaseous emissions from decomposition. The surface area of silage exposed to the atmosphere will be minimized by enclosing silage or covering it with tarps, except for the face of the pile where feed is being removed.

Cow Housing (C-6817-2)

All of the milk cows will be housed in freestall barns with concrete lanes. Particulate matter emissions from freestall barns are greatly reduced because the cows will be on a paved surface rather than on dry dirt. Additionally, the flushing of the freestall lanes creates a moist environment, which further decreases particulate matter emissions. The dry cows and heifers will all be housed in open corrals with concrete flush lanes. The open corrals at this dairy are equipped with shades. Providing shade for the animals reduces movement and unnecessary activity during hot weather, which reduces PM_{10} emissions. The surfaces of exercise corrals for the freestall barns and the corrals will be scraped in the morning hours on a weekly basis except during wet conditions. Frequent scraping of the corrals will reduce the amount of dry manure on the corral surfaces that may be pulverized by the cows' hooves and emitted as PM_{10}. This practice will also reduce the chance of anaerobic conditions developing in the manure pack of the corral surface, potentially reducing VOC emissions. In addition, the applicant has proposed to sprinkle water over 48% of the heifer corral area to match the evaporation rate.

The lanes and walkways in the freestall barns will be flushed/scraped four times per day and the lanes and walkways in the corrals will be flushed/scraped once per day. Manure, which is a source of emissions, will be removed from the freestall barns and corral lanes by flushing/scraping. Because of ammonia's high affinity for and solubility in water, flushing the corral lanes and walkways will also reduce volatilization of ammonia from the manure deposited in the corral lanes.

VII. General Calculations

A. Assumptions

- Potential to Emit for the dairy will be based on the maximum design capacity of the number and types of cows at the dairy.
- Only emissions from the emergency IC engine (C-6817-9) and storage pond (C-6817-3) at the dairy will be used to determine if the facility is a major source since these units are considered to be the only sources of non-fugitive emissions at dairies.
- Currently, 4,800 milk cows are housed in freestall barns with flushed lanes; 960 mature cows (milk and dry) and 5,194 support stocks are housed in open corrals with flushed lanes.
- After completion of this project, all 10,000 milk cows will be housed in freestall barns with flushed lanes; 2,000 mature cows (milk and dry) and 7,508 support stock will be housed in open corrals with flushed lanes.
- The mitigation measures practiced at the dairy are taken from the Rule 4570 Phase II Project C-1110587.

- All PM10 emissions from the dairy will be allocated to the cow housing permit unit (C-6817-2).
- The project does not result in any increase in emissions from the anaerobic treatment lagoon/storage pond.
- The PM10 control efficiency for shade structures is based on the SJVAPCD memo – Dairy and Feedlot PM10 Mitigation Practices and their Control Efficiencies.
- The PM10 emission factors for the dairy animals are based on a District document entitled "Dairy and Feedlot PM10 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 Emission Factors for milk cows used in this evaluation are from the "APCO's Revision to the Dairy VOC Emission Factor," dated February 2012. The VOC emission factors for the support stock were developed by taking the ratio of volatile solids excreted by the different types of cows to the milk cow and multiplying it by the milk cow VOC emission factor.
- The NH3 emission factor for milk cows is based on the dairy cattle ammonia emission factor used by the California Air Resources Board. This emission factor was apportioned to the dairy permit units based on VOC emissions from manure. The NH3 emission factors for the support stock were developed by taking the ratio of nitrogen excreted by the different types of cows to the milk cow and multiplying it by the milk cow NH3 emission factor.
- The District is currently applying a 50% PM10 control efficiency for sprinkling of the heifer corrals as long as the amount of water applied meets the evaporation rates. The applicant has proposed to sprinkle water over 48% of the total heifer corral area, which matches the evaporation rate. Therefore, a control efficiency of 24% will be applied (CE of 50% x 48% = 24%).

B. Emission Factors

All emission factors for this project are included in Appendix F.

C. Calculations

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

1. Pre-Project Potential to Emit (PE1)

The cow housing Potential to Emit (PE) is listed in the table below.

PE1		
	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO_X	0.0	0
SO_X	0.0	0
PM_{10}	103.0	37,628
CO	0.0	0
VOC	205.1	74,853
NH_3	384.9	140,452
H_2S	0.0	0

2. Post Project Potential to Emit (PE2)

The cow housing Potential to Emit (PE) is listed in the table below.

PE2		
	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO_X	0.0	0
SO_X	0.0	0
PM_{10}	163.7	59,759
CO	0.0	0
VOC	388.4	141,799
NH_3	751.5	274,266
H_2S	0.0	0

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

Pursuant to District Rule 2201, the SSPE1 is the Potential to Emit (PE) from all units with valid Authorities to Construct (ATC) or Permits to Operate (PTO) at the Stationary Source and the quantity of Emission Reduction Credits (ERC) which have been banked since September 19, 1991 for Actual Emissions Reductions (AER) that have occurred at the source, and which have not been used on-site. As previously mentioned, the facility has valid ATCs for the proposed herd expansion for permit units '-1, '-3, '-4, and '-5; therefore, the following emissions for permit units '-1, '-3, '-4, and '-5 are taken from the SSPE2 table in Appendix F.

Pre-Project Stationary Source Potential to Emit [SSPE1] (lb/year)							
	NO_X	SO_X	PM_{10}	CO	VOC	NH_3	H2S
C-6817-1-4 (Milk Parlor)	0	0	0	0	4,000	1,368	0
C-6817-2-2 (Cow Housing)	0	0	37,628	0	74,853	140,452	0
C-6817-3-2 (Liquid Manure Handling)	0	0	0	0	27,897	63,570	1,540
C-6817-4-1 (Solid Manure Handling)	0	0	0	0	6,702	36,791	0
C-6817-5-1 (Feed Storage and Handling)	0	0	0	0	174,500	0	0
C-6817-9-0* (Emergency IC Engine)	725	1	20	198	33	0	0
Pre-Project SSPE (SSPE1)	**725**	**1**	**37,648**	**198**	**287,985**	**242,181**	**1,540**

*Referenced from Project C-1120348.

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

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

Post-Project Stationary Source Potential to Emit [SSPE2] (lb/year)							
	NO_X	SO_X	PM_{10}	CO	VOC	NH_3	H2S
C-6817-1-4	0	0	0	0	4,000	1,368	0
C-6817-2-4 (ATC)	0	0	59,759	0	141,799	274,266	0
C-6817-3-2	0	0	0	0	27,897	63,570	1,540
C-6817-4-1	0	0	0	0	6,702	36,791	0
C-6817-5-1	0	0	0	0	174,500	0	0
C-6817-9-0	725	1	20	198	33	0	0
Post-Project SSPE (SSPE2)	**725**	**1**	**59,779**	**198**	**354,931**	**375,995**	**1,540**

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. transportable 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 70.2

In determining whether a facility is a major source, fugitive emissions are not counted unless the facility belongs to certain specified source categories. 40 CFR 71.2 (Definitions, Major Source (2)) states the following:

(2) A major stationary source of air pollutants, 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 subject to regulation (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—The term chemical processing plant shall not include ethanol production facilities that produce ethanol by natural fermentation included in NAICS codes 325193 or 312140; (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 70.2 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.

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 storage pond and IC engine (C-6817-9-0) will be used to determine if this facility is a major source. See Appendix F for Pre- and Post-Project Major Source totals.

Pre-Project Major Source Determination:
All housing at the dairy is served by a flush system. Therefore, it is assumed manure from all the animals is flushed to the lagoons.

Major Source Determination (lb/year)						
	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO	VOC
C-6817-3-2	0	0	0	0	0	9,937
C-6817-9-0	725	1	20	20	198	33
Non-Fugitive SSPE1	725	1	20	20	198	9,970
Major Source Threshold	20,000	140,000	140,000	140,000	200,000	20,000

As seen in the table above, the facility is not a Major Source.

Post Project Major Source Determination:
All housing at the dairy is served by a flush system. Therefore, it is assumed manure from all the animals is flushed to the lagoons.

Major Source Determination (lb/year)						
	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO	VOC
C-6817-3-2	0	0	0	0	0	9,937
C-6817-9-0	725	1	20	20	198	33
Non-Fugitive SSPE2	725	1	20	20	198	9,970
Major Source Threshold	20,000	140,000	140,000	140,000	200,000	20,000

As seen in the table above, the facility is not a Major Source.

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.

Fugitive emissions at dairies are excluded in determining if a source is a major source for PSD. Except for PM10 emissions from the IC engine located at the facility, all other PM10 emissions at the facility are fugitive, and are therefore excluded. Further, all VOC emissions except for non-fugitive VOC emissions from the storage pond and IC engine are also excluded from PSD calculations.

PSD Major Source Determination (tons/year)						
	NO2	VOC	SO2	CO	PM	PM10
Estimated Facility PE before Project Increase	0.4	5.0	0.0	0.1	0.0	0.0
PSD Major Source Thresholds	250	250	250	250	250	250
PSD Major Source ? (Y/N)	N	N	N	N	N	N

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

6. Baseline Emissions (BE)

The BE calculation (in lb/year) is performed pollutant-by-pollutant for each unit within the project to calculate the QNEC, and if applicable, to determine the amount of offsets required.

Pursuant to District Rule 2201, BE = PE1 for:

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

otherwise,

BE = Historic Actual Emissions (HAE), calculated pursuant to District Rule 2201.

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

Therefore BE=PE1.

As calculated in Section VII.C.1 above, PE1 is summarized in the following table:

BE (lb/year)						
	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO	VOC
C-6817-2-4	0	0	37,628	37,628	0	74,853

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 any pollutant regulated under the Clean Air Act, except those for which the District has been classified nonattainment. The pollutants which must be addressed in the PSD applicability determination for sources located in the SJV and which are emitted in this project are: (See 52.21 (b) (23) definition of significant)

- PM
- PM10

I. Project Emissions Increase - New Major Source Determination

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

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

PSD Major Source Determination: Potential to Emit (tons/year)						
	NO2	VOC	SO2	CO	PM	PM10
Total PE from New and Modified Units	0.0	70.9	0.0	0.0	29.9	29.9
PSD Major Source threshold	250	250	250	250	250	250
New PSD Major Source?	N	N	N	N	N	N

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

10. Quarterly Net Emissions Change (QNEC)

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

VIII. Compliance

Rule 2201 New and Modified Stationary Source Review Rule

A. Best Available Control Technology (BACT)

1. BACT Applicability

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

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

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

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

As discussed in Section I above, there are no new emissions units associated with this project. Therefore BACT for new units with PE > 2 lb/day purposes is not triggered.

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

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

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

AIPE = PE2 – HAPE

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

HAPE = PE1 x (EF2/EF1)

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

AIPE = PE2 – (PE1 * (EF2 / EF1))

Based on the AIPE values in Appendix F, BACT is triggered for the following modified emission units:

- Cow housing – Freestall Barns: VOC, NH3, PM10
- Cow housing – Corrals: VOC, NH3, PM10

d. SB 288/Federal Major Modification

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

2. Top-Down BACT Analysis

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

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

Corrals and Freestall Barns:
VOC: 1) Concrete feed lanes and walkways;
2) Flushing the feed lanes and walkways for the milk and dry cows four times per day and flushing feed lanes and walkways for the remaining animals once per day;
3) Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
4) Properly sloping corrals (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the

available space for each animal is more than 400 square feet per animal) or managing corrals to maintain a dry surface; and
5) Scraping corrals and exercise pens every two weeks
6) VOC mitigation measures required by District Rule 4570

NH_3: 1) Concrete feed lanes and walkways;
2) Flushing the feed lanes and walkways for the milk and dry cows four times per day and flushing feed lanes and walkways for the remaining animals once per day;
3) Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
4) Properly sloping corrals (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing corrals to maintain a dry surface; and
5) Scraping corrals and exercise pens every two weeks

PM_{10}: 1) Scraping of exercise pens and open corrals every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions.
2) Concrete feed lanes and walkways for all cows
3) Shade structures in open corrals
4) Feeding heifers near (within 1 hour of) dusk
5) Above-ground calf hutches for baby calves under three months
6) Application of water (sprinklers) in corrals.

B. Offsets

Per Section 4.6.9, offsets are not required for agricultural sources unless they are a major source. As determined in Section VII.C.5 above, this facility is not a major source for any pollutant. Therefore, offsets are not required.

C. Public Notification

1. Applicability

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

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

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

As demonstrated in Sections VII.C.7 and VII.C.8, this project does not constitute an SB 288 or Federal Major Modification; therefore, public noticing for SB 288 or Federal Major Modification purposes is not required.

b. PE > 100 lb/day

Applications which include a new emissions unit with a PE greater than 100 pounds during any one day for any pollutant will trigger public noticing requirements. There are no new emissions units associated with this project. Therefore public noticing is not required for this project for PE > 100 lb/day.

c. Offset Threshold

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

Offset Thresholds				
Pollutant	SSPE1 (lb/year)	SSPE2 (lb/year)	Offset Threshold	Public Notice Required?
NO_X	725	725	20,000 lb/year	No
SO_X	1	1	54,750 lb/year	No
PM_{10}	37,648	59,779	29,200 lb/year	No
CO	198	198	200,000 lb/year	No
VOC	287,985	354,931	20,000 lb/year	No

As detailed above, there were no thresholds surpassed with this project; the facility already went through public noticing in project C-1120348. Therefore, public noticing is not required for offset purposes.

d. SSIPE > 20,000 lb/year

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

SSIPE Public Notice Thresholds					
Pollutant	SSPE2 (lb/year)	SSPE1 (lb/year)	SSIPE (lb/year)	SSIPE Public Notice Threshold	Public Notice Required?
NO_x	725	725	0	20,000 lb/year	No
SO_x	1	1	0	20,000 lb/year	No
PM_{10}	59,779	37,648	22,131	20,000 lb/year	Yes
CO	198	198	0	20,000 lb/year	No
VOC	354,931	287,985	66,946	20,000 lb/year	Yes
NH_3	375,995	242,181	133,914	20,000 lb/year	Yes
H_2S	1,540	1,540	0	20,000 lb/year	No

As demonstrated above, the SSIPEs for VOC, PM_{10}, and NH_3 exceed 20,000 lb/year; therefore public noticing for SSIPE purposes is required.

e. Title V Significant Permit Modification

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

2. Public Notice Action

As discussed above, public noticing is required for this project because PM_{10}, VOC, and NH_3 emissions exceed the 20,000 lb/year SSIPE threshold. Therefore, public notice documents will be submitted to the California Air Resources Board (CARB) and a public notice will be published in a local newspaper of general circulation prior to the issuance of the ATC for this equipment.

D. Daily Emission Limits (DELs)

DELs and other enforceable conditions are required by Rule 2201 to restrict a unit's maximum daily emissions, to a level at or below the emissions associated with the maximum design capacity. The 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. The number and types of cows are listed in the permit equipment description for the milking parlor and cow housing permits. Additionally, the following District Rule 2201 conditions will also be added:

Cow Housing (C-6817-2-4)

The following conditions will ensure that the DEL and BACT requirements are met:

- The freestall and corral feed lanes and walkways at this dairy shall be constructed of concrete. [District Rule 2201]
- The feed lanes and walkways for mature cows at this dairy shall be flushed and/or scraped at least four times per day. The feed lanes and walkways for support stock at this dairy shall be flushed and/or scraped at least once per day. [District Rules 2201 and 4570]
- All animals at this dairy shall be fed in accordance with the National Research Council (NRC) guidelines utilizing routine dairy nutritionist analyses of rations. [District Rule 2201]
- Open corrals shall be scraped at least once every other week using a pull-type scraper in the morning hours, except when this is prevented by wet conditions. [District Rule 2201]
- Open corrals at this dairy shall be equipped with at least one shade structure. [District Rule 2201]
- Shade structures shall be installed in any of the following ways: 1) constructed with a light permeable roofing material; 2) uphill of any slope in the corral; 3) installed so that the structure has a North/South orientation. OR Permittee shall clean manure from under corral shades at least once every fourteen (14) days, when weather permits access into the corral. [District Rule 2201 and 4570]

- Permittee shall implement at least one of the following corral mitigation measures: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 square feet or less and shall slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 square feet per animal; 2) maintain corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape corrals sufficiently to maintain a dry surface except during periods of rainy weather. [District Rules 2201 and 4570]
- At least one of the feedings of the heifers at this dairy shall be near (within one hour of) dusk. [District Rule 2201]
- Permittee shall flush, scrape or vacuum freestall lanes immediately prior to, immediately after or during each milking. [District Rules 2201 and 4570]
- Permittee shall pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers. [District Rules 2201 and 4570]
- Permittee shall 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). [District Rules 2201 and 4570]
- Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rules 2201 and 4570]
- Permittee shall clean manure from corrals at least four (4) times per year with at least sixty (60) days between each cleaning, or permittee shall clean corrals at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]
- Permittee shall sprinkle water over at least 48% of area of the unpaved area of the heifer corrals. Sprinkling rate shall match with the local wet soil evaporation rate (70-80% of the local wet pan evaporation rate) to keep sufficient moisture content in the surface of the corrals. Sprinkling of corrals is not required during wet conditions. [District Rule 2201]
- Sprinklers or water trucks shall be designed to spray the corrals uniformly to prevent inconsistent distribution of water. [District Rule 2201]
- Permittee shall manage corrals such that the manure depth in the corral does not exceed twelve (12) inches at any time or point, except for in-corral mounding. Manure depth may exceed 12 inches when corrals become inaccessible due to rain events. However, permittee must resume management of the manure depth of 12 inches or lower immediately upon the corral becoming accessible. [District Rules 2201 and 4570]
- Milk cows shall be housed in freestall barns. [District Rule 2201]

Conditions Removed:

The facility has indicated they use non-manure-based bedding for at least 90% of the bedding material, by weight; therefore, the following condition has been removed since it is no longer applicable.

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

The following conditions on the current cow housing PTO will not be added to the proposed ATC because they are either obsolete or not applicable. These requirements were added during the facility's initial permitting project (C-1050519) and are conditions the District no longer requires for dairy operations due to insufficient data to quantify any associated emissions reductions.

- 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 Rules 2201 and 4570]
- Inspection for potholes or other sources of emissions shall be performed on a monthly basis. [District Rule 2201]
- Firm, stable, and not easily eroded soils shall be used for the exercise pens. [District Rule 2201]
- Permittee shall install all shade structures uphill of any slope in the corral. [District Rules 2201 and 4570]
- A supply of fill soil shall be kept on site in order to fill areas where erosion and gouging occurs. This will help fill areas where puddles may form. This fill soil shall be covered with a tarp. [District Rule 2201]
- Clean rainfall runoff shall be diverted around exercise pens to reduce the amount of water that is potentially detained on the corral surface. [District Rule 2201]

E. Compliance Assurance

1. Source Testing

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

2. Monitoring

No monitoring is required for this project.

3. Recordkeeping

Recordkeeping is required to demonstrate compliance with the public notification and daily emission limit requirements of Rule 2201.

Cow Housing (C-6817-2)

The following are existing recordkeeping requirements on the current PTO that will be carried over to the proposed ATC. These requirements ensure compliance with BACT requirements that were previously triggered for the cow housing emissions units. Additionally, they will also ensure compliance with BACT for VOC, PM_{10}, and NH_3 emissions from the freestall barns and corrals which were triggered as a result of the herd increase.

- Permittee shall keep records or maintain an operating plan that requires the feed lanes and walkways for mature cows to be flushed and or scraped at least four times per day and the feed lanes and walkways for support stock to be flushed and or scraped at least once per day. [District Rule 2201]

- Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rule 2201]
- Permittee shall maintain records of dates open corrals and exercise pens are scraped. [District Rule 2201]
- If permittee has selected to comply using shades constructed with a light permeable roofing material, then permittee shall maintain records, such as design specifications, demonstrating that the shade structures are equipped with such roofing material or if Permittee has selected to comply by cleaning the manure from under the corral shades, then Permittee shall maintain records demonstrating that manure is cleaned from under the shades at least once every fourteen (14) days, as long as weather permits access to corrals. [District Rules 2201 and 4570]
- Permittee shall maintain records sufficient to demonstrate that freestall lanes are flushed, scraped or vacuumed immediately prior to, immediately after or during each milking. [District Rules 2201 and 4570]
- Permittee shall demonstrate that manure from corrals are cleaned at least four (4) times per year with at least sixty (60) days between each cleaning or demonstrate that corrals are cleaned at least once between April and July and at least once between September and December. [District Rules 2201 and 4570]
- Permittee shall 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 corrals are groomed (i.e., harrowed, raked, or scraped, etc.). [District Rules 2201 and 4570]
- Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rules 2201 and 4570]
- Permittee shall maintain a record of the number of animals of each species and production group at the facility and shall maintain quarterly records of any changes to this information. [District Rules 2201 and 4570]
- Permittee shall maintain records demonstrating that water pipes and troughs are inspected and leaks are repaired at least once every seven (7) days. [District Rules 2201 and 4570]
- Permittee shall maintain records of the daily local evaporation rate/soil evaporation rate and the amount of water (inches or cm) applied to the corral surface. Records of sprinkler run time and flow rate may be used to satisfy this requirement. [District Rule 2201]
- 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]

Additional recordkeeping conditions are included under the Rule 4570 compliance section.

Conditions Removed:

The facility has indicated they use non-manure-based bedding for at least 90% of the bedding material, by weight; therefore, the following condition has been removed since it is no longer applicable.

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

The following condition on the current cow housing PTO will not be added to the proposed ATC because they are either obsolete or not applicable. These requirements were added during the facility's initial permitting project (C-1050519) and are conditions the District no longer requires for dairy operations due to insufficient data to quantify any associated emissions reductions.

- 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 Rules 2201 and 4570]
- Permittee shall maintain daily records of the number of milk cows and dry cows at this dairy and shall maintain weekly records of the number of cows at the dairy in each of the following categories: large heifers (15 to 24 months of age); medium heifers (7 to 14 months of age); small heifers (3 to 6 months); baby calves (under 3 months); and mature bulls. [District Rule 2201] N

4. Reporting

No reporting is required to demonstrate compliance with Rule 2201.

F. Ambient Air Quality Analysis (AAQA)

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

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

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

Rule 2410 Prevention of Significant Deterioration

As shown in Section VII.C.9. above, this project does not result in a new PSD major source or PSD major modification. No further discussion is required.

Rule 2520 Federally Mandated Operating Permits

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

Rule 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	
1,2-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	

[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.

[2] 0.01 + 0.07 = 0.08 lbs/hd-yr
[3] 0.012 + 0.15 = 0.162 lbs/hd-yr

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	10,000	x	1.828	=	18,280	9.1
Dry Cow	2,000	x	1.123	=	2,246	1.1
Support Stock	7,488	x	0.786	=	5,886	2.9
Bulls	20	X	1.123	=	22	0.0
Total				=	**26,434**	**13.2**

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 9.8 tons per year (13.2 tons 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.

[4] The emission factor has been adjusted for each type of cow based on the ratio of amount of manure generated for each cow.

Rule 4101 Visible Emissions

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

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

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

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

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

The units involved in this project are used solely for the raising of dairy animals. Therefore, these units are exempt from the provisions of this rule.

Rule 4102 Nuisance

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

This project is proposing BACT and has proposed all mitigation measures required by Rule 4570. Therefore, this dairy is expected to comply with this rule.

California Health and Safety Code 41700 (Health Risk Assessment)

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

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

The cancer risk for this project is shown below:

RMR Summary			
Categories	**Cow Housing (Unit 2-4)**	**Project Totals**	**Facility Totals**
Prioritization Score	2.57	>1	>1
Acute Hazard Index	0.11	0.11	0.46
Chronic Hazard Index	0.04	0.04	0.06
Maximum Individual Cancer Risk	3.35E-7	3.35E-7	2.01E-6
T-BACT Required?	No		
Special Permit Conditions?	No		

Discussion of T-BACT

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

Rule 4550 Conservation Management Practices (CMP)

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

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

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

The facility received District approval for its CMP plan on June 20, 2006. Continued compliance with the requirements of District Rule 4550 is expected. The applicant has proposed to comply with the same PM_{10} mitigation measures for the expansion as proposed for the existing facility.

Rule 4570 Confined Animal Facilities (CAF)

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

PTOs incorporating Phase II mitigation measures of District Rule 4570, as evaluated under District project C-1110587, have already been issued to this facility. All applicable District Rule 4570 conditions on the current cow housing PTO will be carried over to the proposed ATC.

As previously mentioned, the current cow housing permit includes an incorrect bedding mitigation measure. The facility has indicated they do no remove manure that is not dry from individual cow freestall beds or rake, harrow, scrape, or grade freestall bedding at least once every seven days. Therefore, the following conditions will be removed as they are not applicable:

- Permittee shall remove manure that is not dry from individual cow freestall beds or shall rake, harrow, scrape, or grade freestall bedding at least once every seven (7) days. [District Rules 2201 and 4570]
- Permittee shall record either of the following: 1) the dates when manure that is not dry is removed from individual cow freestall beds or 2) the dates when the freestall bedding is raked, harrowed, scraped, or graded. [District Rules 2201 and 4570]

The facility has stated they use non-manure-based bedding in their freestall barns. To ensure compliance with District Rule 4570 bedding mitigations, the following condition will be included on the proposed ATC:

- Permittee shall 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). [District Rules 2201 and 4570]

California Health & Safety Code 42301.6 (School Notice)

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

California Environmental Quality ACT (CEQA)

The proposed project is located in Kings County and is thus, subject to the Kings County Planning Agency Site Plan Review Process. In 2002, Kings County amended their General Plan to include a Dairy Element. The Dairy Element was developed by the Kings County Planning Agency as a comprehensive set of goals, objectives, policies, and standards to guide development, expansion, and operation of milk cow (bovine) dairies and dairy replacement stock facilities within Kings County. The Dairy Element establishes a written process (Site Plan Review) by which subsequent dairy projects involving site-specific operations can be evaluated to determine whether the environmental effects of the operation were covered in the Program Environmental Impact Report (EIR). The Program EIR for the Dairy Element (State Clearinghouse Number 2000111133) was certified by the Kings County Board of Supervisors on July 20, 2002.

Kings County is the Agency which has the principal responsibility for approving this project. Consistent with procedures established within the Program EIR, the Kings County Planning Agency has approved the project through its Site Plan Review process. The District is a Responsible Agency for the project because of its discretionary approval power over the project via its Permits Rule (Rule 2010) and New Source Review Rule (Rule 2201), (CCR §15381). Rule 2010 requires operators of emission sources to obtain an Authority to Construct (ATC) and Permit to Operate (PTO) from the District. Rule 2201 requires that new and modified stationary sources reduce their emissions using Best Available Control Technology (BACT) and for non-agricultural sources offsetting emissions when above certain thresholds (SB 700).

As a responsible agency the District complies with CEQA by considering the EIR prepared by the Lead Agency, and by reaching its own conclusion on whether and how to approve the project involved (CCR §15096). The District has reviewed the environmental review document prepared by the Lead Agency for the project and finds it to be adequate. To reduce project related impacts on air quality, the District has imposed air pollutant emission controls on the

project as required by BACT and District Rule 2201. Offsets were considered, but determined not to be a feasible mitigation measure due to legal constraints (Health and Safety Code §42301.18(c)). Pursuant to CCR §15096, prior to project approval and issuance of ATCs the District is to prepare findings.

ATC C-1120348 evaluated the project with the windbreaks, which were originally required by District permit conditions under BACT. The only change to the original project (ATC C-1120348) is the District has now removed the requirement of installing windbreaks from the permit conditions. Therefore, ATC C-1120348 previously evaluated project impacts of this ATC C-1151019, and the District Findings for the Phillip Verwey Farms #2 dated June 2012 for ATC C-1120348 is still valid for ATC C-1151019. No additional findings are required.

Indemnification Agreement/Letter of Credit Determination

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

The proposed project has been determined to have a less than significant environmental impact, and does not trigger school notice. No Toxic Best Available Control Technology for mitigating health risk impacts is required. Although, the proposed project is located at a type of facility that may be of public concern, there is no known public concern for this particular facility.

Therefore, at this time the District has preliminary determined that there is minimal potential for litigation risk for this ATC permitting project, and as such, an Indemnification Agreement and Letter of Credit are not required.

However, because a public notice will be triggered the District retains the discretion to require an indemnification and Letter of Credit after the public notice ends.

IX. Recommendation

Compliance with all applicable rules and regulations is expected. Pending a successful NSR Public Noticing period, issue ATC C-6817-2-4 subject to the permit conditions on the attached draft ATC in Appendix A.

X. Billing Information

Annual Permit Fees			
Permit Number	Fee Schedule	Fee Description	Annual Fee
C-6817-2-4	3020-06	Cow Housing	$111.00

Appendixes

A: Draft ATC
B: Current PTO
C: BACT Guideline
D: BACT Analysis
E: HRA/AAQA Summary
F: Dairy Emissions Calculator
G: Quarterly Net Emissions Change
H: Emission Profile
I: Lease Agreement
J: Agronomic Soil Analysis

APPENDIX A
Draft ATC

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: C-6817-2-4 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: PHILIP VERWEY FARMS #2
MAILING ADDRESS: 19765 13TH AVE
HANFORD, CA 93230

LOCATION: 19765 13TH AVE
HANFORD, CA 93230

EQUIPMENT DESCRIPTION:
MODIFICATION OF COW HOUSING - 4,800 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 5,760 MATURE COWS (MILK AND DRY); 5,184 SUPPORT STOCK (HEIFERS, CALVES, AND BULLS); AND 10 FREESTALLS WITH FLUSH/SCRAPE SYSTEM: INCREASE HERD TO 10,000 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 12,000 MATURE COWS (MILK AND DRY); 7,508 TOTAL SUPPORT STOCK (HEIFERS, CALVES, AND BULLS)

CONDITIONS

1. This Authority to Construct (ATC) cancels and supersedes ATC C-6817-2-3. [District Rule 2201]
2. Authorities to Construct (ATC) C-6817-3-3, '-4-2, and '-5-2 shall be implemented concurrently with this Authority to Construct. [District Rule 2201]
3. {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]
4. {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]
5. {4452} If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (559) 230-5950 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT. This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Seyed Sadredin, Executive Director / APCO

DRAFT

Arnaud Marjollet, Director of Permit Services
C-6817-2-4 Jan 12 2016 3:54PM -- YOSHIMUJ : Joint Inspection NOT Required

6. Milk cows shall be housed in freestall barns. [District Rule 2201]
7. The freestall and corral feed lanes and walkways at this dairy shall be constructed of concrete. [District Rule 2201]
8. The feed lanes and walkways for mature cows at this dairy shall be flushed and/or scraped at least four times per day. The feed lanes and walkways for support stock at this dairy shall be flushed and/or scraped at least once per day. [District Rules 2201 and 4570]
9. Permittee shall keep records or maintain an operating plan that requires the feed lanes and walkways for mature cows to be flushed and or scraped at least four times per day and the feed lanes and walkways for support stock to be flushed and or scraped at least once per day. [District Rule 2201]
10. All animals at this dairy shall be fed in accordance with the National Research Council (NRC) guidelines utilizing routine dairy nutritionist analyses of rations. [District Rule 2201]
11. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rule 2201]
12. Open corrals shall be scraped at least once every other week using a pull-type scraper in the morning hours, except when this is prevented by wet conditions. [District Rule 2201]
13. Permittee shall maintain records of dates open corrals and exercise pens are scraped. [District Rule 2201]
14. Open corrals at this dairy shall be equipped with at least one shade structure. [District Rule 2201]
15. Shade structures shall be installed in any of the following ways: 1) constructed with a light permeable roofing material; 2) uphill of any slope in the corral; 3) installed so that the structure has a North/South orientation. OR Permittee shall clean manure from under corral shades at least once every fourteen (14) days, when weather permits access into the corral. [District Rules 2201 and 4570]
16. If permittee has selected to comply using shades constructed with a light permeable roofing material, then permittee shall maintain records, such as design specifications, demonstrating that the shade structures are equipped with such roofing material or if Permittee has selected to comply by cleaning the manure from under the corral shades, then Permittee shall maintain records demonstrating that manure is cleaned from under the shades at least once every fourteen (14) days, as long as weather permits access to corrals. [District Rules 2201 and 4570]
17. Permittee shall implement at least one of the following corral mitigation measures: 1) slope the surface of the corrals at least 3% where the available space for each animal is 400 square feet or less and shall slope the surface of the corrals at least 1.5% where the available space for each animal is more than 400 square feet per animal; 2) maintain corrals to ensure proper drainage preventing water from standing more than forty-eight hours; or 3) harrow, rake, or scrape pens sufficiently to maintain a dry surface except during periods of rainy weather. [District Rules 2201 and 4570]
18. 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 corrals are groomed (i.e., harrowed, raked, or scraped, etc.). [District Rules 2201 and 4570]
19. At least one of the feedings of the heifers at this dairy shall be near (within one hour of) dusk. [District Rule 2201]
20. Permittee shall flush, scrape or vacuum freestall lanes immediately prior to, immediately after or during each milking. [District Rules 2201 and 4570]
21. Permittee shall maintain records sufficient to demonstrate that freestall lanes are flushed, scraped or vacuumed immediately prior to, immediately after or during each milking. [District Rules 2201 and 4570]
22. Permittee shall pave feedlanes, where present, for a width of at least 8 feet along the corral side of the feedlane fence for milk and dry cows and at least 6 feet along the corral side of the feedlane for heifers. [District Rules 2201 and 4570]
23. Permittee shall remove manure that is not dry from individual cow freestall beds or shall rake, harrow, scrape, or grade freestall bedding at least once every seven (7) days. [District Rules 2201 and 4570]

CONDITIONS CONTINUE ON NEXT PAGE

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

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

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

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

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

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

30. 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 Rules 2201 and 4570]

31. 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 Rules 2201 and 4570]

32. Permittee shall sprinkle water over at least 48% of area of the unpaved area of the heifer corrals. Sprinkling rate shall match with the local wet soil evaporation rate (70-80% of the local wet pan evaporation rate) to keep sufficient moisture content in the surface of the corrals. Sprinkling of corrals is not required during wet conditions. [District Rule 2201]

33. Sprinklers or water trucks shall be designed to spray the corrals uniformly to prevent inconsistent distribution of water. [District Rule 2201]

34. Permittee shall maintain records of the daily local evaporation rate/soil evaporation rate and the amount of water (inches or cm) applied to the corral surface. Records of sprinkler run time and flow rate may be used to satisfy this requirement. [District Rule 2201]

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

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

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

38. {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]

39. {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]

APPENDIX B
Current PTO

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: C-6817-2-2 **EXPIRATION DATE:** 12/31/2017

EQUIPMENT DESCRIPTION:
COW HOUSING - 4,800 MILK COWS NOT TO EXCEED A COMBINED TOTAL OF 5,760 MATURE COWS (MILK AND DRY); 4,752 SUPPORT STOCK (HEIFERS); 432 CALVES; AND 10 FREESTALLS 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. If a licensed veterinarian or a certified nutritionist determines that any VOC mitigation measure will be required to be suspended as a detriment to animal health or necessary for the animal to molt, the owners/operators must notify the District in writing within forty-eight (48) hours of the determination including the duration and the specific health condition requiring the mitigation measure to be suspended. If the situation is expected to exist longer than a thirty-day (30) period, the owner/operator shall submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the suspended mitigation measure. [District Rule 4570]
4. The total number of cattle housed at this dairy at any one time shall not exceed any of the following: 4,800 Holstein milk cows; 960 dry cows; 2,160 heifers (15-24 months); 1,728 heifers (7-14 months); 864 heifers (3-6 months); and 432 calves (under 3 months). [District Rule 2201]
5. Milk cows and dry cows shall be housed in freestall barns. [District Rule 2201]
6. The freestall and corral feed lanes and walkways at this dairy shall be constructed of concrete. [District Rule 2201]
7. All animals at this dairy shall be fed in accordance with the National Research Council (NRC) guidelines utilizing routine dairy nutritionist analyses of rations. [District Rule 2201]
8. Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rule 1070]
9. At least one of the feedings of the heifers at this dairy shall be near (within one hour of) dusk. [District Rule 2201]
10. Open corrals at this dairy shall be equipped with shade structures. [District Rule 2201]
11. 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]
12. Permittee shall flush, scrape or vacuum freestall lanes immediately prior to, immediately after or during each milking. [District Rule 4570]
13. Permittee shall maintain records sufficient to demonstrate that freestall lanes are flushed, scraped or vacuumed immediately prior to, immediately after or during each milking. [District Rule 4570]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

14. 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]
15. 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]
16. Permittee shall inspect water pipes and troughs and repair leaks at least once every seven (7) days. [District Rule 4570]
17. Permittee shall maintain records demonstrating that water pipes and troughs are inspected and leaks are repaired at least once every seven (7) days. [District Rule 4570]
18. 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]
19. 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]
20. 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]
21. 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]
22. 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]
23. 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]
24. Permittee shall sprinkle water over at least 48% of area of the unpaved area of the heifer corrals. Sprinkling rate shall match with the local wet soil evaporation rate (70-80% of the local wet pan evaporation rate) to keep sufficient moisture content in the surface of the corrals. Sprinkling of corrals is not required during wet conditions. [District Rule 2201]
25. Sprinklers or water trucks shall be designed to spray the corrals uniformly to prevent inconsistent distribution of water. [District Rule 2201]
26. Permittee shall maintain records of the daily local evaporation rate/soil evaporation rate and the amount of water (inches or cm) applied to the corral surface. Records of sprinkler run time and flow rate may be used to satisfy this requirement. [District Rule 2201]
27. Permittee shall install all shade structures uphill of any slope in the corral. [District Rules 2201 and 4570]
28. Inspection for potholes or other sources of emissions shall be performed on a monthly basis. [District Rule 2201]
29. Firm, stable, and not easily eroded soils shall be used for the exercise pens. [District Rule 2201]
30. A supply of fill soil shall be kept on site in order to fill areas where erosion and gouging occurs. This will help fill areas where puddles may form. This fill soil shall be covered with a tarp. [District Rule 2201]
31. Clean rainfall runoff shall be diverted around exercise pens to reduce the amount of water that is potentially detained on the corral surface. [District Rule 2201]
32. 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]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

33. Permittee shall measure and document the depth of manure in the corrals at least once every ninety (90) days. [District Rule 4570]
34. Permittee shall maintain daily records of the number of milk cows and dry cows at this dairy and shall maintain weekly records of the number of cows at the dairy in each of the following categories: large heifers (15 to 24 months of age); medium heifers (7 to 14 months of age); small heifers (3 to 6 months); baby calves (under 3 months); and mature bulls. [District Rule 2201]
35. 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]
36. 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]
37. Permittee shall keep and maintain all records for a minimum of five (5) years and shall make records available to the APCO and EPA upon request. [District Rule 4570]

APPENDIX C
BACT Guideline

San Joaquin Valley Unified Air Pollution Control District

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

Last Update: XXXX XX, 2015

Emissions Unit: Dairy Cow Housing - Freestall Barns

Pollutant	Achieved in Practice or contained in SIP	Technologically Feasible	Alternate Basic Equipment
PM_{10}	- Concrete feed lanes and walkways; - Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions		
VOC	- Concrete feed lanes and walkways; - Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, Scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning lanes and walkways for support stock (heifers) at least once per day); - Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines; - Properly sloping corrals (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing corrals to maintain a dry surface; - Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions; and - Rule 4570 Measures		
Ammonia	- Concrete feed lanes and walkways; - Flushing the lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, Scraping lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning lanes and walkways for support stock (heifers) at least once per day); - Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines; - Properly sloping corrals (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing corrals to maintain a dry surface; and - Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions;		

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

***This is a Summary Page for this Class of Source** **XXX Quarter 2015**

San Joaquin Valley Unified Air Pollution Control District

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

Last Update: XXXX XX, 2015

Emissions Unit: Dairy Cow Housing - Open Corrals

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

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

***This is a Summary Page for this Class of Source** **XXX Quarter 2015**

APPENDIX D
BACT Analysis

Top-Down BACT Analysis for the Cow Housing Permit Unit: Dairy Freestall Barns and Open Corrals

1. BACT Analysis for PM_{10} Emissions from Dairy Freestall Barns and Open Corrals:

a. Step 1 - Identify all control technologies

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

Freestall Barns

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

Open Corrals

1) Design and Management Practices
   - Concrete feed lanes and walkways
   - Scraping of open corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions
   - Shade structures in open corrals
   - Feeding heifers in corrals near dusk (within 1 hour of dusk)
   - Windbreaks controlling dust from corrals (when feasible and there is adequate space at existing facilities)
   - Sprinklers for dust control in corrals

Description of Control Technologies

Concrete Feedlanes and Walkways

Dairy animals are typically housed in freestall barns or open corrals. In a freestall barn, the milk and dry cows are grouped in large pens with free access to feed bunks, water, and stalls for resting, and exercise corral areas. An open corral is a large open area where cows are confined with unlimited access to feed and water.

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

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

As stated above, dairy animals are typically housed in freestall barns or open corrals. The surface of the corrals and freestall exercise pens is composed of earth and deposited manure, both of which have the potential for particulate matter emissions either as a result of wind or animal movement. Frequent scraping of corral surfaces will reduce the amount of dry manure on the corral surfaces that may be pulverized by the cows' hooves and emitted as PM_{10}.

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

Shade Structures in Open Corrals

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

Feeding Heifers in Corrals Near Dusk (within 1 hour of dusk)

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

Shelterbelts/Windbreaks Controlling Dust from Corrals

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

There may be instances where windbreaks are not practical or feasible for a particular operation such as existing dairy facilities that is expanding but lacks adequate space for a windbreak or when there is insufficient water for establishment of a windbreak. Windbreaks will not be required if an operation demonstrates satisfactorily that they are infeasible or impractical for the particular operation.

Sprinklers in Corrals

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

instances of disease. Excessive moisture also increases the chances of mastitis. For these reasons, sprinkler systems are not commonly used to control dust at dairies.

b. Step 2 - Eliminate technologically infeasible options

Windbreaks controlling dust from corrals

The facility submitted an agronomic soil analysis report (see Appendix J) that indicated vegetative windbreaks could not be sustained at the facility. Therefore, windbreaks will be eliminated as a technologically infeasible option.

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.

Freestall Barns

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

Open Corrals

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

d. Step 4 - Cost Effectiveness Analysis

Freestall Barns

1. Design and Management Practices
   - Concrete feed lanes and walkways
   - Scraping of exercise pens every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions

Open Corrals

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

The options above are all achieved in practice; therefore a cost analysis is not required.

e. Step 5 - Select BACT

BACT for PM_{10} from freestall barns is satisfied with:
1) Concrete feed lanes and walkways;
2) Scraping exercise pens every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions

BACT for PM_{10} from open corrals is satisfied with:
1) Concrete feed lanes and walkways
2) Scraping of open corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions
3) Shade structures in open corrals
4) Feeding heifers in corrals near dusk (within 1 hour of dusk)
5) Sprinklers for dust control in corrals

2. BACT Analysis for VOC Emissions from Dairy Freestall Barns and Open Corrals:

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 will be estimated based on the control efficiencies of similar processes and engineering judgment. Unless specifically noted, for practices required to reduce VOC emissions, a 10% control efficiency will be assumed for the specific portion of the emission source or process affected by the measure.

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

1) Feed and Manure Management Practices
   - Concrete feed lanes and walkways
   - Frequent Cleaning of feed lanes and walkways
     a) Feed lanes and walkways for mature cows (milk and dry cows) flushed four times per day. Feed lanes and walkways for support stock (heifers) flushed at least once per day; or
     b) Feed lanes and walkways for mature cows (milk and dry cows) scraped four times per day with an automatic scraper. Feed lanes and walkways for support stock (heifers) cleaned at least once per day; or
     c) Feed lanes and walkways for mature cows (milk and dry cows) scraped four times per day with a tractor/skid steer. Feed lanes and walkways for support stock (heifers) cleaned at least once per day; or
     d) Feed lanes and walkways for mature cows (milk and dry cows) vacuumed four times per day. Feed lanes and walkways for support stock (heifers) cleaned at least once per day;
   - All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines
   - Exercise pens and open corrals properly sloped to promote drainage (minimum of 3% slope where the available space for each animal is 400 square feet or less

and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal), or managed to maintain a dry surface (except during periods of rainy weather)
- Scraping of exercise pens and open corrals every two weeks using a pull-type scraper in the morning hours except when prevented by wet conditions
- VOC mitigation measures required by District Rule 4570

Description of Control Technologies

1) Feed and Manure Management Practices

Concrete Feed Lanes and Walkways

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

Frequent Cleaning of Feed Lanes and Walkways

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

In addition to cleaning the corral and freestall feed lanes and walkways, the flush, scrape, and vacuum systems also serve as an emission control for reducing VOC emissions. The manure deposited in the lanes, which is a source of VOC emissions, is removed from the cow housing area by the flush, scrape, or vacuum system. Flush systems also reduce PM_{10} and ammonia emissions. Additionally, many of the VOCs emitted from fresh cow manure, such as alcohols (ethanol and methanol) and

many Volatile Fatty Acids (VFAs), are highly soluble in water. Therefore, when a flush system is used, a large percentage of these compounds will dissolve in the flush water and will not be emitted from the cow housing permit unit. The flush water can then carry the manure and the dissolved volatile compounds to an anaerobic treatment lagoon or other manure stabilization process for treatment.

It must be noted that the system for cleaning the lanes and walkways will only control the VOCs emitted from the manure it will have little or no effect on enteric emissions produced from the cows' digestive processes. As stated above, the feed lanes and walkways in the cow housing areas are typically cleaned twice per day. Cleaning the lanes four times per day will increase the frequency that manure is removed from the cow housing permit unit. Although the control efficiency for VOCs may actually be much higher, increasing the cleaning frequency of the lanes will be conservatively assumed to have a control efficiency of 10% for VOCs emitted from manure until better data becomes available.

Animals Fed in Accordance with (NRC) or other District-Approved Guidelines

Nutritional management of dairy feed is routinely practiced to improve milk production and herd health. The potential for VOC emissions can be reduced by reducing the quantity of undigested nutrients in the manure. Many of the VOCs emitted from Confined Animal Facilities, including dairies, originate from the decomposition of undigested protein in animal waste.[5] This undigested protein also produces ammonia and hydrogen sulfide emissions. The level of microbial action in the manure corresponds to the level of organic nitrogen content in the manure; the lower the level of nitrogen the lower the level of microbial action and the lower the production of VOCs, ammonia, and hydrogen sulfide.

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

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

---

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

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

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

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

b. Step 2 - Eliminate Options

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

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) Feed and Manure Management Practices
   - Concrete feed lanes and walkways
   - Frequent cleaning of feed lanes and walkways
     Flushing is generally the most effective method of using frequent cleaning of the lanes to reduce emissions; however, because some dairies may be unable to flush at increased frequencies because of water constraints, use of automatic scraping system will be allowed when dairies demonstrate that they are unable to flush at increased frequencies.
     a) Feed lanes and walkways for mature cows (milk and dry cows) flushed four times per day. Feed lanes and walkways for support stock (heifers) flushed at least once per day; or
     b) For dairies that are not able to use a flush system, Feed lanes and walkways for mature cows (milk and dry cows) scraped four times per day with an automatic scraper (or equivalent). Feed lanes and walkways for support stock (heifers) cleaned at least once per day
   - All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines

- Exercise pens and open corrals properly sloped to promote drainage (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal), or managed to maintain a dry surface (except during periods of rainy weather)
- Scraping of exercise pens and open corrals every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions
- VOC mitigation measures required by District Rule 4570

d. Step 4 - Cost Effectiveness Analysis

Feed and Manure Management Practices:

- Concrete feed lanes and walkways
- Feed lanes and walkways for mature cows (milk and dry cows) flushed four times per day and Feed lanes and walkways for support stock (heifers) flushed at least once per day; or for dairies that are not able to use a flush system, Feed lanes and walkways for mature cows scraped four times per day with an automatic scraper (or equivalent) and Feed lanes and walkways for support stock (heifers) cleaned at least once per day
- All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines
- Exercise pens and open corrals properly sloped to promote drainage (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal), or managed to maintain a dry surface (except during periods of rainy weather)
- Scraping of exercise pens and open corrals every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions
- VOC mitigation measures required by District Rule 4570

The options above are all achieved in practice; therefore a cost analysis is not required.

e. Step 5 - Select BACT

BACT for VOC from Dairy Freestall Barns and Open Corrals is:

1) Concrete feed lanes and walkways;
2) Flushing the feed lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing feed lanes and walkways for the remaining animals once per day (or for dairies that cannot use a flush system, Scraping feed lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning feed lanes and walkways for support stock (heifers) at least once per day);
3) Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
4) Properly sloping corrals (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing corrals to maintain a dry surface; and

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

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

2. BACT Analysis for NH_3 Emissions from Dairy Freestall Barns and Open Corrals:

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.

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

1) Feed and Manure Management Practices
   - Concrete feed lanes and walkways
   - Frequent Cleaning of feed lanes and walkways
     a) Feed lanes and walkways for mature cows (milk and dry cows) flushed four times per day. Feed lanes and walkways for support stock (heifers) flushed at least once per day; or
     b) Feed lanes and walkways for mature cows (milk and dry cows) scraped four times per day with an automatic scraper. Feed lanes and walkways for support stock (heifers) cleaned at least once per day; or
     c) Feed lanes and walkways for mature cows (milk and dry cows) scraped four times per day with a tractor/skid steer. Feed lanes and walkways for support stock (heifers) cleaned at least once per day; or
     d) Feed lanes and walkways for mature cows (milk and dry cows) vacuumed four times per day. Feed lanes and walkways for support stock (heifers) cleaned at least once per day;
   - All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines
   - Exercise pens and open corrals properly sloped to promote drainage (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal), or managed to maintain a dry surface (except during periods of rainy weather)
   - Scraping of exercise pens and open corrals every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions

Description of Control Technologies

1) Feed and Manure Management Practices

Concrete Feed Lanes and Walkways

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

Frequent Cleaning of Feed Lanes and Walkways

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

In addition to cleaning the corral and freestall feed lanes and walkways, the flush, scrape, and vacuum systems also serve as an emission control for reducing emissions. The manure deposited in the lanes, which is a source of NH_3 emissions, is removed from the cow housing area by the flush, scrape, or vacuum system. Additionally, ammonia is highly soluble in water. Therefore, when a flush system is used, a large portion of ammonia will be flushed away with the flush water and will not be emitted from the cow housing permit unit.

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

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

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

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

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

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

b. Step 2 - Eliminate technologically infeasible options

There are no technologically infeasible options to eliminate from step 1. However, the following options will be eliminated from consideration because the emissions from increased use of tractors are expected to offset the benefits of any NH_3 reductions from these practices.

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) Feed and Manure Management Practices
- Concrete feed lanes and walkways
- Frequent cleaning of feed lanes and walkways
  Cleaning lanes by frequent flushing is much more effective at reducing ammonia emissions than frequent scraping; however, because some dairies may be unable to flush at increased frequencies because of water constraints, use of automatic scarping system will be allowed when dairies demonstrate that they are unable to flush at increased frequencies.

a) Feed lanes and walkways for mature cows (milk and dry cows) flushed four times per day. Feed lanes and walkways for support stock (heifers) flushed at least once per day; or
b) For dairies that are not able to use a flush system, Feed lanes and walkways for mature cows (milk and dry cows) scraped four times per day with an automatic scraper (or equivalent). Feed lanes and walkways for support stock (heifers) cleaned at least once per day

- All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines
- Exercise pens and open corrals properly sloped to promote drainage (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal), or managed to maintain a dry surface (except during periods of rainy weather)
- Scraping of exercise pens and open corrals every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions

d. Step 4 - Cost Effectiveness Analysis

The options above are all achieved in practice; therefore a cost analysis is not required.

e. Step 5 - Select BACT

BACT for NH_3 from Dairy Freestall Barns and Open Corrals is:

1) Concrete feed lanes and walkways;
2) Flushing the feed lanes and walkways for the mature cows (milk and dry cows) four times per day and flushing feed lanes and walkways for the remaining animals at least once per day (or for dairies that cannot use a flush system, Scraping feed lanes and walkways for mature cows with an automatic scraper (or equivalent) four times per day and cleaning feed lanes and walkways for support stock (heifers) at least once per day);
3) Feeding all animals in accordance with National Research Council (NRC) or other District-approved guidelines;
4) Properly sloping corrals (minimum of 3% slope where the available space for each animal is 400 square feet or less and minimum of 1.5% where the available space for each animal is more than 400 square feet per animal) or managing corrals to maintain a dry surface; and
5) Scraping of exercise pens and open corrals every two weeks using pull-type scraper in the morning hours except when prevented by wet conditions

APPENDIX E
HRA/AAQA Summary

Revised
San Joaquin Valley Air Pollution Control District
Risk Management Review

To:	John Yoshimura – Permit Services
From:	Kyle Melching – Technical Services
Date:	December 23, 2015
Facility Name:	Philip Verwey Farms #2
Location:	19765 13th Ave. Hanford, CA 93230
Application #(s):	C-6817-2-4
Project #:	C-1151019

A. RMR SUMMARY

RMR Summary			
Categories	**Cow Housing (Unit 2-4)**	**Project Totals**	**Facility Totals**
Prioritization Score	2.57	2.57	>1
Acute Hazard Index	0.11	0.11	0.46
Chronic Hazard Index	0.04	0.04	0.06
Maximum Individual Cancer Risk	3.35E-7	3.35E-7	2.01E-06
T-BACT Required?	**No**		
Special Permit Conditions?	**No**		

[1]The Maximum Cancer Risk was not calculated since there is no risk factor or the risk factor is so low that it has been determined to be insignificant for this type of unit.

B. RMR REPORT

I. Project Description

Technical Services received a request on December 22, 2015, to perform a Risk Management Review (RMR) and Ambient Air Quality Analysis (AAQA) for a proposed modification to a dairy operation. The District evaluated the same proposed expansion in project C-1120348. However, the facility has proposed to remove downwind shelterbelts as a requirement. This project will evaluate the increase in emissions as a result of removing the windbreaks and using updated PM10 emission factors for sprinkling of the corrals. This project will also evaluate the milk parlor increase from project C-1120348 since that modification had been deleted and updated to 1-4. Ammonia emissions from the dry manure storage and land application will also be under review since those emissions were not evaluated in the previous project. Lastly, the project engineer has stated that upon

completion of this project unit modification 2-3 will be deleted; therefore, emissions associated with the total number of head being introduced into the dairy will be re-evaluated.

II. Analysis

Technical Services performed a prioritization using the District's HEARTs database. Since the total facility prioritization score was greater than one, a refined health risk assessment was required. Emissions calculated using the District's DICE database and District-developed spreadsheets for dairies were input into the HEARTs database. AERMOD was used, with the parameters outlined below and meteorological data for 2009-2013 from Hanford to determine the dispersion factors (i.e., the predicted concentration or X divided by the normalized source strength or Q) for a receptor grid. These dispersion factors were input into the San Joaquin Valley APCD's Hazard Assessment and Reporting Program (SHARP) and the Air Dispersion Modeling and Risk Tool (ADMRT) of the Hot Spots Analysis and Reporting Program Version 2 (HARP 2) to calculate the chronic and acute hazard indices and the carcinogenic risk for the project. The risk associated with the milk parlor (Unit 1) was assigned to project C-1123453. The risk from the dairy dry manure handling and land application was added to the risk for the cow housing modification 2-4 for this project. Unit modification 2-4 also includes the total herd size increase, PM10, and ammonia increases associated with the housing unit.

The following parameters were used for the review:

Diary Mod	# of Cows	PM10 (lb/hr)	PM10 (lb/yr)	Ammonia (lb/hr)	Ammonia (lb/yr)
Milk	5,200*	N/A	N/A	0.1	711
Housing	8,554*	2.53	22,131	15.28	133,814
Dry Manure	N/A	N/A	N/A	2.05	17,939
Land Application	N/A	N/A	N/A	3.77	33,033

*Used to calculate VOC emissions

Analysis Parameters Unit 2-4 Cow Housing			
Source Type	Area	**Location Type**	Rural
Approx. Area (m^2)	478,684	**Release Height (m)**	1

AAQA. In addition to the RMR, Technical Services performed modeling for the criteria pollutant PM_{10} using AERMOD. The emission rate used was 22,131 lb PM_{10}/year. The results from the Criteria Pollutant Modeling are as follows:

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

Category	24 Hours	Annual
Net Value	6.69	0.59
Interim Significance Level	10.4[1]	2.08[1]
Result	Pass	Pass

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

III. Conclusion

The acute and chronic indices are below 1.0 and the cancer risk associated with the project is less than 1.0 in a million. **In accordance with the District's Risk Management Policy, the project is approved without Toxic Best Available Control Technology (T-BACT).**

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.

IV. Attachments

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

APPENDIX F
Dairy Emissions Calculator

Rev. January 5, 2015

Pre-Project Facility Information

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

Pre-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals
Milk Cows	4,800				4,800
Dry Cows			960		960
Support Stock (Heifers and Bulls)			5,194		5,194
Large Heifers					0
Medium Heifers					0
Small Heifers					0
Bulls					0

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

Total Herd Summary

Total Milk Cows	4,800
Total Mature Cows	5,760
Support Stock (Heifers and Bulls)	5,194
Total Calves	0
Total Dairy Head	10,954

Pre-Project Silage Information

Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	1	30	150
Alfalfa			
Wheat	1	30	150

Post-Project Facility Information

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

Post-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals
Milk Cows	10,000				10,000
Dry Cows			2,000		2,000
Support Stock (Heifers and Bulls)			7,508		7,508
Large Heifers					0
Medium Heifers					0
Small Heifers					0
Bulls					0

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

Total Herd Summary

Total Milk Cows	10,000
Total Mature Cows	12,000
Support Stock (Heifers and Bulls)	7,508
Total Calves	0
Total Dairy Head	19,508

Post-Project Silage Information

Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn	1	30	150
Alfalfa			
Wheat	1	30	150

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

VOC Mitigation Measures and Control Efficiencies

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

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

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

Liquid Manure Handling				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	VOC Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Lagoons/Storage Ponds Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%
☐	☐	Use phototropic lagoon	0%	0%
☑	☑	Use an anaerobic treatment lagoon designed according to NRCS Guideline No. 359	40%	40%
☑	☑	Remove solids from the waste system with a solid separator system, prior to the waste entering the lagoon. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF.	0%	0%
☐	☐	Maintain lagoon pH between 6.5 and 7.5	0%	0%
		Total Control Efficiency	46.00%	46.00%
		Liquid Manure Land Application Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%
☐	☐	Only apply liquid manure that has been treated with an anaerobic or aerobic treatment lagoon, aerobic lagoon, or digester system	0%	0%
☑	☑	Allow liquid manure to stand in the fields for no more than 24 hours after irrigation. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF.	0%	0%
☐	☐	Apply liquid/slurry manure via injection with drag hose or similar apparatus	0%	0%
		Total Control Efficiency	10.00%	10.00%

Solid Manure Handling				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	VOC Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Solid Manure Storage Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%
☑	☑	Within 72 hours of removal from housing, either a) remove dry manure from the facility, or b) cover dry manure outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed 24 hours per event.	10%	10%
		Total Control Efficiency	19.00%	19.00%
		Separated Solids Piles Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%
☑	☑	Within 72 hours of removal from the drying process, either a) remove separated solids from the facility, or b) cover separated solids outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed 24 hours per event.	10%	10%
		Total Control Efficiency	19.00%	19.00%
		Solid Manure Land Application Mitigations		
☑	☑	Feed according to NRC guidelines	10%	10%
☑	☑	Incorporate all solid manure within 72 hours of land application. Note: If selected for dairies > 999 milk cows, control efficiency is already included in EF. Note: No additional control given for rapid manure incorporation (e.g. BACT requirement).	0%	0%
☐	☐	Only apply solid manure that has been treated with an anaerobic treatment lagoon, aerobic lagoon or digester system.	0%	0%
☐	☐	Apply no solid manure with a moisture content of more than 50%	0%	0%
		Total Control Efficiency	10.00%	10.00%

Silage and TMR				
Measure Proposed?		Mitigation Measure(s) per Emissions Point	VOC Control Efficiency (%)	
Pre-Project	Post-Project		Pre-Project	Post-Project
		Corn/Alfalfa/Wheat Silage Mitigations		
		1. Utilize a sealed feed storage system (e.g. Ag-Bag) for bagged silage, or 2. Cover the surface of silage piles, except for the area where feed is being removed from the pile, with a plastic tarp that is at least 5 mils thick (0.005 inches), multiple plastic tarps with a cumulative thickness of at least 5 mils (0.005 inches), or an oxygen barrier film covered with a UV resistant material within 72 hours of last delivery of material to the pile, and implement one of the following:		

☑	☑	a) build silage piles such that the average bulk density is at least 44 lb/cu-ft for corn silage and 40 lb/cu-ft for other silage types, as measured in accordance with Section 7.10 of Rule 4570, b) when creating a silage pile, adjust filling parameters to assure a calculated average bulk density of at least 44 lb/cu-ft for corn silage and at least 40 lb/cu-ft for other silage types, using a spreadsheet approved by the District, c) harvest silage crop at > or = 65% moisture for corn; and >= 60% moisture for alfalfa/grass and other silage crops; manage silage material delivery such that no more than 6 inches of materials are uncompacted on top of the pile; and incorporate the applicable Theoretical Length of Chop (TLC) and roller opening for the crop being harvested. For dairies - implement two of the following: For heifer/calf ranches - implement one of the following: Manage Exposed Silage. a) manage silage piles such that only one silage pile has an uncovered face and the uncovered face has a total exposed surface area of less than 2,150 sq. ft., or b) manage multiple uncovered silage piles such that the total exposed surface area of all silage piles is less than 4,300 sq ft. Maintain Silage Working Face. a) use a shaver/facer to remove silage from the silage pile, or b) maintain a smooth vertical surface on the working face of the silage pile Silage Additive: a) inoculate silage with homolactic acid bacteria in accordance with manufacturer recommendations to achieve a concentration of at least 100,000 colony forming units per gram of wet forage or apply proprionic acid, benzoic acid, sorbic acid, sodium benzoate, or potassium sorbate at a rate specified by the manufacturer to reduce yeast counts when forming silage pile; or b) apply other additives at specified rates that have been demonstrated to reduce alcohol concentrations in silage and/or VOC emissions from silage and have been approved by the District and EPA.	39.0%	39.0%
		Total Control Efficiency*	39.00%	39.00%

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

		TMR Mitigations		
☑	☑	**(D)** Push feed so that it is within 3 feet of feedlane fence within 2 hrs of putting out the feed or use a feed trough or other feeding structure designed to maintain feed within reach of the cows.	10%	10%
☑	☑	**(D)** Begin feeding total mixed rations within 2 hrs of grinding and mixing rations. Note: If selected for dairies > 999 milk cows, control efficiency already included in EF.	0%	0%
☐	☐	Feed steam-flaked, dry rolled, cracked or ground corn or other ground cereal grains.	0%	0%
☑	☑	Remove uneaten wet feed from feed bunks within 24 hrs after then end of a rain event.	10%	10%
☐	☐	**(D)** For total mixed rations that contain at least 30% by weight of silage, feed animals total mixed rations that contain at least 45% moisture.	0%	0%
☐	☐	Feed according to NRC guidelines. Note: If selected for dairies, control efficiency already included in EF.	0%	0%
		Total Control Efficiency	19.00%	19.00%

Ammonia Mitigation Measures and Control Efficiencies

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

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

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

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

PM10 Mitigation Measures and Control Efficiencies

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

Pre-Project PM10 Mitigation Measures

Pre-Project PM10 Mitigation Measures

	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows	# of Combined Housing Units in row	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk
1	Milk Freestall	freestall	milk cows	4,800		☐	☐	☐	☐	☐	☐	☑	☐	☐
2	Dry Corral	open corral	dry cows	960		☑	☐	☐	☐	☐	☐	☑	☑	☐
3	Support Corral	open corral	support stock	5,194		☑	☐	☐	☐	☐	☐	☑	☑	☑
			Pre-Project Total # of Cows	10,954										

Pre-Project PM10 Control Efficiencies and Emission Factors

	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows	Uncontrolled EF (lb/hd-yr)	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk	Controlled EF (lb/hd-yr)
1	Milk Freestall	freestall	milk cows	4,800	1.370							15%			1.17
2	Dry Corral	open corral	dry cows	960	5.460	16.7%						15%	24%		2.94
3	Support Corral	open corral	support stock	5,194	10.550	8.3%						15%	24%	10%	5.63
			Pre-Project Total # of Cows	10,954											

Post-Project PM10 Mitigation Measures

Post-Project PM10 Mitigation Measures

	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows	# of Combined Housing Units in row	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk
1	Milk Freestall	freestall	milk cows	10,000		☐	☐	☐	☐	☐	☐	☑	☐	☐
2	Dry Corral	open corral	dry cows	2,000		☑	☐	☐	☐	☐	☐	☑	☑	☐
3	Support Corral	open corral	support stock	7,508		☑	☐	☐	☐	☐	☐	☑	☑	☑

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

	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows	# of Combined Housing Units in row	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk
			Post-Project Total # of Cows	19,508										

Post-Project PM10 Control Efficiencies and Emission Factors

	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows	Uncontrolled EF (lb/hd-yr)	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk	Controlled EF (lb/hd-yr)
1	Milk Freestall	freestall	milk cows	10,000	1.370							15%			1.17
2	Dry Corral	open corral	dry cows	2,000	5.460	16.7%						15%	24%		2.94
3	Support Corral	open corral	support stock	7,508	10.550	8.3%						15%	24%	10%	5.63

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

	Housing Name(s) or #(s)	Type of Housing	Type of cow	Total # of cows	Uncontrolled EF (lb/hd-yr)	Shaded Corrals	Downwind Shelterbelts	Upwind Shelterbelts	No exercise pens, non manure bedding	No exercise pens, manure bedding	Fibrous layer	Bi-weekly scraping Corrals/Pens	Sprinkling Corrals/Pens	Feed Young Stock Near Dusk	Controlled EF (lb/hd-yr)

lb/hd-yr Emissions Factors for Holstein Cows																															
			Milk Cows				Dry Cows				Large Heifers (15 to 24 months)				Medium Heifers (7 to 14 months)				Small Heifers (3 to 6 months)				Calves (0 - 3 months)				Bulls			
			Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled	
			<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2	<1000 milk cows	≥1000 milk cows	EF1	EF2
Milking Parlor	VOC	Enteric Emissions in Milking Parlors	0.43	0.41	0.37	0.37	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
		Milking Parlor Floor	0.04	0.03	0.03	0.03	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
		Total	**0.47**	**0.44**	**0.40**	**0.40**	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
	NH3	**Total**	**0.19**	**0.19**	**0.14**	**0.14**	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-		-	-	-		-	-	-
Cow Housing	VOC	Enteric Emissions in Cow Housing	3.69	3.69	3.32	3.32	2.33	2.23	2.01	2.01	1.81	1.71	1.54	1.54	1.23	1.17	1.05	1.05	0.69	0.65	0.58	0.58	0.32	0.31	0.28	0.28	1.10	1.04	0.94	0.94
		Corrals/Pens	10.00	9.60	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	2.55	1.67	1.29	1.29
		Bedding	1.05	1.00	0.81	0.81	0.57	0.54	0.44	0.44	0.44	0.42	0.34	0.34	0.30	0.28	0.23	0.23	0.17	0.16	0.13	0.13	0.08	0.08	0.06	0.06	0.27	0.25	0.20	0.20
		Lanes	0.64	0.60	0.65	0.65	0.45	0.44	0.35	0.35	0.35	0.33	0.27	0.27	0.24	0.23	0.18	0.18	0.13	0.13	0.10	0.10	0.06	0.06	0.05	0.05	0.21	0.20	0.16	0.16
		Total	**15.78**	**12.09**	**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**	**4.13**	**3.16**	**2.59**	**2.59**
	NH3	Enteric Emissions in Cow Housing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Corrals/Pens	41.90	41.90	15.08	15.08	21.20	21.20	7.63	7.63	11.00	11.00	3.96	3.96	7.90	7.90	2.84	2.84	6.00	6.00	2.16	2.16	1.80	1.80	0.65	0.65	15.30	15.30	5.51	5.51
		Bedding	6.30	6.30	2.37	2.37	3.20	3.20	1.20	1.20	1.70	1.70	0.64	0.64	1.20	1.20	0.45	0.45	0.90	0.90	0.34	0.34	0.30	0.30	0.11	0.11	2.30	2.30	0.87	0.87
		Lanes	5.10	5.10	3.67	3.67	2.60	2.60	1.87	1.87	1.30	1.30	0.94	0.94	1.00	1.00	0.72	0.72	0.70	0.70	0.50	0.50	0.20	0.20	0.14	0.14	1.90	1.90	1.37	1.37
		Total	**53.30**	**53.30**	**21.13**	**21.13**	**27.00**	**27.00**	**10.71**	**10.71**	**14.00**	**14.00**	**5.54**	**5.54**	**10.10**	**10.10**	**4.02**	**4.02**	**7.60**	**7.60**	**3.00**	**3.00**	**2.30**	**2.30**	**0.90**	**0.90**	**19.50**	**19.50**	**7.74**	**7.74**
Liquid Manure Handling	VOC	Lagoons/Storage Ponds	1.52	1.30	0.70	0.70	0.82	0.71	0.38	0.38	0.64	0.54	0.29	0.29	0.43	0.37	0.20	0.20	0.24	0.21	0.11	0.11	0.11	0.10	0.05	0.05	0.40	0.33	0.18	0.18
		Liquid Manure Land Application	1.64	1.40	1.26	1.26	0.89	0.76	0.69	0.69	0.69	0.58	0.53	0.53	0.47	0.40	0.36	0.36	0.26	0.22	0.20	0.20	0.12	0.11	0.10	0.10	0.42	0.35	0.32	0.32
		Total	**3.16**	**2.70**	**1.96**	**1.96**	**1.71**	**1.47**	**1.07**	**1.07**	**1.33**	**1.13**	**0.82**	**0.82**	**0.90**	**0.77**	**0.56**	**0.56**	**0.51**	**0.43**	**0.31**	**0.31**	**0.24**	**0.21**	**0.15**	**0.15**	**0.82**	**0.68**	**0.49**	**0.49**
	NH3	Lagoons/Storage Ponds	8.20	8.20	1.18	1.18	4.20	4.20	0.60	0.60	2.20	2.20	0.32	0.32	1.50	1.50	0.22	0.22	1.20	1.20	0.17	0.17	0.35	0.35	0.05	0.05	3.00	3.00	0.43	0.43
		Liquid Manure Land Application	8.90	8.90	3.72	3.72	4.50	4.50	1.88	1.88	2.30	2.30	0.96	0.96	1.70	1.70	0.71	0.71	1.30	1.30	0.54	0.54	0.37	0.37	0.15	0.15	3.23	3.23	1.35	1.35
		Total	**17.10**	**17.10**	**4.90**	**4.90**	**8.70**	**8.70**	**2.48**	**2.48**	**4.50**	**4.50**	**1.28**	**1.28**	**3.20**	**3.20**	**0.93**	**0.93**	**2.50**	**2.50**	**0.72**	**0.72**	**0.72**	**0.72**	**0.20**	**0.20**	**6.23**	**6.23**	**1.78**	**1.78**
Solid Manure Handling	VOC	Solid Manure Storage	0.16	0.15	0.12	0.12	0.09	0.08	0.07	0.07	0.07	0.06	0.05	0.05	0.05	0.04	0.03	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.04	0.04	0.03	0.03
		Separated Solids Piles	0.06	0.06	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02
		Solid Manure Land Application	0.39	0.33	0.30	0.30	0.21	0.18	0.16	0.16	0.16	0.14	0.12	0.12	0.11	0.09	0.08	0.08	0.06	0.05	0.05	0.05	0.03	0.03	0.02	0.02	0.10	0.08	0.07	0.07
		Total	**0.61**	**0.54**	**0.47**	**0.47**	**0.33**	**0.29**	**0.25**	**0.25**	**0.26**	**0.23**	**0.20**	**0.20**	**0.17**	**0.15**	**0.13**	**0.13**	**0.10**	**0.09**	**0.07**	**0.07**	**0.05**	**0.04**	**0.04**	**0.04**	**0.16**	**0.14**	**0.12**	**0.12**
	NH3	Solid Manure Storage	0.95	0.95	0.95	0.95	0.48	0.48	0.48	0.48	0.25	0.25	0.25	0.25	0.18	0.18	0.18	0.18	0.13	0.13	0.13	0.13	0.04	0.04	0.04	0.04	0.35	0.35	0.35	0.35
		Separated Solids Piles	0.38	0.38	0.38	0.38	0.19	0.19	0.19	0.19	0.10	0.10	0.10	0.10	0.07	0.07	0.07	0.07	0.05	0.05	0.05	0.05	0.02	0.02	0.02	0.02	0.14	0.14	0.14	0.14
		Solid Manure Land Application	2.09	2.09	1.50	1.50	1.06	1.06	0.76	0.76	0.55	0.55	0.40	0.40	0.39	0.39	0.28	0.28	0.30	0.30	0.22	0.22	0.09	0.09	0.06	0.06	0.76	0.76	0.55	0.55
		Total	**3.42**	**3.42**	**2.83**	**2.83**	**1.73**	**1.73**	**1.43**	**1.43**	**0.90**	**0.90**	**0.75**	**0.75**	**0.64**	**0.64**	**0.53**	**0.53**	**0.48**	**0.48**	**0.40**	**0.40**	**0.15**	**0.15**	**0.12**	**0.12**	**1.25**	**1.25**	**1.04**	**1.04**

Silage and TMR (Total Mixed Ration) Emissions (µg/m^2-min)					
		Silage Type	Uncontrolled	EF1	EF2
Feed Storage and Handling	VOC	Corn Silage	34,661	21,155	21,155
		Alfalfa Silage	17,458	10,649	10,649
		Wheat Silage	43,844	26,745	26,745
		TMR	13,056	10,575	10,575

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

PM_{10} Emission Factors (lb/hd-yr)		
Type of Cow	Dairy EF	Source
Cows in Freestalls	1.37	Based on a Summer 2003 study by Texas A&M ASAE at a West Texas Dairy
Milk/Dry in Corrals	5.48	Based on a Summer 2003 study by Texas A&M ASAE at a West Texas Dairy
Heifers/Bulls in Open Corrals	10.55	Based on a USDA/UC Davis report quantifying dairy and feedlot emissions in Tulare & Kern Counties (April '01)
Calf (under 3 mo.) open corrals	1.37	SJVAPCD
Calf on-ground hutches	0.343	SJVAPCD
Calf above-ground flushed	0.069	SJVAPCD
Calf above-ground scraped	0.206	SJVAPCD

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

Pre-Project Potential to Emit - Cow Housing

	Pre-Project Potential to Emit - Cow Housing											
	Housing Name(s) or #(s)	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
1	Milk Freestall	milk cows	4,800	9.86	21.128328	1.17	129.7	47,328	277.9	101,416	15.3	5,592
2	Dry Corral	dry cows	960	5.57	10.708992	2.94	14.6	5,347	28.2	10,281	7.7	2,820
3	Support Corral	support stock	5,194	4.27	5.536152	5.63	60.8	22,178	78.8	28,755	80.0	29,216
	Pre-Project Total # of Cows		**10,954**				**205.1**	**74,853**	**384.9**	**140,452**	**103.0**	**37,628**

Pre-Project Totals						
Total # of Cows	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
10,954	205.1	74,853	384.9	140,452	103.0	37,628

Calculations:

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

Post-Project Potential to Emit - Cow Housing

	Post-Project Potential to Emit - Cow Housing											
	Housing Name(s) or #(s)	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
1	Milk Freestall	milk cows	10,000	9.86	21.128328	1.17	270.1	98,600	578.9	211,283	31.9	11,650
2	Dry Corral	dry cows	2,000	5.57	10.708992	2.94	30.5	11,140	58.7	21,418	16.1	5,876
3	Support Corral	support stock	7,508	4.27	5.536152	5.63	87.8	32,059	113.9	41,565	115.7	42,233
	Post-Project # of Cows (non-expansion)		**19,508**				**388.4**	**141,799**	**751.5**	**274,266**	**163.7**	**59,759**

Post-Project Potential to Emit - Cow Housing: New Freestalls at Existing Dairy											
Housing Name(s) or #(s)	Type of Cow	# of Cows	Controlled VOC EF (lb/hd-yr)	Controlled NH3 EF (lb/hd-yr)	Controlled PM10 EF (lb/hd-yr)	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
Total # of Cows From Expansion		0				0.0	0	0.0	0	0.0	0

Post-Project Totals						
Total # of Cows	VOC (lb/day)	VOC (lb/yr)	NH3 (lb/day)	NH3 (lb/yr)	PM10 (lb/day)	PM10 (lb/yr)
19,508	388.4	141,799	751.5	274,266	163.7	59,759

Calculations:

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

Pre-Project Potential to Emit (PE1)

Pre-Project Herd Size					
Herd	**Flushed Freestalls**	**Scraped Freestalls**	**Flushed Corrals**	**Scraped Corrals**	**Total # of Animals**
Milk Cows	4,800	0	0	0	4,800
Dry Cows	0	0	960	0	960
Support Stock (Heifers and Bulls)	0	0	5,194	0	5,194
Large Heifers	0	0	0	0	0
Medium Heifers	0	0	0	0	0
Small Heifers	0	0	0	0	0
Bulls	0	0	0	0	0

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

Silage Information				
Feed Type	**Maximum # Open Piles**	**Maximum Height (ft)**	**Maximum Width (ft)**	**Open Face Area (ft^2)**
Corn	1	30	150	3,407
Alfalfa	0	0	0	
Wheat	1	30	150	3,407

Milking Parlor				
Cow	VOC		NH3	
Milk Cows	lb/day	lb/yr	lb/day	lb/yr
	5.3	1,920	1.8	657

Cow Housing						
Cow	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Total	**205.1**	**74,853**	**384.9**	**140,452**	**103.0**	**37,628**

Liquid Manure Handling						
Cow	VOC		NH3		H2S*	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	25.8	9,408	64.4	23,520	3.2	1,181
Dry Cows	2.8	1,027	6.5	2,381	0.3	121
Support Stock (Heifers and Bulls)	11.7	4,259	18.2	6,648	0.7	238
Large Heifers	0.0	0	0.0	0	0	0
Medium Heifers	0.0	0	0.0	0	0	0
Small Heifers	0.0	0	0.0	0	0	0
Calves	0.0	0	0.0	0	0	0
Bulls	0.0	0	0.0	0	0	0
Total	**40.3**	**14,694**	**89.1**	**32,549**	**4.2**	**1,540**

Solid Manure Handling				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	6.2	2,256	37.2	13,584
Dry Cows	0.7	240	3.8	1,373
Support Stock (Heifers and Bulls)	2.8	1,039	10.7	3,896
Large Heifers	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0
Calves	0.0	0	0.0	0
Bulls	0.0	0	0.0	0
Total	**9.7**	**3,535**	**51.7**	**18,852**

Feed Handling and Storage		
	Daily PE (lb-VOC/day)	Annual PE (lb-VOC/yr)
Corn Emissions	21.2	7,743
Alfalfa Emissions	0.0	0
Wheat Emissions	26.8	9,789
TMR	241.5	88,140
Total	**289.5**	**105,671**

Calculations for milking parlor:

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

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

Calculations for cow housing:

See detailed calculations under Cow Housing Calculations worksheet.

Calculations for liquid manure and solid manure handling:

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

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

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

Calculations for silage emissions:

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

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

Calculation for TMR emissions:

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

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

Calves are not included in TMR calculation.

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

Total Daily Pre-Project Potential to Emit (lb/day)							
Permit	**NOx**	**SOx**	**PM10**	**CO**	**VOC**	**NH3**	**H2S**
Milking Parlor	0.0	0.0	0.0	0.0	5.3	1.8	0.0
Cow Housing	0.0	0.0	103.0	0.0	205.1	384.9	0.0
Liquid Manure	0.0	0.0	0.0	0.0	40.3	89.1	4.2
Solid Manure	0.0	0.0	0.0	0.0	9.7	51.7	0.0
Feed Handling	0.0	0.0	0.0	0.0	289.5	0.0	0.0
Total	**0.0**	**0.0**	**103.0**	**0.0**	**549.9**	**527.5**	**4.2**

Major Source Emissions (lb/yr)					
Permit	**NOx**	**SOx**	**PM10**	**CO**	**VOC**
Milk Parlor	0	0	0	0	0
Cow Housing	0	0	0	0	0
Liquid Manure	0	0	0	0	5,231
Solid Manure	0	0	0	0	0
Feed Handling	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**5,231**

Total Annual Pre-Project Potential to Emit (lb/yr)							
Permit	**NOx**	**SOx**	**PM10**	**CO**	**VOC**	**NH3**	**H2S**
Milking Parlor	0	0	0	0	1,920	657	0
Cow Housing	0	0	37,628	0	74,853	140,452	0
Liquid Manure	0	0	0	0	14,694	32,549	1,540
Solid Manure	0	0	0	0	3,535	18,852	0
Feed Handling	0	0	0	0	105,671	0	0
Total	**0**	**0**	**37,628**	**0**	**200,673**	**192,510**	**1,540**

Post-Project Potential to Emit (PE2)

Post-Project Herd Size					
Herd	**Flushed Freestalls**	**Scraped Freestalls**	**Flushed Corrals**	**Scraped Corrals**	**Total # of Animals**
Milk Cows	10,000	0	0	0	10,000
Dry Cows	0	0	2,000	0	2,000
Support Stock (Heifers and Bulls)	0	0	7,508	0	7,508
Large Heifers	0	0	0	0	0
Medium Heifers	0	0	0	0	0
Small Heifers	0	0	0	0	0
Bulls	0	0	0	0	0

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

Silage Information				
Feed Type	Maximum # Open Piles	Maximum Height (ft)	Maximum Width (ft)	Open Face Area (ft^2)
Corn	1	30	150	3,407
Alfalfa	0	0	0	
Wheat	1	30	150	3,407

Milking Parlor				
Cow	VOC		NH3	
Milk Cows	lb/day	lb/yr	lb/day	lb/yr
Total	**11.0**	**4,000**	**3.7**	**1,368**

Cow Housing						
	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Total	**388.4**	**141,799**	**751.5**	**274,266**	**163.7**	**59,759**

Liquid Manure Handling						
Cow	VOC		NH3		H2S	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	53.7	19,600	134.2	49,000	3.2	1,181
Dry Cows	5.9	2,140	13.6	4,960	0.3	121
Support Stock (Heifers and Bulls)	16.9	6,157	26.3	9,610	0.7	238
Large Heifers	0.0	0	0.0	0	0	0
Medium Heifers	0.0	0	0.0	0	0	0
Small Heifers	0.0	0	0.0	0	0	0
Calves	0.0	0	0.0	0	0	0
Bulls	0.0	0	0.0	0	0	0
Total	**76.5**	**27,897**	**174.1**	**63,570**	**4.2**	**1,540**

Solid Manure Handling				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	12.9	4,700	77.5	28,300
Dry Cows	1.4	500	7.8	2,860
Support Stock (Heifers and Bulls)	4.1	1,502	15.4	5,631
Large Heifers	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0
Calves	0.0	0	0.0	0
Bulls	0.0	0	0.0	0
Total	**18.4**	**6,702**	**100.7**	**36,791**

Feed Handling and Storage		
	Daily PE (lb-VOC/day)	Annual PE (lb-VOC/yr)
Corn Emissions	21.2	7,743
Alfalfa Emissions	0.0	0
Wheat Emissions	26.8	9,789
TMR	430.1	156,968
Total	**478.1**	**174,500**

Calculations for milking parlor:

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

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

Calculations for cow housing:

See detailed calculations under Cow Housing Calculations worksheet.

Calculations for liquid manure and solid manure handling:

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

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

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

Calculations for silage emissions:

Annual PE = (EF2) x (area ft^2) x (0.0929 m^2/ft^2) x (8,760 hr/yr) x (60 min/hr) x 2.20E-9 lb/µg

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

Calculation for TMR emissions:

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

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

Calves are not included in TMR calculation.

Total Daily Post-Project Potential to Emit (lb/day)							
Permit	**NOx**	**SOx**	**PM10**	**CO**	**VOC**	**NH3**	**H2S**
Milking Parlor	0.0	0.0	0.0	0.0	11.0	3.7	0.0
Cow Housing	0.0	0.0	163.7	0.0	388.4	751.5	0.0
Liquid Manure	0.0	0.0	0.0	0.0	76.5	174.1	4.2
Solid Manure	0.0	0.0	0.0	0.0	18.4	100.7	0.0
Feed Handling	0.0	0.0	0.0	0.0	478.1	0.0	0.0
Total	**0.0**	**0.0**	**163.7**	**0.0**	**972.4**	**1,030.0**	**4.2**

Major Source Emissions (lb/yr)					
Permit	**NOx**	**SOx**	**PM10**	**CO**	**VOC**
Milk Parlor	0	0	0	0	0
Cow Housing	0	0	0	0	0
Liquid Manure	0	0	0	0	9,937
Solid Manure	0	0	0	0	0
Feed Handling	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**9,937**

Total Annual Post-Project Potential to Emit (lb/yr)							
Permit	**NOx**	**SOx**	**PM10**	**CO**	**VOC**	**NH3**	**H2S**
Milking Parlor	0	0	0	0	4,000	1,368	0
Cow Housing	0	0	59,759	0	141,799	274,266	0
Liquid Manure	0	0	0	0	27,897	63,570	1,540
Solid Manure	0	0	0	0	6,702	36,791	0
Feed Handling	0	0	0	0	174,500	0	0
Total	**0**	**0**	**59,759**	**0**	**354,897**	**375,995**	**1,540**

BACT Applicability

Milking Parlor					
VOC Emissions					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	11.0	5.3	0.40	0.40	5.7
BACT triggered for VOC for milking parlor				**Total**	**5.7**
NH3 Emissions					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	3.7	1.8	0.14	0.14	1.9
				Total	**1.9**

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

Liquid Manure Handling					
VOC Emissions - Lagoon/Storage Pond(s)					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	19.2	9.2	0.70	0.70	10.0
Dry Cows	2.1	1.0	0.38	0.38	1.1
Support Stock (Heifers and Bulls)	6.0	4.1	0.29	0.29	1.9
Large Heifers	0.0	0.0	0.29	0.29	0.0
Medium Heifers	0.0	0.0	0.20	0.20	0.0
Small Heifers	0.0	0.0	0.11	0.11	0.0
Calves	0.0	0.0	0.05	0.05	0.0
Bulls	0.0	0.0	0.18	0.18	0.0
BACT triggered for VOC for Lagoon/Storage Ponds				**Total**	**13.0**
VOC Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	34.5	16.6	1.26	1.26	17.9
Dry Cows	3.8	1.8	0.69	0.69	2.0
Support Stock (Heifers and Bulls)	10.8	7.5	0.53	0.53	3.3
Large Heifers	0.0	0.0	0.53	0.53	0.0
Medium Heifers	0.0	0.0	0.36	0.36	0.0
Small Heifers	0.0	0.0	0.20	0.20	0.0
Calves	0.0	0.0	0.10	0.10	0.0
Bulls	0.0	0.0	0.32	0.32	0.0
BACT triggered for VOC for Liquid Manure Land Application				**Total**	**23.2**
NH3 Emissions - Lagoon/Storage Pond(s)					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	32.4	15.5	1.18	1.18	16.9
Dry Cows	3.3	1.6	0.60	0.60	1.7
Support Stock (Heifers and Bulls)	6.5	4.5	0.32	0.32	2.0
Large Heifers	0.0	0.0	0.32	0.32	0.0
Medium Heifers	0.0	0.0	0.22	0.22	0.0
Small Heifers	0.0	0.0	0.17	0.17	0.0
Calves	0.0	0.0	0.05	0.05	0.0
Bulls	0.0	0.0	0.43	0.43	0.0
BACT triggered for NH3 for Lagoon/Storage Ponds				**Total**	**20.5**
NH3 Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	101.8	48.9	3.72	3.72	52.9
Dry Cows	10.3	4.9	1.88	1.88	5.4
Support Stock (Heifers and Bulls)	19.8	13.7	0.96	0.96	6.1
Large Heifers	0.0	0.0	0.96	0.96	0.0
Medium Heifers	0.0	0.0	0.71	0.71	0.0
Small Heifers	0.0	0.0	0.54	0.54	0.0
Calves	0.0	0.0	0.15	0.15	0.0
Bulls	0.0	0.0	1.35	1.35	0.0
BACT triggered for NH3 for Liquid Manure Land Application				**Total**	**64.4**
H2S Emissions - Lagoon/Storage Pond(s)					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	3.2	3.2	0.12	0.12	0.0
Dry Cows	0.3	0.3	0.06	0.06	0.0
Support Stock (Heifers and Bulls)	0.7	0.7	0.03	0.03	0.0
Large Heifers	0.0	0.0	0.03	0.03	0.0
Medium Heifers	0.0	0.0	0.02	0.02	0.0
Small Heifers	0.0	0.0	0.02	0.02	0.0
Calves	0.0	0.0	0.01	0.01	0.0
Bulls	0.0	0.0	0.04	0.04	0.0
				Total	**0.0**

Solid Manure Handling					
VOC Emissions - Solid Manure Storage/Separated Solids Piles					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	4.7	2.2	0.17	0.17	2.5
Dry Cows	0.5	0.2	0.09	0.09	0.3
Support Stock (Heifers and Bulls)	1.5	1.0	0.10	0.07	0.1
Large Heifers	0.0	0.0	0.07	0.07	0.0
Medium Heifers	0.0	0.0	0.05	0.05	0.0
Small Heifers	0.0	0.0	0.03	0.03	0.0
Calves	0.0	0.0	0.01	0.01	0.0
Bulls	0.0	0.0	0.05	0.05	0.0
BACT triggered for VOC for Solid Manure Storage				**Total**	**2.9**
VOC Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	8.1	3.9	0.30	0.30	4.2
Dry Cows	0.9	0.4	0.16	0.16	0.5
Support Stock (Heifers and Bulls)	2.6	1.8	0.12	0.12	0.8
Large Heifers	0.0	0.0	0.12	0.12	0.0
Medium Heifers	0.0	0.0	0.08	0.08	0.0
Small Heifers	0.0	0.0	0.05	0.05	0.0
Calves	0.0	0.0	0.02	0.02	0.0
Bulls	0.0	0.0	0.07	0.07	0.0
BACT triggered for VOC for Solid Manure Land Application				**Total**	**5.5**
NH3 Emissions - Solid Manure Storage/Separated Solids Piles					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	36.4	17.5	1.33	1.33	18.9
Dry Cows	3.7	1.8	0.67	0.67	1.9
Support Stock (Heifers and Bulls)	7.2	5.0	0.35	0.35	2.2
Large Heifers	0.0	0.0	0.35	0.35	0.0
Medium Heifers	0.0	0.0	0.25	0.25	0.0
Small Heifers	0.0	0.0	0.18	0.18	0.0
Calves	0.0	0.0	0.06	0.06	0.0
Bulls	0.0	0.0	0.49	0.49	0.0
BACT triggered for NH3 for Solid Manure Storage				**Total**	**23.0**
NH3 Emissions - Land Application					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Milk Cows	41.2	19.8	1.50	1.50	21.4
Dry Cows	4.2	2.0	0.76	0.76	2.2
Support Stock (Heifers and Bulls)	8.1	5.6	0.40	0.40	2.5
Large Heifers	0.0	0.0	0.40	0.40	0.0
Medium Heifers	0.0	0.0	0.28	0.28	0.0
Small Heifers	0.0	0.0	0.22	0.22	0.0
Calves	0.0	0.0	0.06	0.06	0.0
Bulls	0.0	0.0	0.55	0.55	0.0
BACT triggered for NH3 for Solid Manure Land Application				**Total**	**26.1**

Feed Storage and Handling					
VOC Emissions - Silage					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
Corn Silage	21.2	21.2	21,155	21,155	0.0
Alfalfa Silage	0.0	0.0	10,649	10,649	0.0
Wheat Silage	26.8	26.8	26,745	26,745	0.0
				Total	0.0
VOC Emissions - TMR					
	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)
TMR	430.1	241.5	10,575	10,575	188.6
			BACT triggered for VOC for TMR	**Total**	**188.6**

Cow Housing - VOC Emissions

	Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)	BACT Triggered?
1	Milk Freestall	270.1	129.7	9.86	9.86	140.4	Yes
2	Dry Corral	30.5	14.6	5.57	5.57	15.9	Yes
3	Support Corral	87.8	60.8	4.27	4.27	27.0	Yes
	New Units from Expansion						
	Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)	BACT Triggered?

Cow Housing - NH3 Emissions

	Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)	BACT Triggered?
	Milk Freestall	578.9	277.9	21.13	21.13	301.0	Yes
	Dry Corral	58.7	28.2	10.71	10.71	30.5	Yes
	Support Corral	113.9	78.8	5.54	5.54	35.1	Yes
	New Units from Expansion						
	Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)	BACT Triggered?

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

Cow Housing - PM10 Emissions

	Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	AIPE (lb/day)	BACT Triggered?
1	Milk Freestall	31.9	15.3	1.17	1.17	16.6	Yes
2	Dry Corral	15.1	7.7	2.94	2.94	8.4	Yes
3	Support Corral	115.7	80.0	5.63	5.63	35.7	Yes
	New Units from Expansion						
	Housing Name(s) or #(s)	PE2 (lb/day)	PE1 (lb/day)	EF2	EF1	PE2 (lb/day)	BACT Triggered?

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

Increase in Emissions

SSIPE (lb/yr)							
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	2,080	711	0
Cow Housing	0	0	22,131	0	66,946	133,814	0
Liquid Manure	0	0	0	0	13,202	31,021	0
Solid Manure	0	0	0	0	3,167	17,939	0
Feed Handling	0	0	0	0	68,829	0	0
Total	**0**	**0**	**22,131**	**0**	**154,224**	**183,485**	**0**

Total Daily Change in Emissions (lb/day)							
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0.0	0.0	0.0	0.0	5.7	1.9	0.0
Cow Housing	0.0	0.0	60.7	0.0	183.3	366.6	0.0
Liquid Manure	0.0	0.0	0.0	0.0	36.2	85.0	0.0
Solid Manure	0.0	0.0	0.0	0.0	8.7	49.0	0.0
Feed Handling	0.0	0.0	0.0	0.0	188.6	0.0	0.0
Total	**0.0**	**0.0**	**60.7**	**0.0**	**422.5**	**502.5**	**0.0**

Total Annual Change in Non-Fugitive Emissions (Major Source Emissions) (lb/yr)							
	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	0	0	0
Cow Housing	0	0	0	0	0	0	0
Liquid Manure	0	0	0	0	4,706	0	0
Solid Manure	0	0	0	0	0	0	0
Feed Handling	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**4,706**	**0**	**0**

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

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

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

1 short ton = 0.9072 metric ton

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

CO2e from N2O= (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 CO2e Emissions

Pre-Project Lagoon CO2e Emissions from CH4 (metric tons/yr)				
Animal Type	Number of Cows	CH4 Lagoons (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (metric tons/yr)
Milk Cows	4,800	513.0	21.0	23,456
Dry Cows	960	513.0	21.0	4,691
Support Stock	5,194	110.4	21.0	5,462
Large Heifers	0	110.4	21.0	0
Medium Heifers	0	110.4	21.0	0
Small Heifers	0	110.4	21.0	0
Calves	0	--	--	0
Bulls	0	110.4	21.0	0

Pre-Project Non-Lagoons CO2e Emissions from CH4 (metric tons/yr)						
Animal Type	Number of Cows	CH4 Manure Spreading (lbs/hd-yr)	CH4 Solid Manure Storage (lbs/hd-yr)	CH4 Enteric (lbs/hd-yr)	Multiplier	CO2e Non-Lagoons (metric tons/yr)
Milk Cows	4,800	3.5	27.7	271.5	21.0	13,840
Dry Cows	960	3.5	27.7	271.5	21.0	2,768
Support Stock	5,194	1.6	--	151.6	21.0	7,580
Large Heifers	0	1.6	--	151.6	21.0	0
Medium Heifers	0	1.6	--	100.5	21.0	0
Small Heifers	0	1.6	--	100.5	21.0	0
Calves	0	--	--	--	--	0
Bulls	0	1.6	--	151.6	21.0	0

Pre-Project Lagoon CO2e Emissions from N2O (metric tons/yr)				
Animal Type	Number of Cows	N2O Lagoons (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (metric tons/yr)
Milk Cows	4,800	1.5	310.0	1,012
Dry Cows	960	1.5	310.0	202
Support Stock	5,194	1.4	310.0	1,023
Large Heifers	0	1.4	310.0	0
Medium Heifers	0	1.4	310.0	0
Small Heifers	0	1.4	310.0	0
Calves	0	--	--	0
Bulls	0	1.4	310.0	0

Pre-Project Non-Lagoons CO2e Emissions from N2O (metric tons/yr)						
Animal Type	Number of Cows	N2O Manure Spreading (lbs/hd-yr)	N2O Solid Manure Storage (lbs/hd-yr)	N2O Enteric (lbs/hd-yr)	Multiplier	CO2e Non-Lagoons (metric tons/yr)
Milk Cows	4,800	0.0	2.6	0.0	310.0	1,755
Dry Cows	960	0.0	2.6	0.0	310.0	351
Support Stock	5,194	0.0	--	0.0	310.0	0
Large Heifers	0	0.0	--	0.0	310.0	0
Medium Heifers	0	0.0	--	0.0	310.0	0
Small Heifers	0	0.0	--	0.0	310.0	0
Calves	0	0.0	--	0.0	--	0
Bulls	0	0.0	--	0.0	310.0	0

Total Pre-Project CO2e Emissions (metric tons/yr)			
Animal Type	CO2e from CH4	CO2e from N2O	Total
Milk Cows	37,296	2,767	40,063
Dry Cows	7,459	553	8,013
Support Stock	13,042	1,023	14,064
Large Heifers	0	0	0
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	62,141

Post-Project CO2e Emissions

Post-Project Lagoon CO2e Emissions from CH4 (metric tons/yr)				
Animal Type	Number of Cows	CH4 Lagoons (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (metric tons/yr)
Milk Cows	10,000	513.0	21.0	48,866
Dry Cows	2,000	513.0	21.0	9,773
Support Stock	7,508	110.4	21.0	7,896
Large Heifers	0	110.4	21.0	0
Medium Heifers	0	110.4	21.0	0
Small Heifers	0	110.4	21.0	0
Calves	0	--	--	0
Bulls	0	110.4	21.0	0

Post-Project Non-Lagoons CO2e Emissions from CH4 (metric tons/yr)						
Animal Type	Number of Cows	CH4 Manure Spreading (lbs/hd-yr)	CH4 Solid Manure Storage (lbs/hd-yr)	CH4 Enteric (lbs/hd-yr)	Multiplier	CO2e Non-Lagoons (metric tons/yr)
Milk Cows	10,000	3.5	27.7	271.5	21.0	28,834
Dry Cows	2,000	3.5	27.7	271.5	21.0	5,767
Support Stock	7,508	1.6	--	151.6	21.0	10,957
Large Heifers	0	1.6	--	151.6	21.0	0
Medium Heifers	0	1.6	--	100.5	21.0	0
Small Heifers	0	1.6	--	100.5	21.0	0
Calves	0	--	--	--	--	0
Bulls	0	1.6	--	151.6	21.0	0

Post-Project Lagoon CO2e Emissions from N2O (metric tons/yr)				
Animal Type	Number of Cows	N2O Lagoons (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (metric tons/yr)
Milk Cows	10,000	1.5	310.0	2,109
Dry Cows	2,000	1.5	310.0	422
Support Stock	7,508	1.4	310.0	1,478
Large Heifers	0	1.4	310.0	0
Medium Heifers	0	1.4	310.0	0
Small Heifers	0	1.4	310.0	0
Calves	0	--	--	0
Bulls	0	1.4	310.0	0

Post-Project Non-Lagoons CO2e Emissions from N2O (metric tons/yr)						
Animal Type	Number of Cows	N2O Manure Spreading (lbs/hd-yr)	N2O Solid Manure Storage (lbs/hd-yr)	N2O Enteric (lbs/hd-yr)	Multiplier	CO2e Non-Lagoons (metric tons/yr)
Milk Cows	10,000	0.0	2.6	0.0	310.0	3,656
Dry Cows	2,000	0.0	2.6	0.0	310.0	731
Support Stock	7,508	0.0	--	0.0	310.0	0
Large Heifers	0	0.0	--	0.0	310.0	0
Medium Heifers	0	0.0	--	0.0	310.0	0
Small Heifers	0	0.0	--	0.0	310.0	0
Calves	0	0.0	--	0.0	--	0
Bulls	0	0.0	--	0.0	310.0	0

Total Post-Project CO2e Emissions (metric tons/yr)			
Animal Type	CO2e from CH4	CO2e from N2O	Total
Milk Cows	77,700	5,765	83,466
Dry Cows	15,540	1,153	16,693
Support Stock	18,852	1,478	20,330
Large Heifers	0	0	0
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	120,489

Change in CO2e Emissions

Change in Project GHG Emissions			
Animal Type	Pre-Project CO2e (metric tons/yr)	Post-Project CO2e (metric tons/yr)	Change (metric tons/yr)
Milk Cows	40,063	83,466	43,402
Dry Cows	8,013	16,693	8,680
Support Stock	14,064	20,330	6,266
Large Heifers	0	0	0
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	58,348

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

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

Notes:

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

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

Calculations:

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

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

Pre-Project CO2e Emissions

Pre-Project Lagoon CO2e Emissions from CH4 (short tons/yr)				
Animal Type	Number of Cows with Manure Flushed to Lagoon	EF CH4 Anaerobic Treatement Lagoon (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (short tons/yr)
Milk Cows	4800	513.0	21	25,855
Dry Cows	960	513.0	21	5,171
Support Stock	5194	110.4	21	6,021
Large Heifers	0	110.4	21	0
Medium Heifers	0	110.4	21	0
Small Heifers	0	110.4	21	0
Calves	0	--	--	0
Bulls	0	110.4	21	0

Pre-Project Non-Lagoons CO2e Emissions from CH4 (short tons/yr)						
Animal Type	Number of Cows	EF CH4 Manure Spreading (lb/hd-yr)	EF CH4 Solid Manure Storage (lb/hd-yr)	EF CH4 Enteric (lb/hd-yr)	CO2e Multiplier	CO2e Non-Lagoons (short tons/yr)
Milk Cows	4,800	0.0	0.0	0.0	21	0
Dry Cows	960	0.0	0.0	0.0	21	0
Support Stock	5,194	0.0	--	0.0	21	0
Large Heifers	0	0.0	--	0.0	21	0
Medium Heifers	0	0.0	--	0.0	21	0
Small Heifers	0	0.0	--	0.0	21	0
Calves	0	--	--	--	--	0
Bulls	0	0.0	--	0.0	21	0

Pre-Project Lagoon CO2e Emissions from N2O (short tons/yr)				
Animal Type	Number of Cows	EF N2O Anaerobic Treatment Lagoon (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (short tons/yr)
Milk Cows	4800	1.5	310	1,116
Dry Cows	960	1.5	310	223
Support Stock	5194	1.4	310	1,127
Large Heifers	0	1.4	310	0
Medium Heifers	0	1.4	310	0
Small Heifers	0	1.4	310	0
Calves	0	--	--	0
Bulls	0	1.4	310	0

Pre-Project Non-Lagoons CO2e Emissions from N2O (short tons/yr)						
Animal Type	Number of Cows	EF N2O Manure Spreading (lb/hd-yr)	EF N2O Solid Manure Storage (lb/hd-yr)	N2O Enteric (lb/hd-yr)	CO2e Multiplier	CO2e Non-Lagoons (short tons/yr)
Milk Cows	4,800	0.0	0.0	0.0	310	0
Dry Cows	960	0.0	0.0	0.0	310	0
Support Stock	5,194	0.0	--	0.0	310	0
Large Heifers	0	0.0	--	0.0	310	0
Medium Heifers	0	0.0	--	0.0	310	0
Small Heifers	0	0.0	--	0.0	310	0
Calves	0	0.0	--	0.0	--	0
Bulls	0	0.0	--	0.0	310	0

Total Pre-Project CO2e Emissions (short tons/yr)			
Animal Type	CO2e from CH4	CO2e from N2O	Total
Milk Cows	25,855	1,116	26,971
Dry Cows	5,171	223	5,394
Support Stock	6,021	1,127	7,148
Large Heifers	0	0	0
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	39,513

Post-Project CO2e Emissions

Post-Project Lagoon CO2e Emissions from CH4 (short tons/yr)				
Animal Type	Number of Cows with Manure Flushed to Lagoon	EF CH4 Anaerobic Treatement Lagoon (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (short tons/yr)
Milk Cows	10000	513.0	21	53,865
Dry Cows	2000	513.0	21	10,773
Support Stock	7508	110.4	21	8,703
Large Heifers	0	110.4	21	0
Medium Heifers	0	110.4	21	0
Small Heifers	0	110.4	21	0
Calves	0	--	--	0
Bulls	0	110.4	21	0

Post-Project Non-Lagoons CO2e Emissions from CH4 (short tons/yr)						
Animal Type	Number of Cows	EF CH4 Manure Spreading (lb/hd-yr)	EF CH4 Solid Manure Storage (lb/hd-yr)	EF CH4 Enteric (lb/hd-yr)	CO2e Multiplier	CO2e Non-Lagoons (short tons/yr)
Milk Cows	10,000	0.0	0.0	0.0	21	0
Dry Cows	2,000	0.0	0.0	0.0	21	0
Support Stock	7,508	0.0	--	0.0	21	0
Large Heifers	0	0.0	--	0.0	21	0
Medium Heifers	0	0.0	--	0.0	21	0
Small Heifers	0	0.0	--	0.0	21	0
Calves	0	--	--	--	--	0
Bulls	0	0.0	--	0.0	21	0

Post-Project Lagoon CO2e Emissions from N2O (metric tons/yr)				
Animal Type	Number of Cows	EF N2O Anaerobic Treatment Lagoon (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (metric tons/yr)
Milk Cows	10000	1.5	310	2,325
Dry Cows	2000	1.5	310	465
Support Stock	7508	1.4	310	1,629
Large Heifers	0	1.4	310	0
Medium Heifers	0	1.4	310	0
Small Heifers	0	1.4	310	0
Calves	0	--	--	0
Bulls	0	1.4	310	0

Post-Project Non-Lagoons CO2e Emissions from N2O (short tons/yr)						
Animal Type	Number of Cows	EF N2O Manure Spreading (lb/hd-yr)	EF N2O Solid Manure Storage (lb/hd-yr)	EF N2O Enteric (lb/hd-yr)	CO2e Multiplier	CO2e Non-Lagoons (short tons/yr)
Milk Cows	10,000	0.0	0.0	0.0	310	0
Dry Cows	2,000	0.0	0.0	0.0	310	0
Support Stock	7,508	0.0	--	0.0	310	0
Large Heifers	0	0.0	--	0.0	310	0
Medium Heifers	0	0.0	--	0.0	310	0
Small Heifers	0	0.0	--	0.0	310	0
Calves	0	0.0	--	0.0	--	0
Bulls	0	0.0	--	0.0	310	0

Total Post-Project CO2e Emissions (short tons/yr)			
Animal Type	CO2e from CH4	CO2e from N2O	Total
Milk Cows	53,865	2,325	56,190
Dry Cows	10,773	465	11,238
Support Stock	8,703	1,629	10,333
Large Heifers	0	0	0
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	77,761

Change in CO2e Emissions

Change in Project GHG Emissions			
Animal Type	Pre-Project CO2e (short tons/yr)	Post-Project CO2e (short tons/yr)	Change (short tons/yr)
Milk Cows	26,971	56,190	29,219
Dry Cows	5,394	11,238	5,844
Support Stock	7,148	10,333	3,185
Large Heifers	0	0	0
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	38,247

APPENDIX G
Quarterly Net Emissions Change

Quarterly Net Emissions Change (QNEC)

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

QNEC = PE2 - PE1, where:

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

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

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

		Cow Housing					
		NOx	SOx	PM10	CO	VOC	NH3
Annual PE2 (lb/yr)		0	0	59,759	0	141,799	274,266
Daily PE2 (lb/day)		0.0	0.0	163.7	0.0	388.4	751.5
Quarterly Net Emissions Change (lb/qtr)	1:	0.0	0.0	5,532.75	0.0	16,736.5	33,453.5
	2:	0.0	0.0	5,532.75	0.0	16,736.5	33,453.5
	3:	0.0	0.0	5,532.75	0.0	16,736.5	33,453.5
	4:	0.0	0.0	5,532.75	0.0	16,736.5	33,453.5

APPENDIX H
Emission Profile

Application Emissions

Permit #: C-6817-2-4 **Last Updated**
Facility: PHILIP VERWEY FARMS #2 12/30/2015 YOSHIMUJ

Equipment Pre-Baselined: NO

	NOX	SOX	PM10	CO	VOC
Potential to Emit (lb/Yr):	0.0	0.0	59759.0	0.0	141799.0
Daily Emis. Limit (lb/Day)	0.0	0.0	163.7	0.0	388.4
Quarterly Net Emissions Change (lb/Qtr)					
Q1:	0.0	0.0	5532.0	0.0	16736.0
Q2:	0.0	0.0	5533.0	0.0	16736.0
Q3:	0.0	0.0	5533.0	0.0	16737.0
Q4:	0.0	0.0	5533.0	0.0	16737.0
Check if offsets are triggered but exemption applies	N	N	N	N	N
Offset Ratio					
Quarterly Offset Amounts (lb/Qtr)					
Q1:					
Q2:					
Q3:					
Q4:					

APPENDIX I
Lease Agreement

MILK PRODUCERS COUNCIL

"Serving the Dairy Industry for More Than 60 Years"

8-19-2015

SJVAPCD
1990 E Gettysburg Ave
Fresno Ca 93726

Annette Ballatore-Williamson

This letter is intended to acknowledge the Verbal agreement between the parties of Mr. Philip Verwey Farms #2 located at 19765 13th Avenue Hanford Ca, Facility # C-6817 and Mr. Robin Martella's crop land located north of the CAFO and contiguous the existing property boundary of Mr. Verwey with the coordinates of [36o11'2397"N 119o40'58.92W], as shown in the attached site map. Since 2009, there has been an ongoing verbal agreement for Mr. Verwey to do custom farming at the indicated area owned by Mr. Martella's at the ongoing current market rates; the growing and harvesting forage rates range from $55.00 to $150.00 per acre.

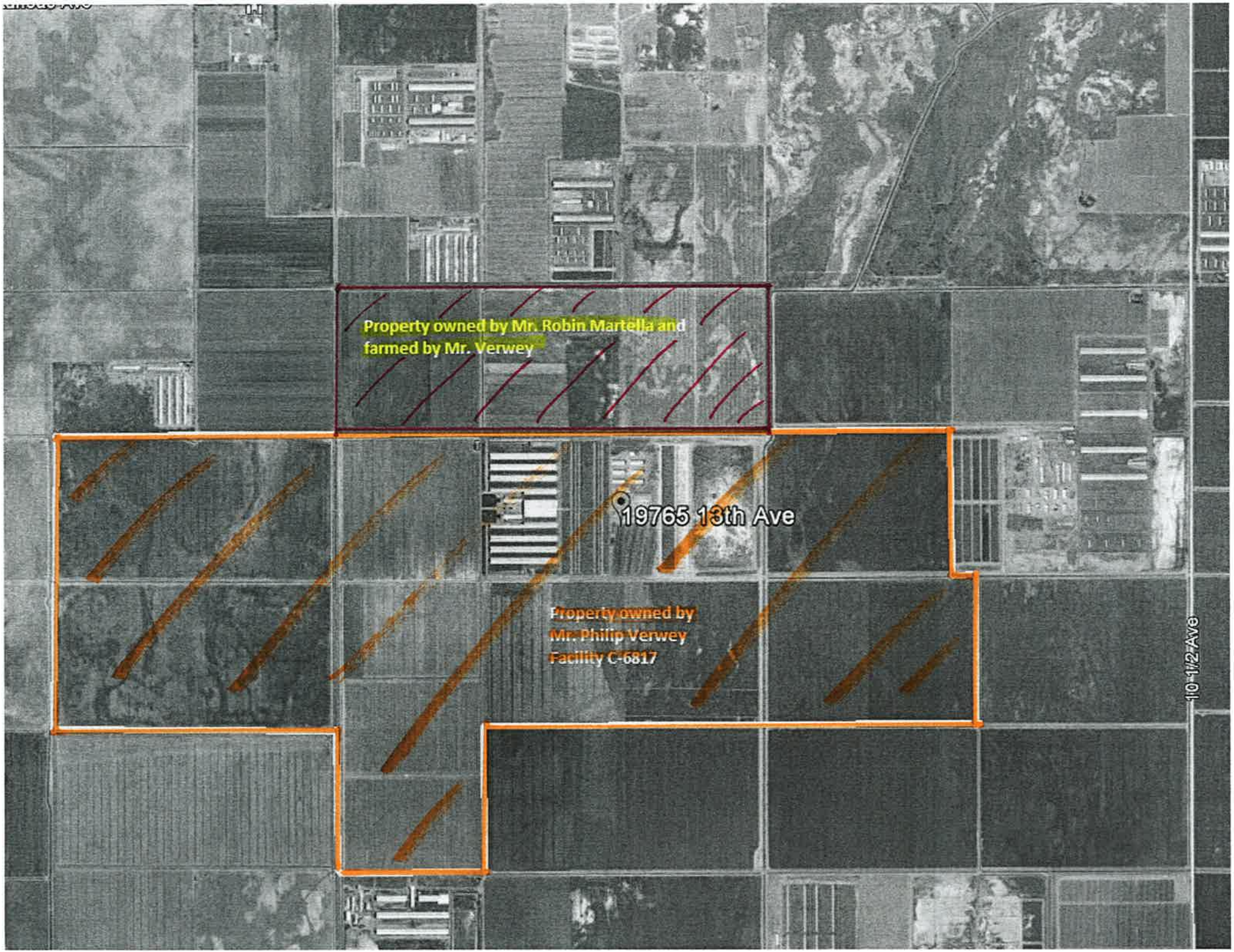
Along with the verbal agreement between Mr. Verwey and Mr. Martella allowing Custom farming, Mr. Verwey purchases the crops that are grown at the current market rates on specific crops ranging from $60.00 to $300.00 per ton

At present there is no intent to Modify or Terminate the agreement between Mr. Verwey and Mr. Martella.

The above documentation is to provide the SJVAPCD the ability to include the additional acreage in the health risk modeling run.

Mr. Philip Verwey

Mr. Robin


Property owned by Mr. Robin Martella and farmed by Mr. Verwey
19765 13th Ave
Property owned by Mr. Philip Verwey Facility C-6817
10 1/2 Ave

APPENDIX J
Agronomic Soil Analysis

Hi John,
As per your request, I reviewed Mr. Hutchings soil report on 19765 13th Ave Hanford CA. I also ran a report from our Web Soil Survey and I attached a screen shot of the subject property report.
As you can see, our web soil survey report confirms a very high pH (8.7) with regard to Westcamp Loam . Soils of this caliber are quite challenged in crops they can support without extreme and repetitive soil amending and a source of good quality water for continued flushing of excess salts. Further, boron and sodium are quite toxic at high levels, although I dident see the actual report as it wasent included.

The second screen shot shows the results as per our Soil Rating Tool "STORIE index". The subject Westcamp Loam is rated 5- Very Poor, with 6 being the absolute lowest rating equating to non- agriculture use. You can see that of the entire 391 acre shot only 1.5 acres are rated good. Additionally it has a electrical conductivity (a measure of water soluble salts) of 9.5. The higher the ECe, the less productive the soil, and the more required to amend it.

As such, and without having made a field inspection, I tend to agree that without years of prior reclaimation to the soil, as per these soil analysis' and the reported observation of other windbreaks in the area, would also encourage the development of other treatment options when possible.

However, the final decision does ultimatly belong to the regulatory agency.

Please do not hesitate to contact me with further questions on this or other matters.

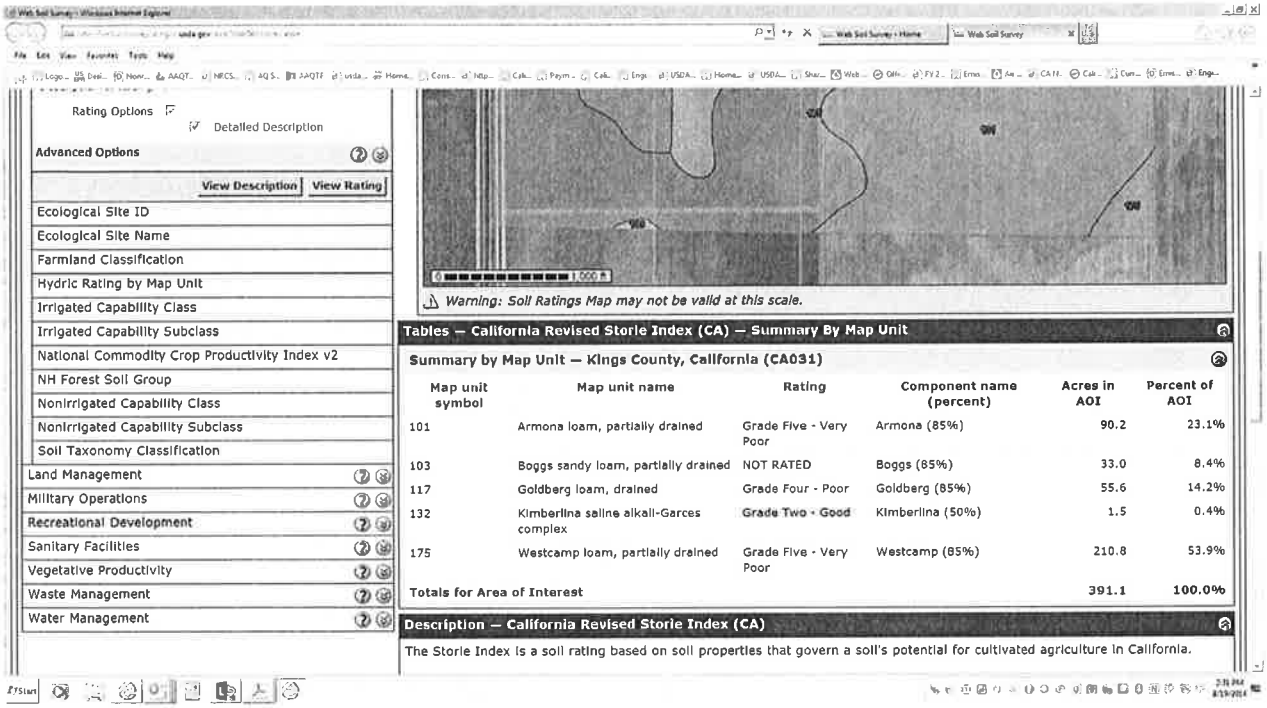
Best regards,

Johnnie Siliznoff
State Air Quality Specialist
USDA-NRCS
559.252.2191 X 112

From: Johnathan Yoshimura [mailto:Johnathan.Yoshimura@valleyair.org]
Sent: Tuesday, August 19, 2014 1:51 PM
To: Siliznoff, Johnnie - NRCS, Fresno, CA
Subject: FW: Attached Image

Johnnie,

As we discussed earlier, please review the attached evaluation. I would like to know if the reasoning behind their determination is correct or if Innovative Ag needs to submit more supportive information.



Rating Options
Detailed Description
Advanced Options
View Description | View Rating
Ecological Site ID
Ecological Site Name
Farmland Classification
Hydric Rating by Map Unit
Irrigated Capability Class
Irrigated Capability Subclass
National Commodity Crop Productivity Index v2
NH Forest Soil Group
Nonirrigated Capability Class
Nonirrigated Capability Subclass
Soil Taxonomy Classification
Land Management
Military Operations
Recreational Development
Sanitary Facilities
Vegetative Productivity
Waste Management
Water Management

Warning: Soil Ratings Map may not be valid at this scale.

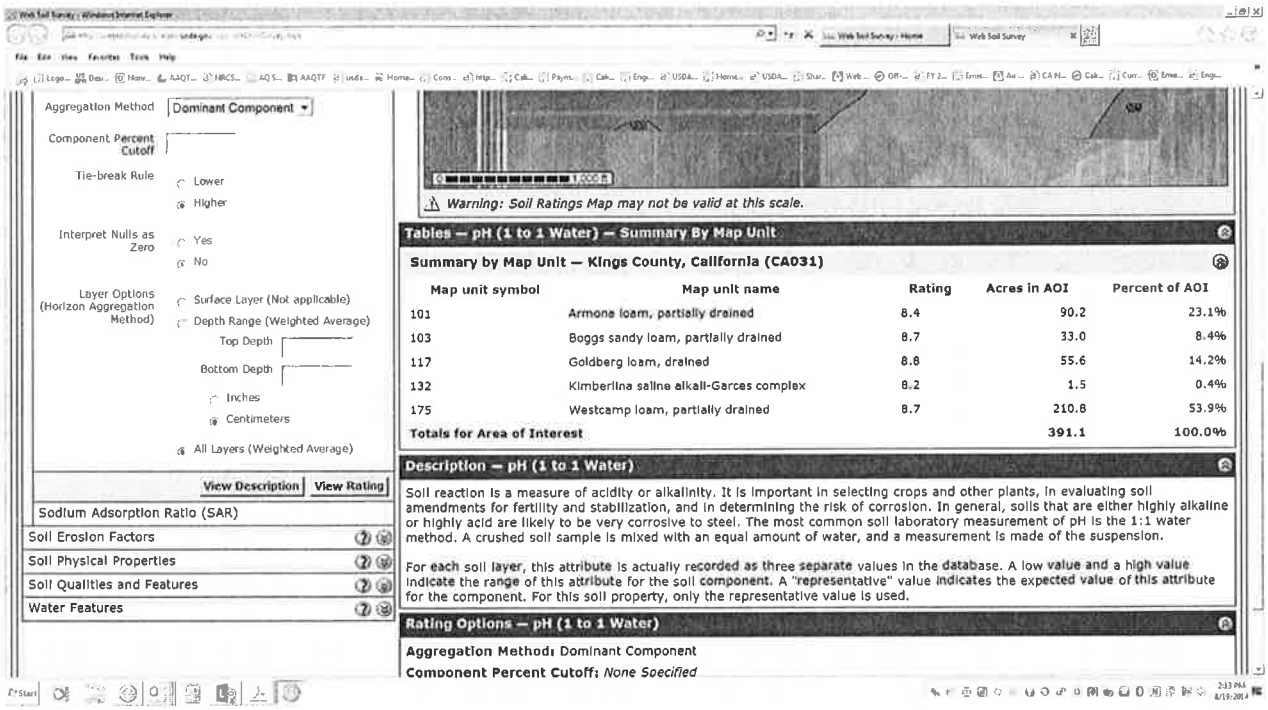
Tables — California Revised Storie Index (CA) — Summary By Map Unit

Summary by Map Unit — Kings County, California (CA031)

Map unit symbol	Map unit name	Rating	Component name (percent)	Acres in AOI	Percent of AOI
101	Armona loam, partially drained	Grade Five - Very Poor	Armona (85%)	90.2	23.1%
103	Boggs sandy loam, partially drained	NOT RATED	Boggs (85%)	33.0	8.4%
117	Goldberg loam, drained	Grade Four - Poor	Goldberg (85%)	55.6	14.2%
132	Kimberlina saline alkali-Garces complex	Grade Two - Good	Kimberlina (50%)	1.5	0.4%
175	Westcamp loam, partially drained	Grade Five - Very Poor	Westcamp (85%)	210.8	53.9%
Totals for Area of Interest				**391.1**	**100.0%**

Description — California Revised Storie Index (CA)

The Storie Index is a soil rating based on soil properties that govern a soil's potential for cultivated agriculture in California.



Aggregation Method: Dominant Component
Component Percent Cutoff
Tie-break Rule: Lower / Higher
Interpret Nulls as Zero: Yes / No
Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable) / Depth Range (Weighted Average) — Top Depth, Bottom Depth — Inches / Centimeters / All Layers (Weighted Average)
View Description | View Rating
Sodium Adsorption Ratio (SAR)
Soil Erosion Factors
Soil Physical Properties
Soil Qualities and Features
Water Features

Warning: Soil Ratings Map may not be valid at this scale.

Tables — pH (1 to 1 Water) — Summary By Map Unit

Summary by Map Unit — Kings County, California (CA031)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
101	Armona loam, partially drained	8.4	90.2	23.1%
103	Boggs sandy loam, partially drained	8.7	33.0	8.4%
117	Goldberg loam, drained	8.8	55.6	14.2%
132	Kimberlina saline alkali-Garces complex	8.2	1.5	0.4%
175	Westcamp loam, partially drained	8.7	210.8	53.9%
Totals for Area of Interest			**391.1**	**100.0%**

Description — pH (1 to 1 Water)

Soil reaction is a measure of acidity or alkalinity. It is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion. In general, soils that are either highly alkaline or highly acid are likely to be very corrosive to steel. The most common soil laboratory measurement of pH is the 1:1 water method. A crushed soil sample is mixed with an equal amount of water, and a measurement is made of the suspension.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options — pH (1 to 1 Water)

Aggregation Method: Dominant Component
Component Percent Cutoff: *None Specified*